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Abstract: The U.S. Air Force proposes to deploy 50 Peacekeeper missiles on 25 trains, which will be based at F.E. Warren AFB, Wyoming, and at up to ten other garrison installations. If the Peacekeeper Rail Garrison system is approved for deployment, F.E. Warren AFB would be the Main Operating Base (MOB) and the first garrison installation. After the Final EIS is filed, the other garrison installations to be used would be selected from the ten candidates and the decision would be documented in one or more Records of Decision. Up to four trains could be deployed at each selected garrison installation. Peacekeeper missiles would be assembled and integrated onto the missile launch cars at F.E. Warren AFB and then dispatched to other selected garrison installations. Periodically, a training train, with no missile propellants or warheads onboard, would travel to each of the garrison installations for operations, security, and maintenance training. Periodically, for maintenance or test launches, missiles (without warheads) would be moved by rail between garrisons and F.E. Warren AFB or Vandenberg AFB. During periods of national need and upon receipt of direction from the National Command Authority, Peacekeeper trains could be dispersed onto the nation's rail network to improve their survivability. The Alternative Action is to deploy 100 Peacekeeper missiles on 50 trains. With this alternative, between four and six trains would be deployed at F.E. Warren AFB, the MOB, and at up to ten other candidate garrison installations. Operations, maintenance, and training activities for the Alternative Action would be similar to those described for the Proposed Action. Potential environmental impacts associated with both of these actions are considered in the DEIS under the following environmental resource categories: socioeconomics, utilities, transportation, land use, cultural, biological, water, geology and soils, air quality, and noise. In addition, national economic impacts, national railroad transportation impacts, and safety considerations are discussed. Finally, mitigation measures that can be taken to rehabilitate or restore the affected environment or to reduce significant adverse impacts are identified.

DEPARTMENT OF THE AIR FORCE
WASHINGTON, D.C. 20330-1000

OFFICE OF THE ASSISTANT SECRETARY

29 June 1988

TO: ALL INTERESTED GOVERNMENT AGENCIES, PUBLIC GROUPS, AND INDIVIDUALS

Attached for your review and comment is the Draft Environmental Impact Statement (EIS) for the Peacekeeper Rail Garrison Program. The document is provided in compliance with the regulations of the President's Council on Environmental Quality.

The Draft EIS addresses the proposed action of deploying 50 Peacekeeper missiles on 25 trains which would be based at F.E. Warren AFB, Wyoming, and at up to 10 other garrison installations.

A series of public hearings will be held in July and August 1988 to provide an opportunity for you to offer comments and present questions concerning the Draft EIS for preparation of the Final EIS. Notice of the time and place of the meetings will be announced in the news media in the area where the meetings will be held.

The review and comment period ends on August 30, 1988. Please forward any comments to:

Lt Col Peter Walsh
AFRCE-BMS/DEV
Norton AFB, CA 92409-6448

GARY D. VEST
Deputy Assistant Secretary of the Air Force
(Environment, Safety and Occupational Health)

1 Attachment
Draft EIS

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Draft

Environmental Impact Statement
Peacekeeper Rail Garrison Program

United States Air Force

June 1988

Cover Sheet

Draft Environmental Impact Statement
Peacekeeper Rail Garrison Program

a. Responsible Agency: U.S. Air Force

b. Proposed Action: Deployment of the Peacekeeper Rail Garrison System

c. Written comments and inquiries on this document should be received by 31 August 1988 and addressed to: Director of Environmental Planning, AFRCE-BMS/DEV, Norton AFB, San Bernardino, California 92409-6448.

d. Designation: Draft Environmental Impact Statement (DEIS)

e. Abstract: The U.S. Air Force proposes to deploy 50 Peacekeeper missiles on 25 trains, which will be based at F.E. Warren AFB, Wyoming, and at up to ten other garrison installations. If the Peacekeeper Rail Garrison system is approved for deployment, F.E. Warren AFB would be the Main Operating Base (MOB) and the first garrison installation. After the Final EIS is filed, the other garrison installations to be used would be selected from the ten candidates and the decision would be documented in one or more Records of Decision. Up to four trains could be deployed at each selected garrison installation. Peacekeeper missiles would be assembled and integrated onto the missile launch cars at F.E. Warren AFB and then dispatched to other selected garrison installations. Periodically, a training train, with no missile propellants or warheads onboard, would travel to each of the garrison installations for operations, security, and maintenance training. Periodically, for maintenance or test launches, missiles (without warheads) would be moved by rail between garrisons and F.E. Warren AFB or Vandenberg AFB. During periods of national need and upon receipt of direction from the National Command Authority, Peacekeeper trains could be dispersed onto the nation's rail network to improve their survivability. The Alternative Action is to deploy 100 Peacekeeper missiles on 50 trains. With this alternative, between four and six trains would be deployed at F.E. Warren AFB, the MOB, and at up to ten other candidate garrison installations. Operations, maintenance, and training activities for the Alternative Action would be similar to those described for the Proposed Action. Potential environmental impacts associated with both of these actions are considered in the DEIS under the following environmental resource categories: socioeconomics, utilities, transportation, land use, cultural, biological, water, geology and soils, air quality, and noise. In addition, national economic impacts, national railroad transportation impacts, and safety considerations are discussed. Finally, mitigation measures that can be taken to rehabilitate or restore the affected environment or to reduce significant adverse impacts are identified.

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EXECUTIVE SUMMARY

In December 1986, President Reagan announced his decision to begin development of the Rail Garrison basing mode for the deployment of Peacekeeper missiles. In this basing mode, Peacekeeper missiles are deployed on trains garrisoned at specified Air Force installations. Missile trains would remain in garrisons on a day-to-day basis, and would move off the installations onto the national rail network only during times of national need. F.E. Warren Air Force Base (AFB), near Cheyenne, Wyoming, was designated by the President as the Main Operating Base (MOB) and the first garrison installation. In February 1987, the Air Force identified ten additional installations as candidate garrison locations. These candidate installations are Barksdale AFB, Louisiana; Dyess AFB, Texas; Eaker (formerly Blytheville) AFB, Arkansas; Fairchild AFB, Washington; Grand Forks AFB, North Dakota; Little Rock AFB, Arkansas; Malmstrom AFB, Montana; Minot AFB, North Dakota; Whiteman AFB, Missouri; and Wurtsmith AFB, Michigan (Figure S-1).

This Draft Environmental Impact Statement (DEIS) was prepared to aid in the following interrelated decisions: whether or not to deploy Peacekeeper missiles in the Rail Garrison basing mode, how many Peacekeeper missiles to deploy in this mode, at which installations to deploy the system, where to site facilities at deployment locations and which mitigation actions would be implemented to reduce the effect of significant adverse impacts. Final selection of garrison installations and determination of the sequence of deployment will be made after the Final EIS is filed and will be documented in a Record of Decision.

The EIS considers the Proposed Action of basing 50 Peacekeeper missiles on 25 trains, with garrisons at F.E. Warren AFB and up to ten other candidate garrison installations. The EIS also considers the Alternative Action of deploying 100 Peacekeeper missiles on 50 trains, cumulative impacts from other programs, and the No Action Alternative. The impacts upon ten resource categories (issue areas) are discussed. These resource categories are: socioeconomics, utilities, transportation, land use, cultural, biological, water, geology and soils, air quality, and noise. Significant environmental issues identified during the scoping process have been incorporated into the analysis. Mitigation measures to reduce significant adverse impacts are also identified.

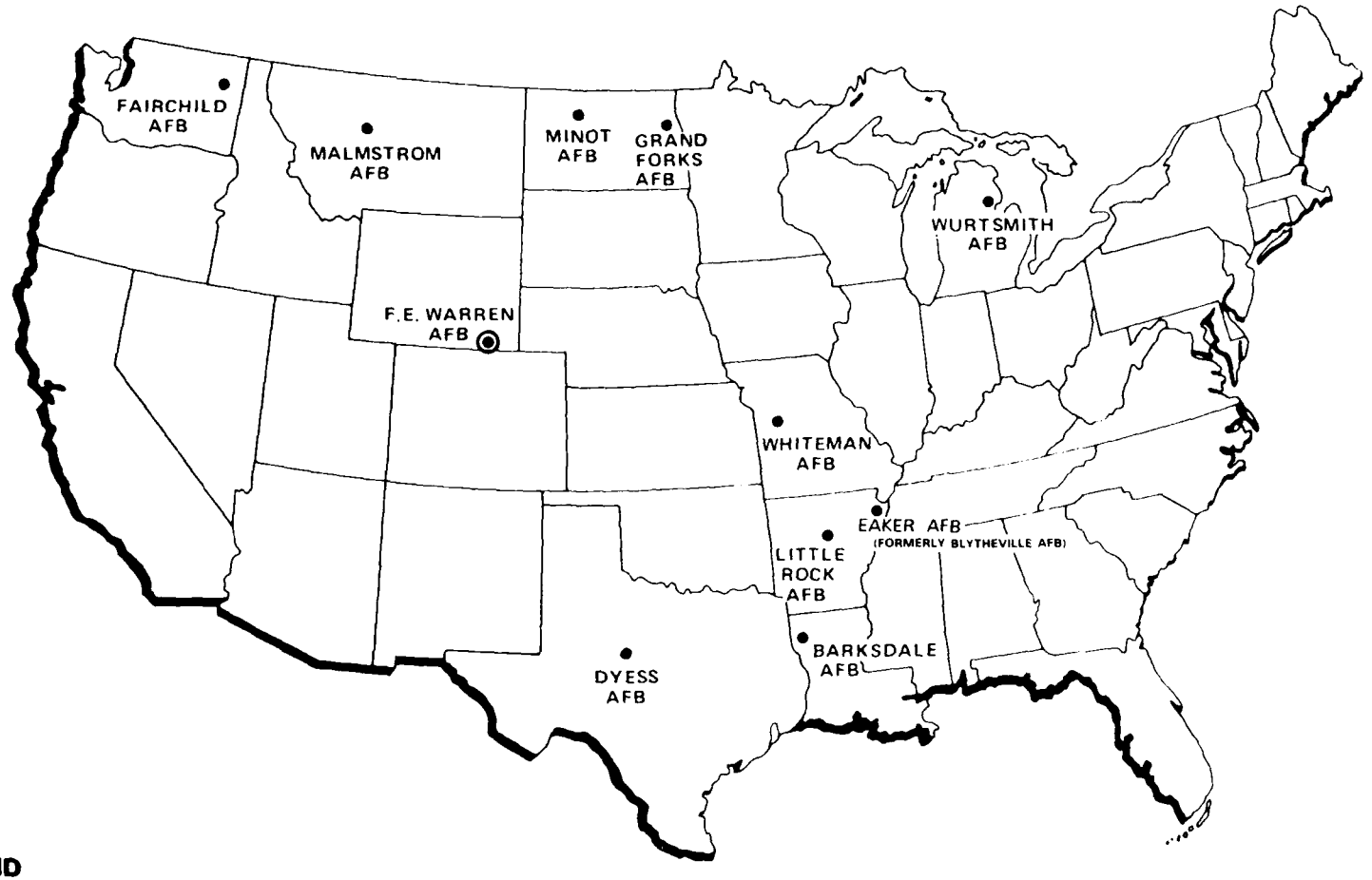
PURPOSE AND NEED

In January 1983, President Reagan established the President's Commission on Strategic Forces, also referred to as the Scowcroft Commission, a bipartisan group of experts charged with reviewing the strategic forces modernization program of the United States. One of the Scowcroft Commission's recommendations was to deploy 100 Peacekeeper missiles in Minuteman silos in order to hold hardened Soviet targets at risk and promote arms talks. Congress and the President endorsed this recommendation. Accordingly, in January 1984, the Air Force prepared and filed an EIS for the deployment of 100 Peacekeeper missiles in modified Minuteman silos at F.E. Warren AFB. Later, in the 1986 Department of Defense Authorization Act, Congress limited the deployment of Peacekeeper missiles in Minuteman silos to 50 and asked the President to propose a more survivable basing mode for the other 50 Peacekeeper missiles.

SYSTEM OVERVIEW

The Peacekeeper Rail Garrison concept is to place two Peacekeeper missiles on each train (Figure S-2). The trains and necessary support facilities would be located at the MOB and up to ten candidate garrison installations located at existing Air Force installations.

The missiles, complete except for their reentry systems that contain the nuclear warheads, would be assembled at F.E. Warren AFB (the MOB), and transported by rail to each garrison. The reentry systems would be shipped separately and installed at the



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FIGURE S-1 LOCATION OF AIR FORCE BASES PROPOSED FOR DEPLOYMENT OF THE PEACEKEEPER RAIL GARRISON SYSTEM

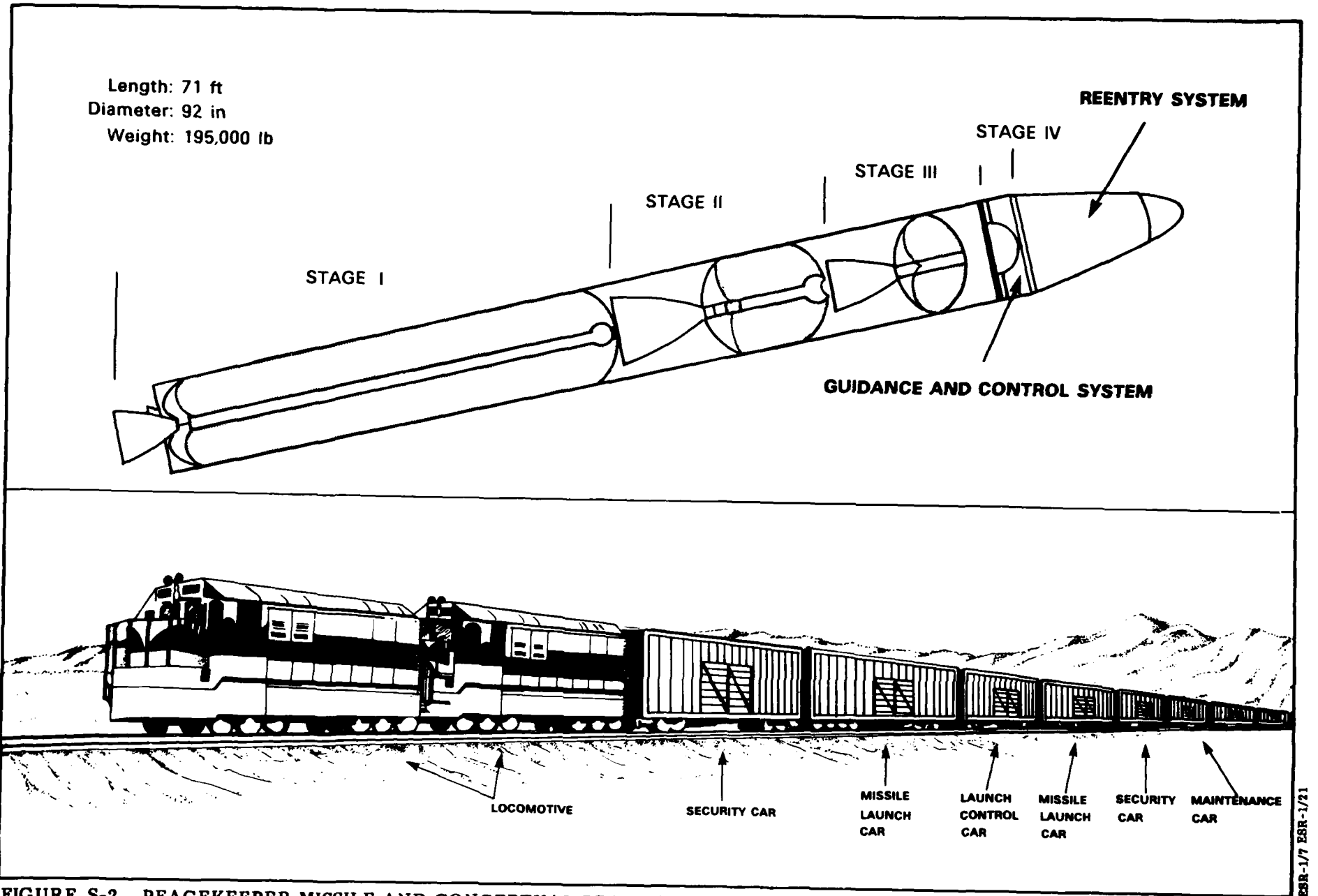


FIGURE S-2 PEACEKEEPER MISSILE AND CONCEPTUAL PEACEKEEPER TRAIN

garrisons. Routine missile maintenance would be provided at the garrisons by Air Force personnel. The missiles, without reentry systems, would be returned by rail to F.E. Warren AFB when required for major maintenance, repair, or preparation for flight testing. From time to time, a randomly selected missile, with its reentry system removed, would also be transported by rail to Vandenberg AFB, California, for flight testing.

The garrison complex is the major new facility needed at each candidate garrison installation and would be a secured area of approximately 150 acres (Figure S-3), enclosed by a double chain link security fence. It would accommodate four to six Train Alert Shelter (TASs) and the major Rail Garrison security and maintenance facilities.

Support facilities at the garrison installations would include those necessary for system operations, maintenance, training, and personnel support.

Onbase rail lines would interconnect the garrison, Training Train Shelter, and other support facilities. In addition, a rail spur would connect the garrison to the commercial rail network (as shown in Figure S-4). Construction of a second rail connection from a garrison to a main rail line is being considered as a possible future option at all garrison installations. Before implementation of this option, the specific proposed routes and their reasonable alternatives will be determined for each garrison installation, and appropriate environmental analysis will be accomplished at that time.

Training trains which physically and electronically simulate the missile train but have no missile propellants or warheads onboard would be moved periodically on the national rail network to provide crew training. All train movements, including training and maintenance trips, would be coordinated with appropriate rail company personnel to ensure safe and efficient movement.

As currently planned, the Peacekeeper Rail Garrison program would achieve initial operational capability, defined as deployment of one train with two missiles and one training train, as early as December 1991. Full operational capability of the system would be achieved by the deployment of the remaining trains and missiles, and could be reached as early as December 1993.

PROPOSED ACTION

The Proposed Action is to deploy 50 Peacekeeper missiles on 25 trains at F.E. Warren AFB and at up to ten other garrison installations. Up to four trains could be deployed at each selected garrison. Activities related to the Proposed Action are described below and involve construction, operations, maintenance and training, as well as the commitment of various resources.

Construction

Construction activities for the Peacekeeper Rail Garrison program would include both new construction and modifications of facilities, roads, railroads, and utilities at F.E. Warren AFB and the other selected garrison installations. The Air Force Site Activation Task Force will serve as the field managing organization for construction, and for assembly and checkout of mechanical and electrical equipment. Details of the construction program for the MOB and the other candidate installations will vary with the type of mission at the installation, the number of people assigned to support the Peacekeeper Rail Garrison mission, the availability of existing facilities, and safety considerations. Facility locations at each candidate base are shown on Figures S-5 through S-18.

Construction activities at the MOB may begin as early as March 1989 for the Missile Assembly Building with completion scheduled for November 1990. Construction of the garrison and support facilities could begin in March 1990 and finish by July 1992.

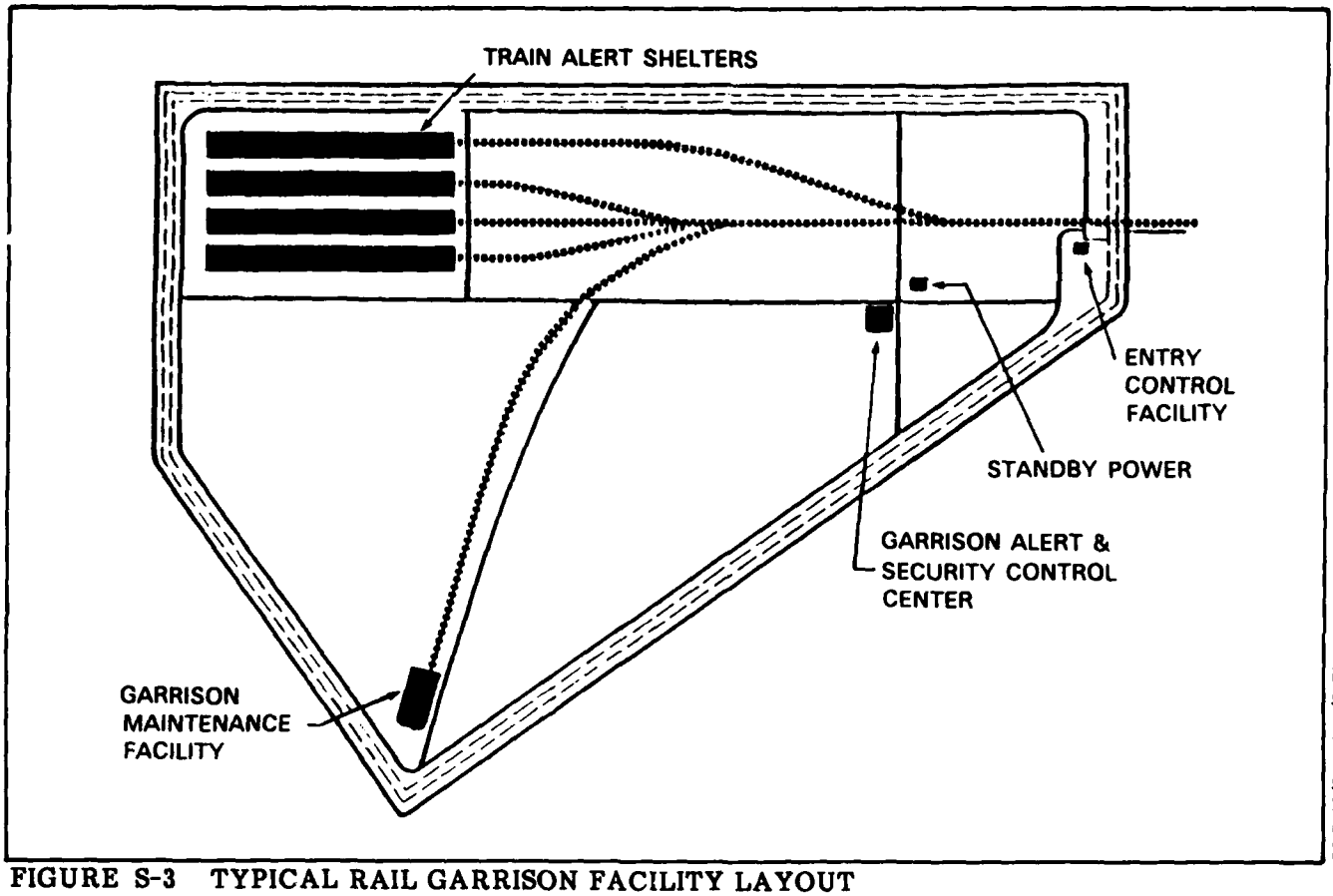


FIGURE S-3 TYPICAL RAIL GARRISON FACILITY LAYOUT

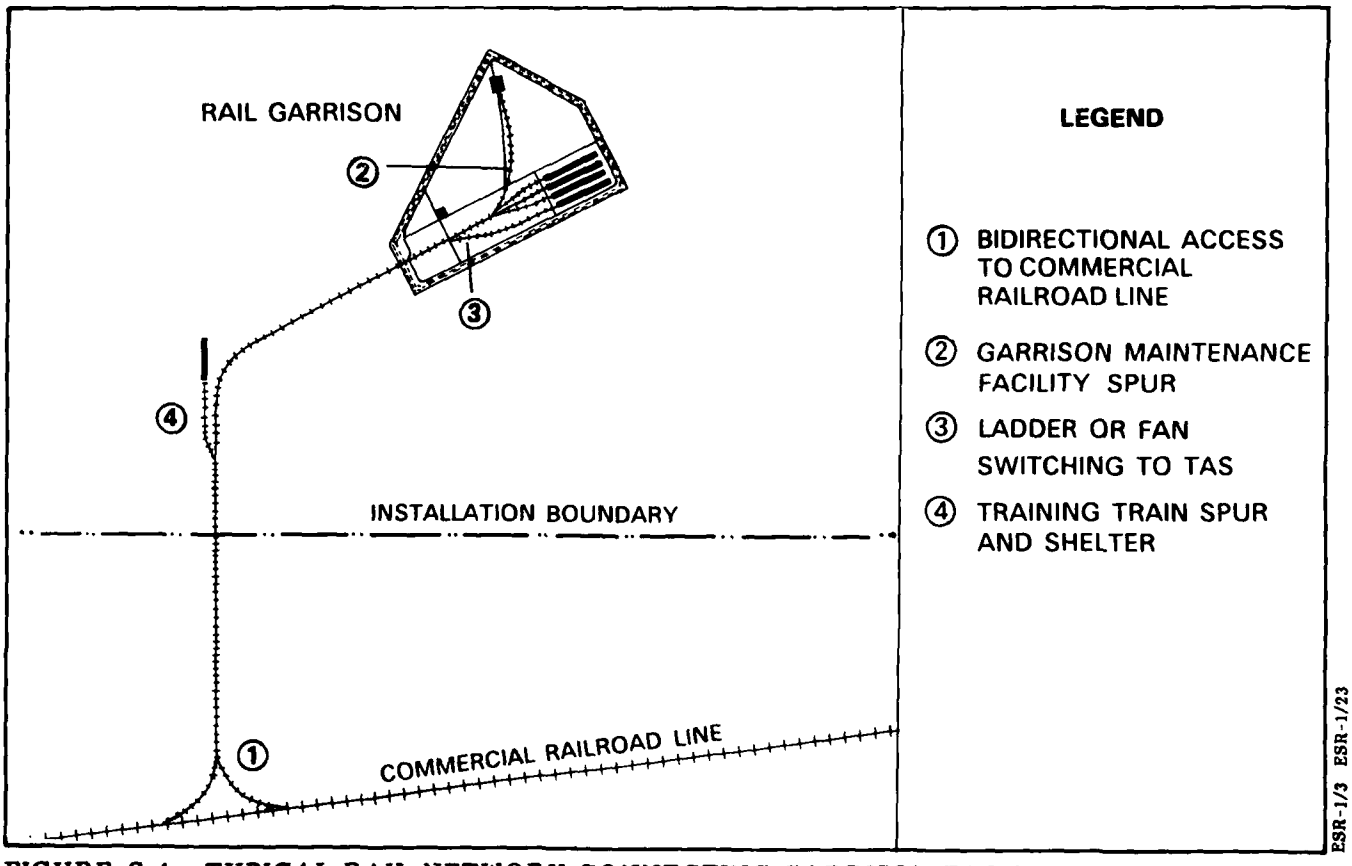


FIGURE S-4 TYPICAL RAIL NETWORK CONNECTING GARRISON FACILITIES TO THE COMMERCIAL RAILROAD LINE

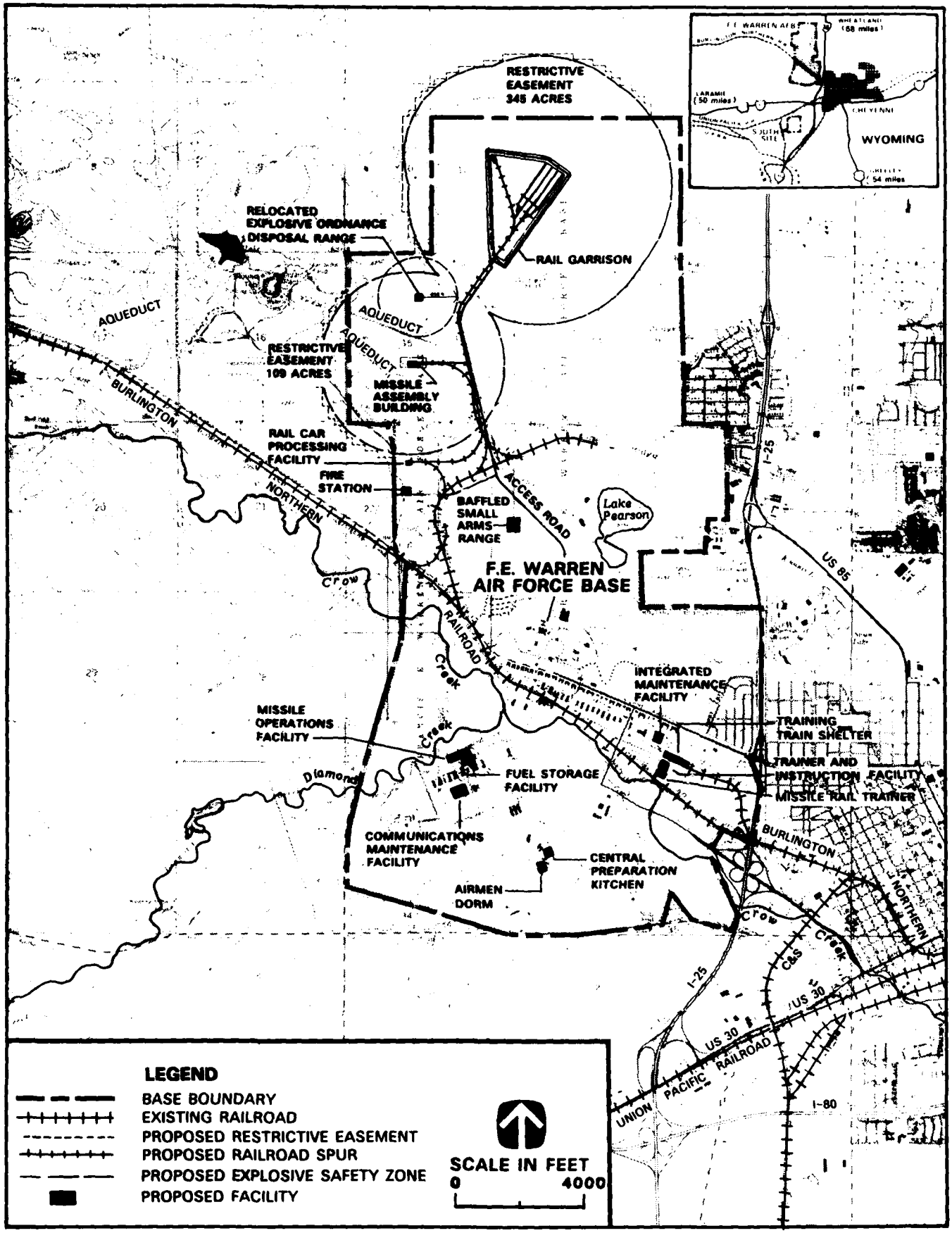
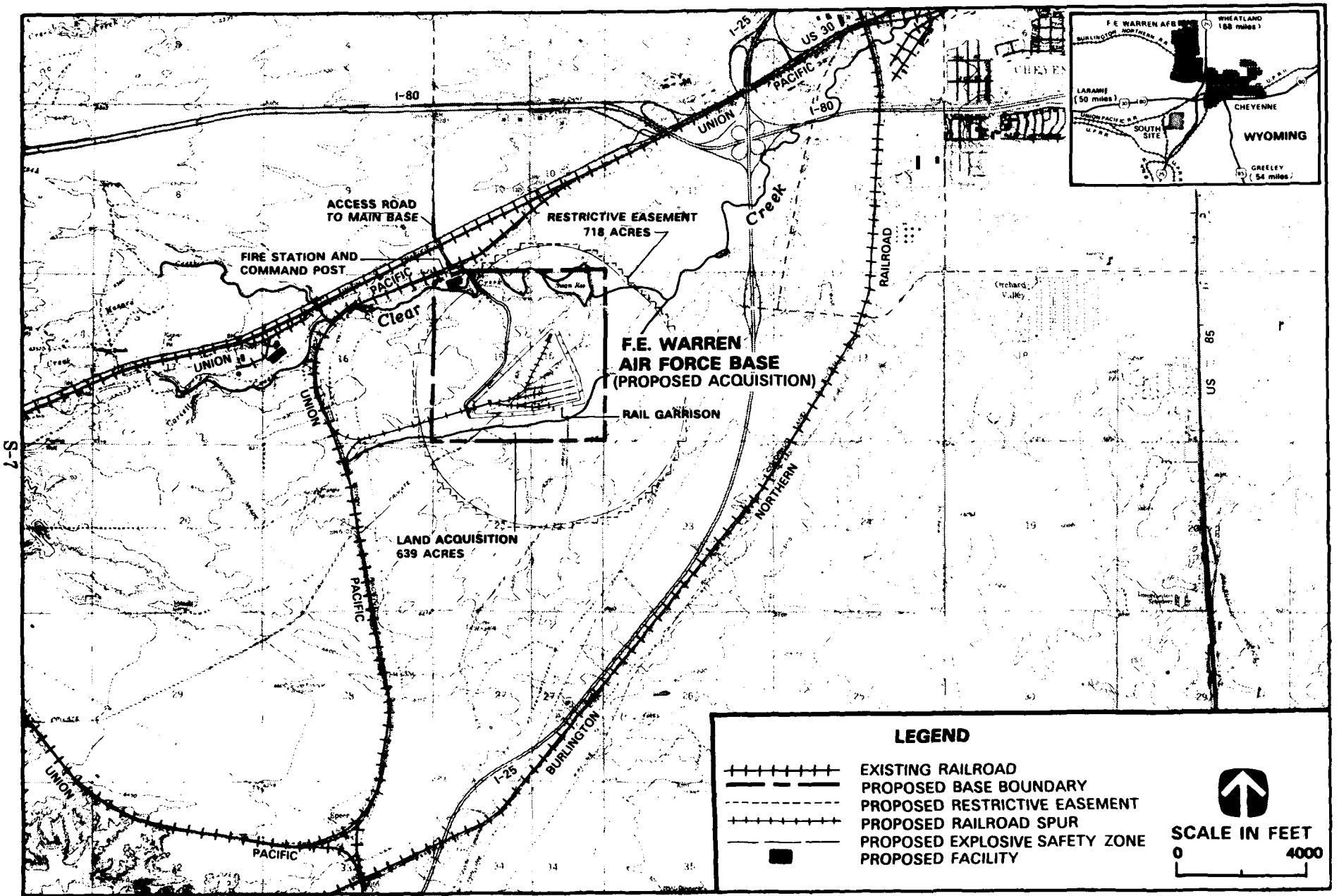


FIGURE S-5 PROPOSED PEACEKEEPER RAIL GARRISON FACILITIES AT F.E. WARREN AFB, WYOMING (NORTH SITE OPTION)



FW-4/3 ESR-1/27

FIGURE S-6 PROPOSED PEACEKEEPER RAIL GARRISON FACILITIES AT F.E. WARREN AFB, WYOMING (SOUTH SITE OPTION)

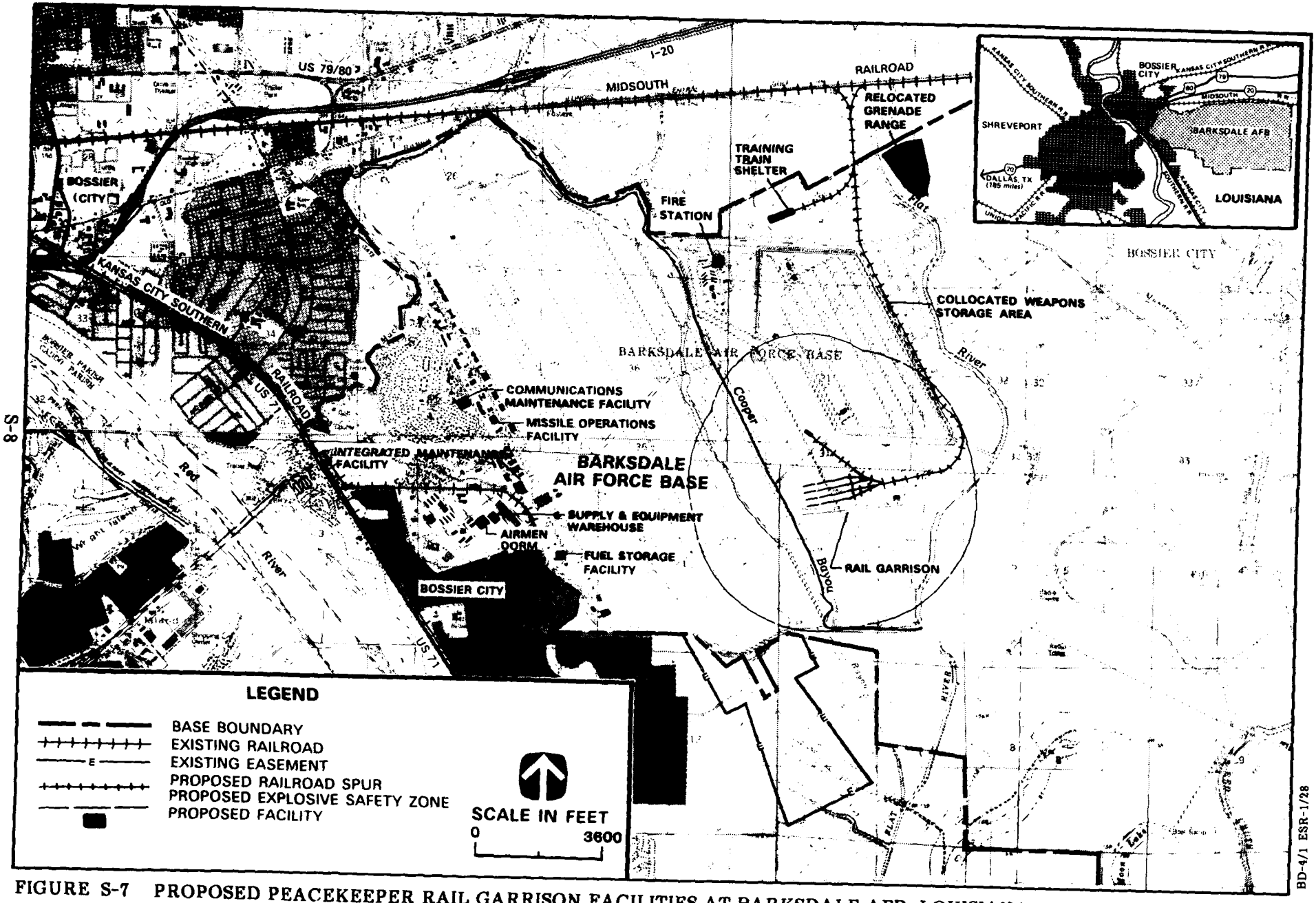


FIGURE S-7 PROPOSED PEACEKEEPER RAIL GARRISON FACILITIES AT BARKSDALE AFB, LOUISIANA

BD-4/1 ESR-1/28

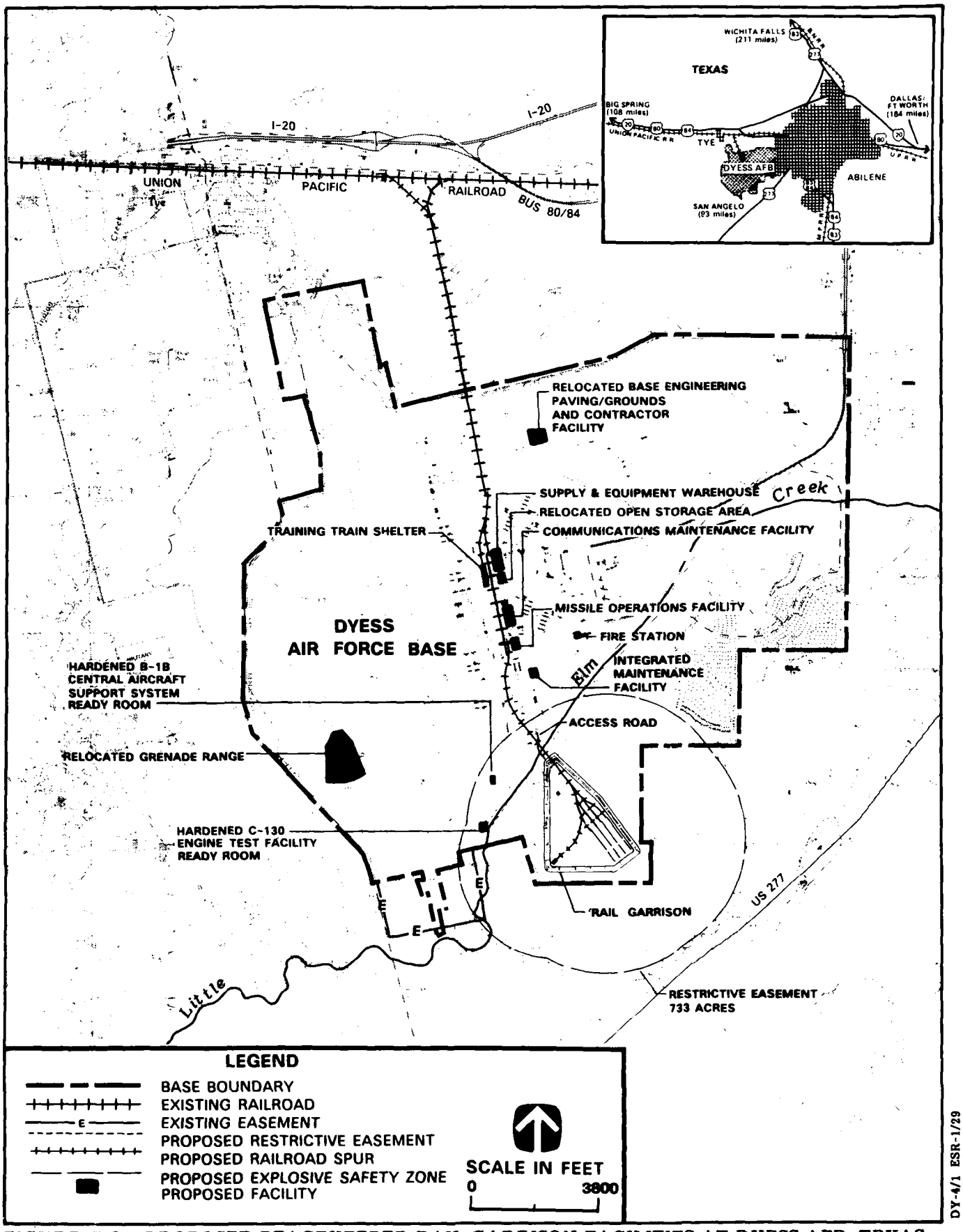


FIGURE S-8 PROPOSED PEACEKEEPER RAIL GARRISON FACILITIES AT DYESS AFB, TEXAS

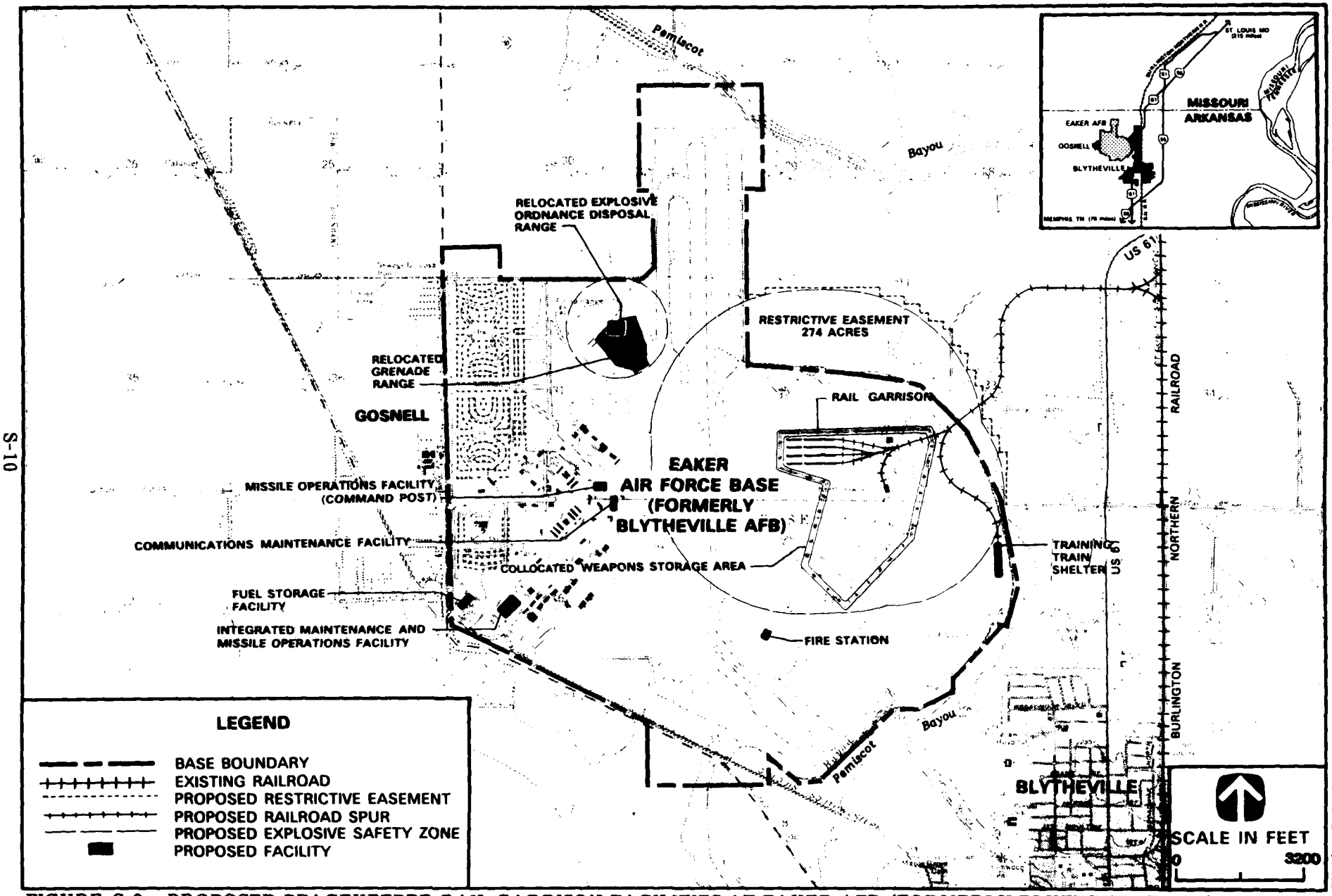


FIGURE S-9 PROPOSED PEACEKEEPER RAIL GARRISON FACILITIES AT EAKER AFB (FORMERLY BLYTHEVILLE AFB), ARKANSAS (ONBASE OPTION)

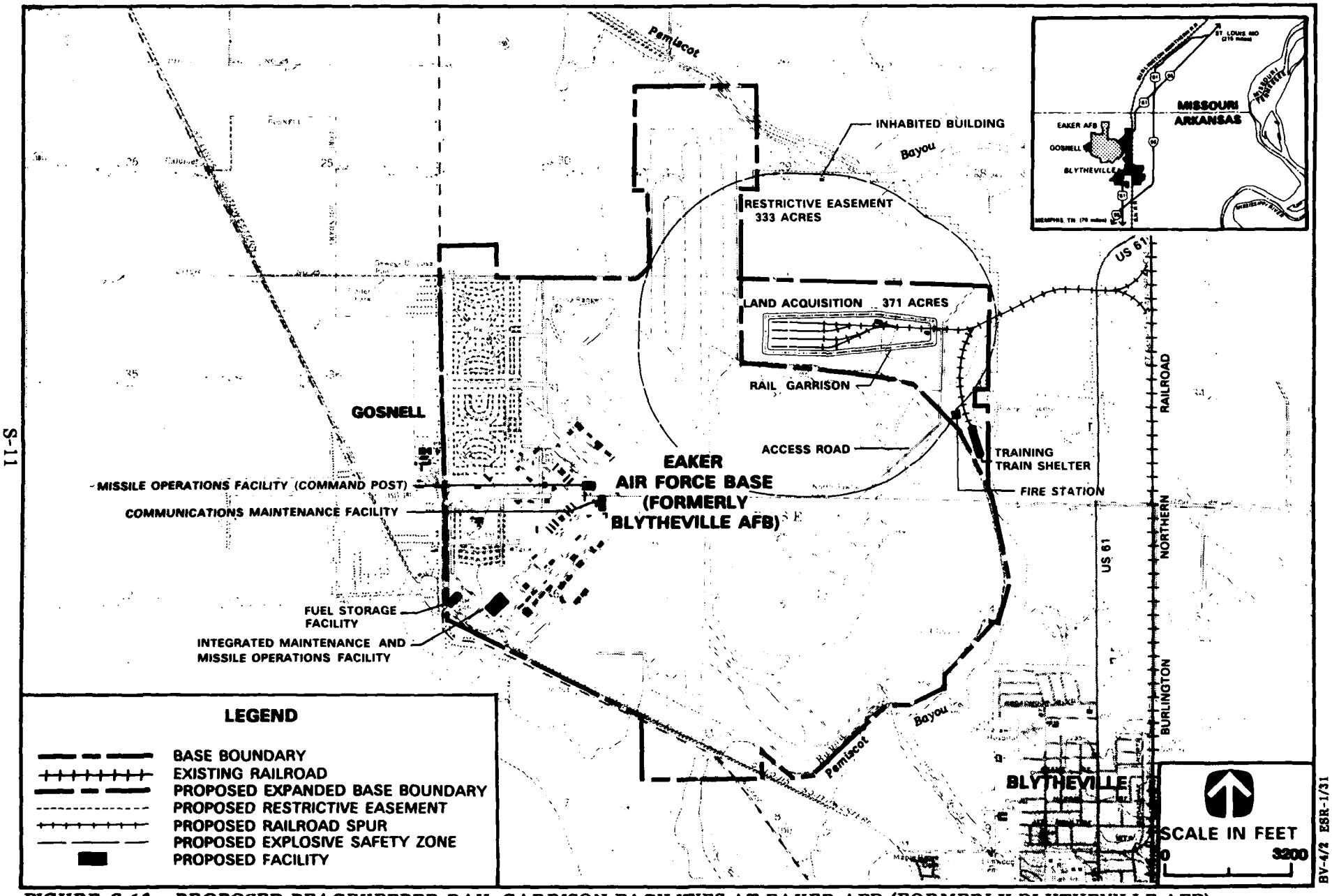


FIGURE S-10 PROPOSED PEACEKEEPER RAIL GARRISON FACILITIES AT EAKER AFB (FORMERLY BLYTHEVILLE AFB), ARKANSAS (OFFBASE OPTION)

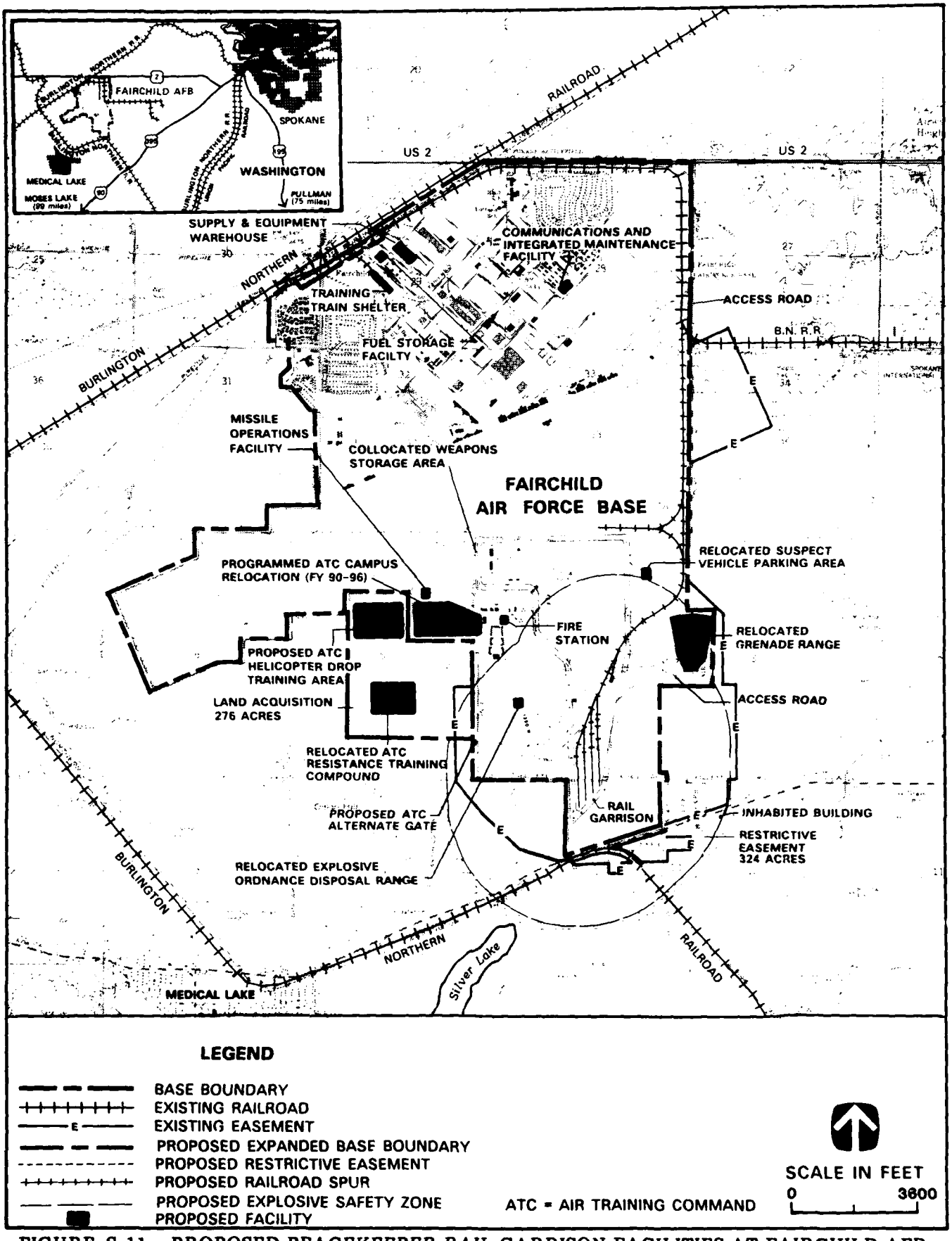


FIGURE S-11 PROPOSED PEACEKEEPER RAIL GARRISON FACILITIES AT FAIRCHILD AFB, WASHINGTON

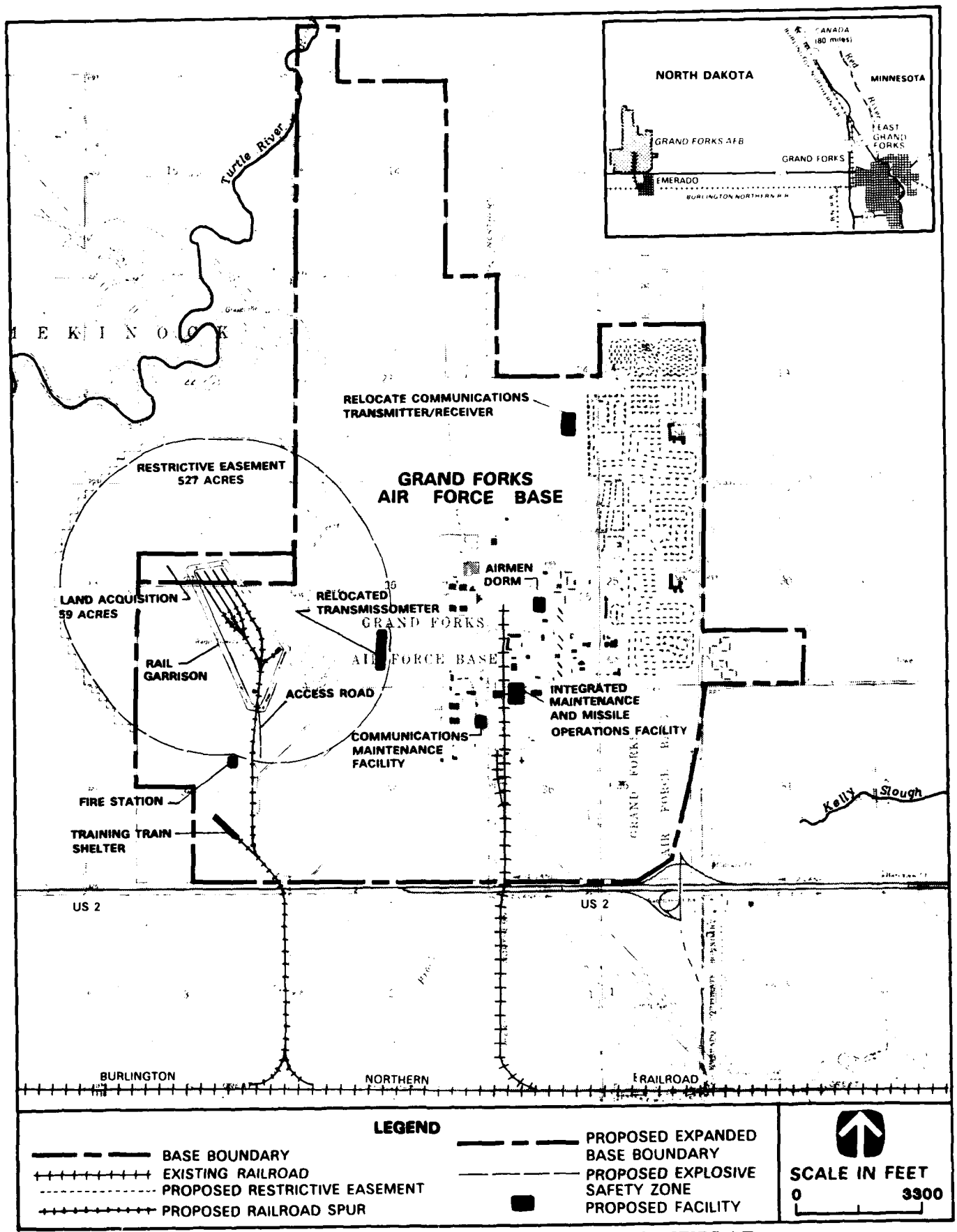


FIGURE S-12 PROPOSED PEACEKEEPER RAIL GARRISON FACILITIES AT GRAND FORKS AFB, NORTH DAKOTA

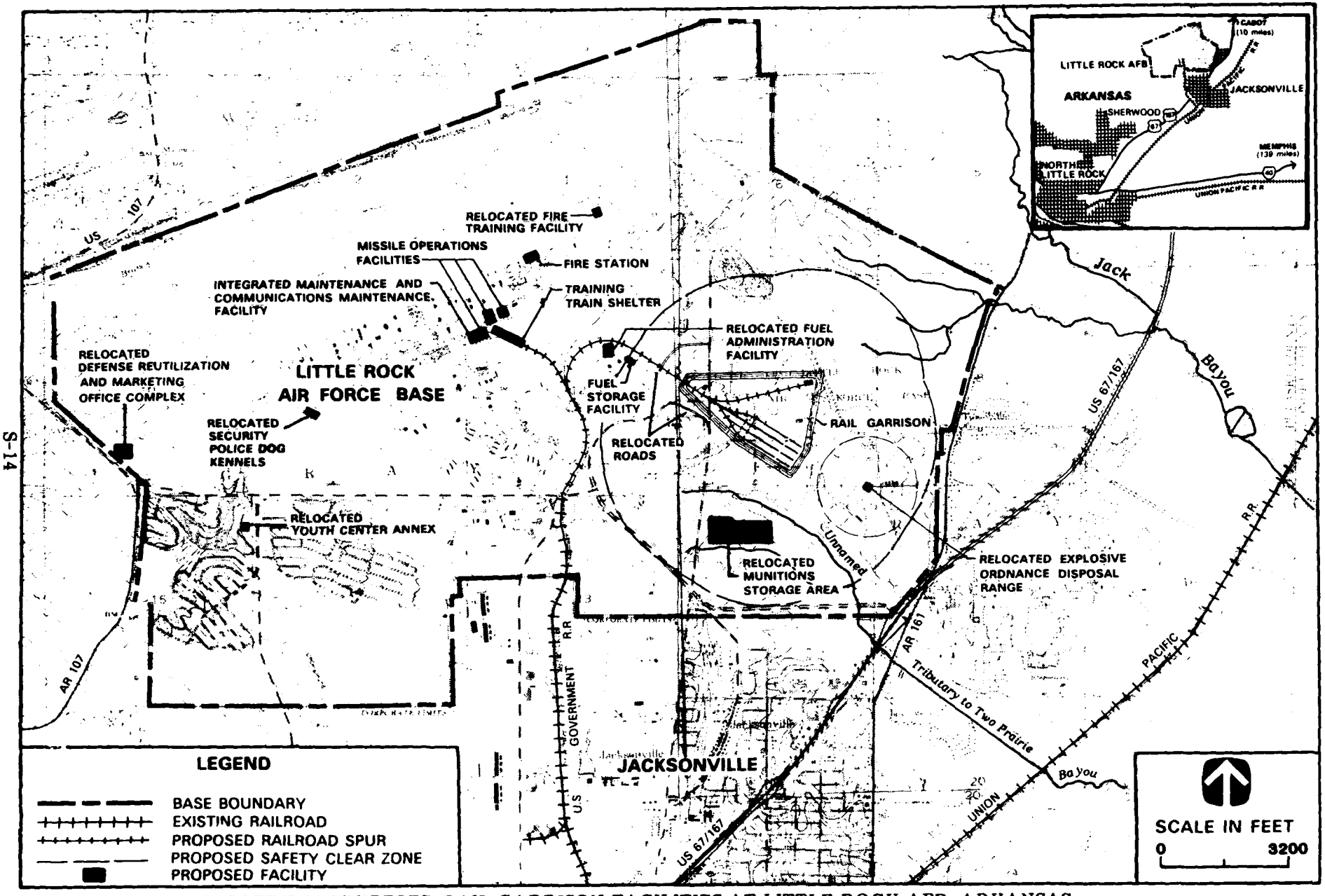


FIGURE S-13 PROPOSED PEACEKEEPER RAIL GARRISON FACILITIES AT LITTLE ROCK AFB, ARKANSAS

LR-4/1 ESR-1/34

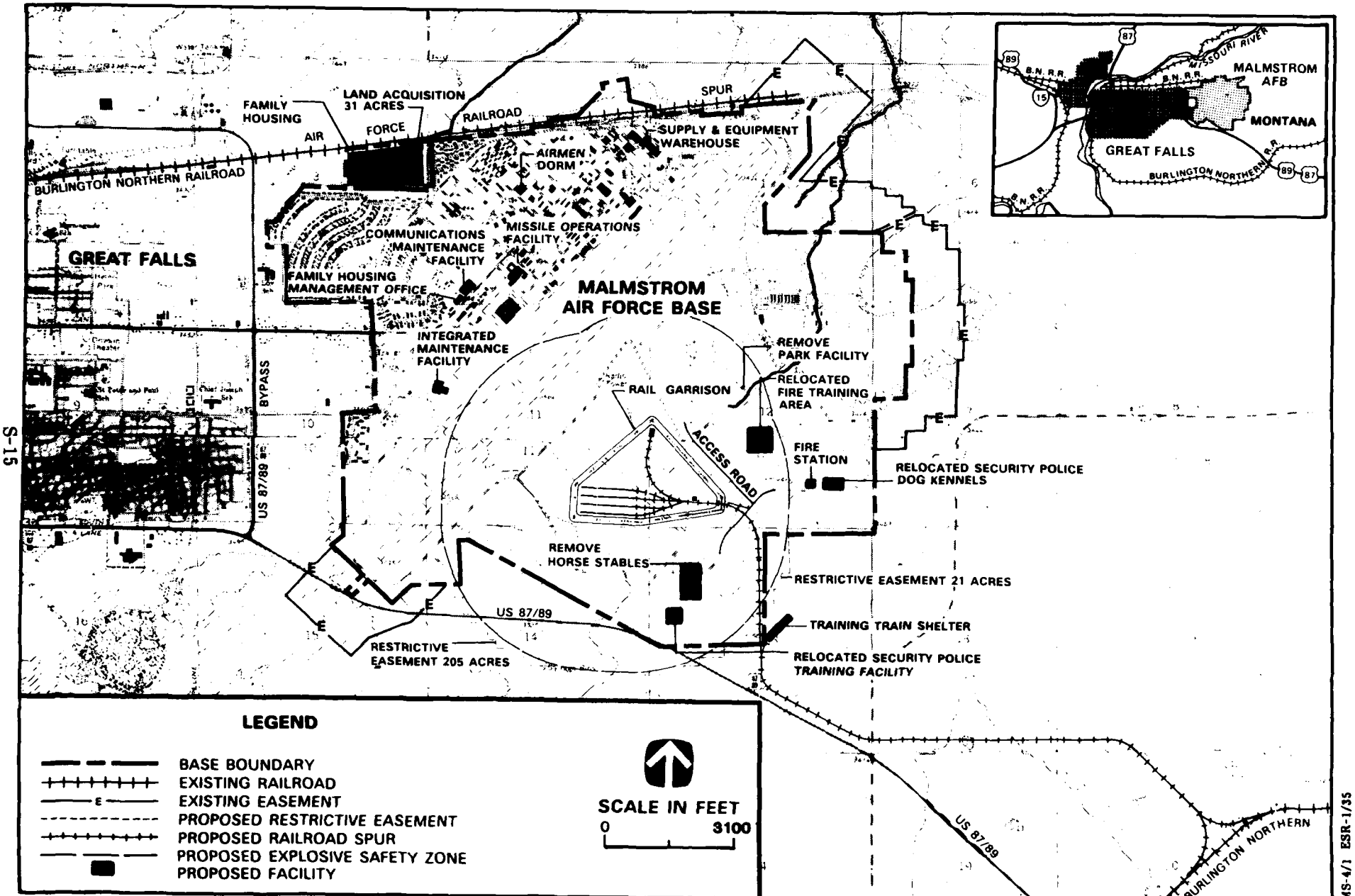


FIGURE S-14 PROPOSED PEACEKEEPER RAIL GARRISON FACILITIES AT MALMSTROM AFB, MONTANA (SOUTH SITE OPTION)

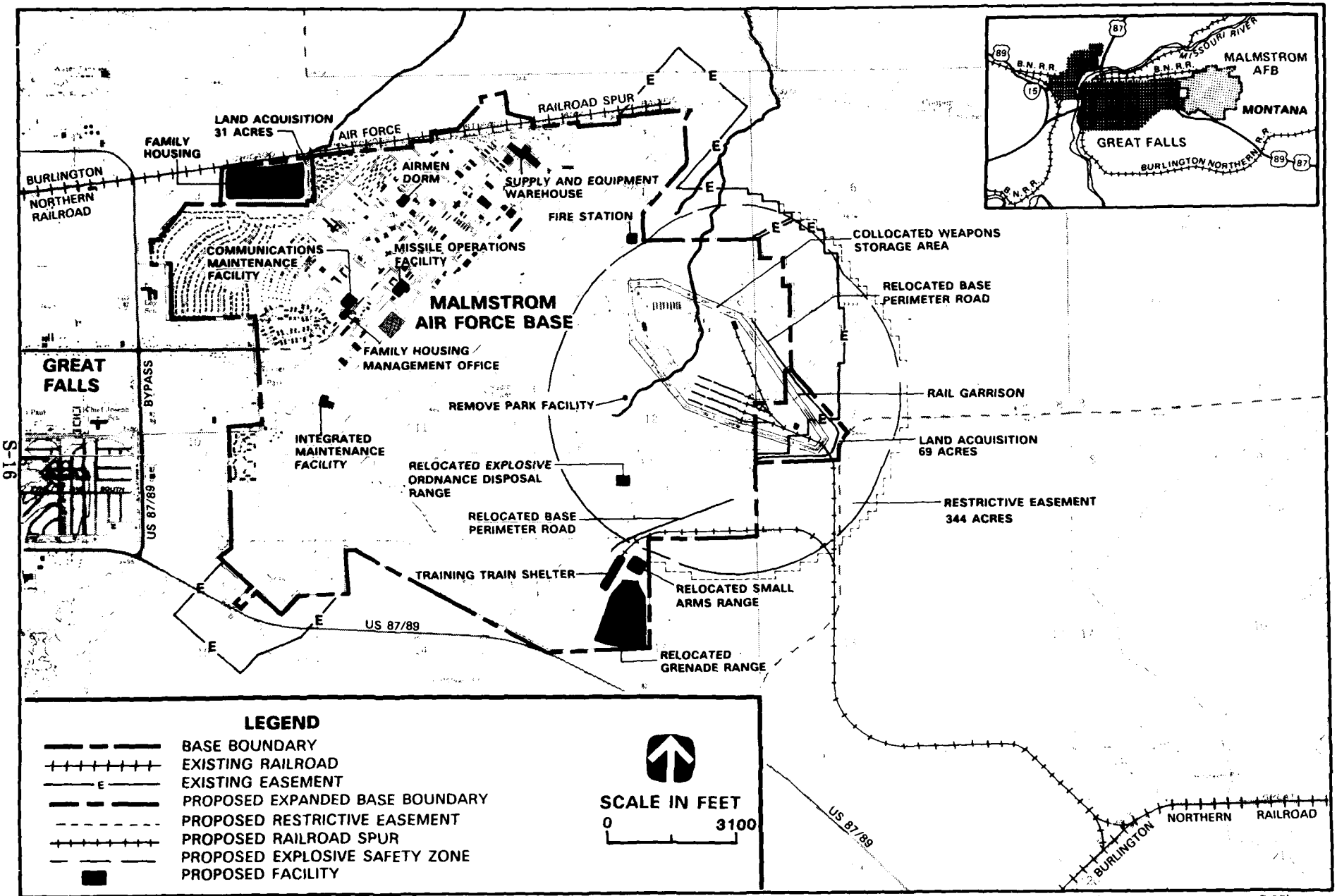
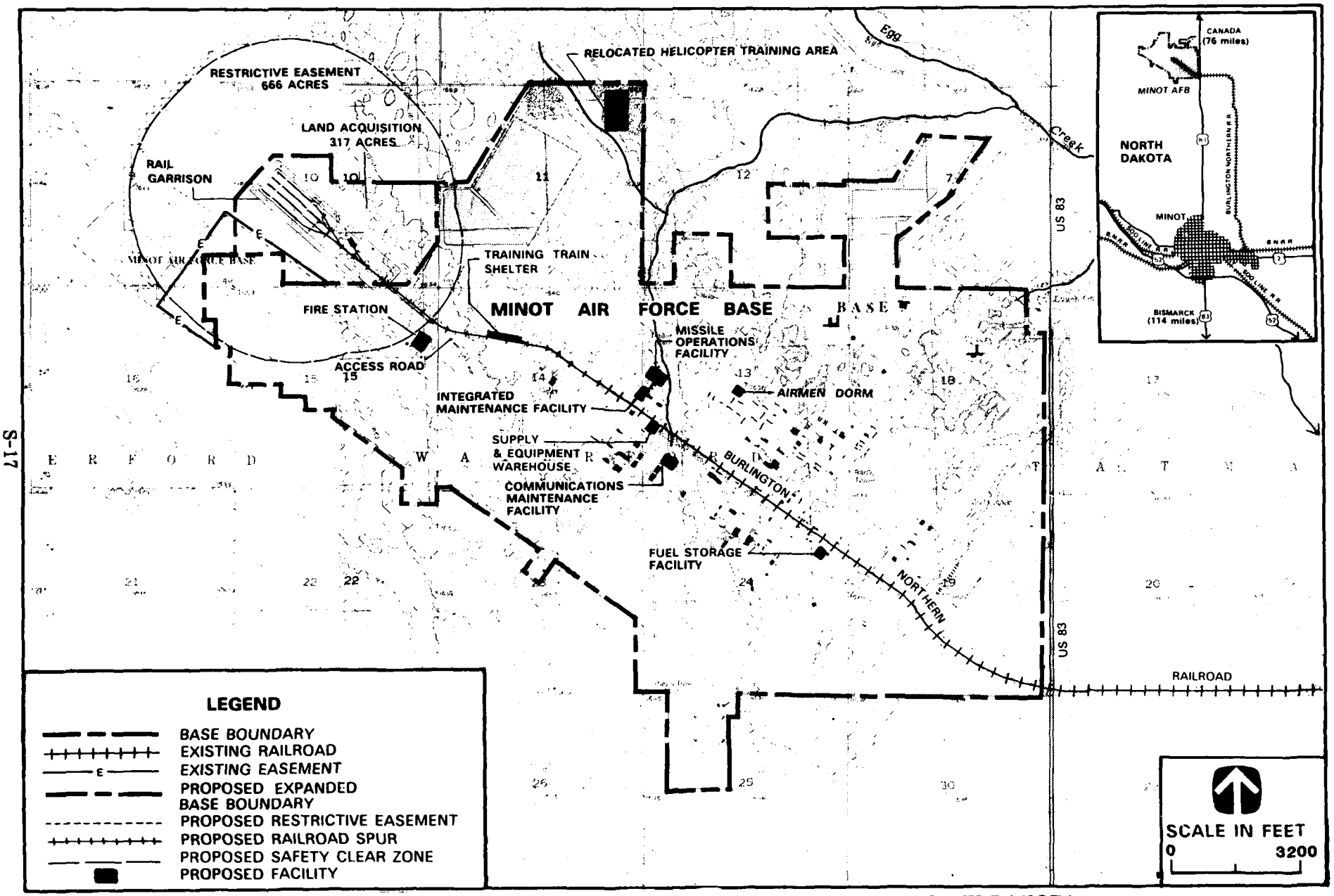


FIGURE S-15 PROPOSED PEACEKEEPER RAIL GARRISON FACILITIES AT MALMSTROM AFB, MONTANA (EAST SITE OPTION)



MN-4/1 ESR-1/37

FIGURE S-16 PROPOSED PEACEKEEPER RAIL GARRISON FACILITIES AT MINOT AFB, NORTH DAKOTA

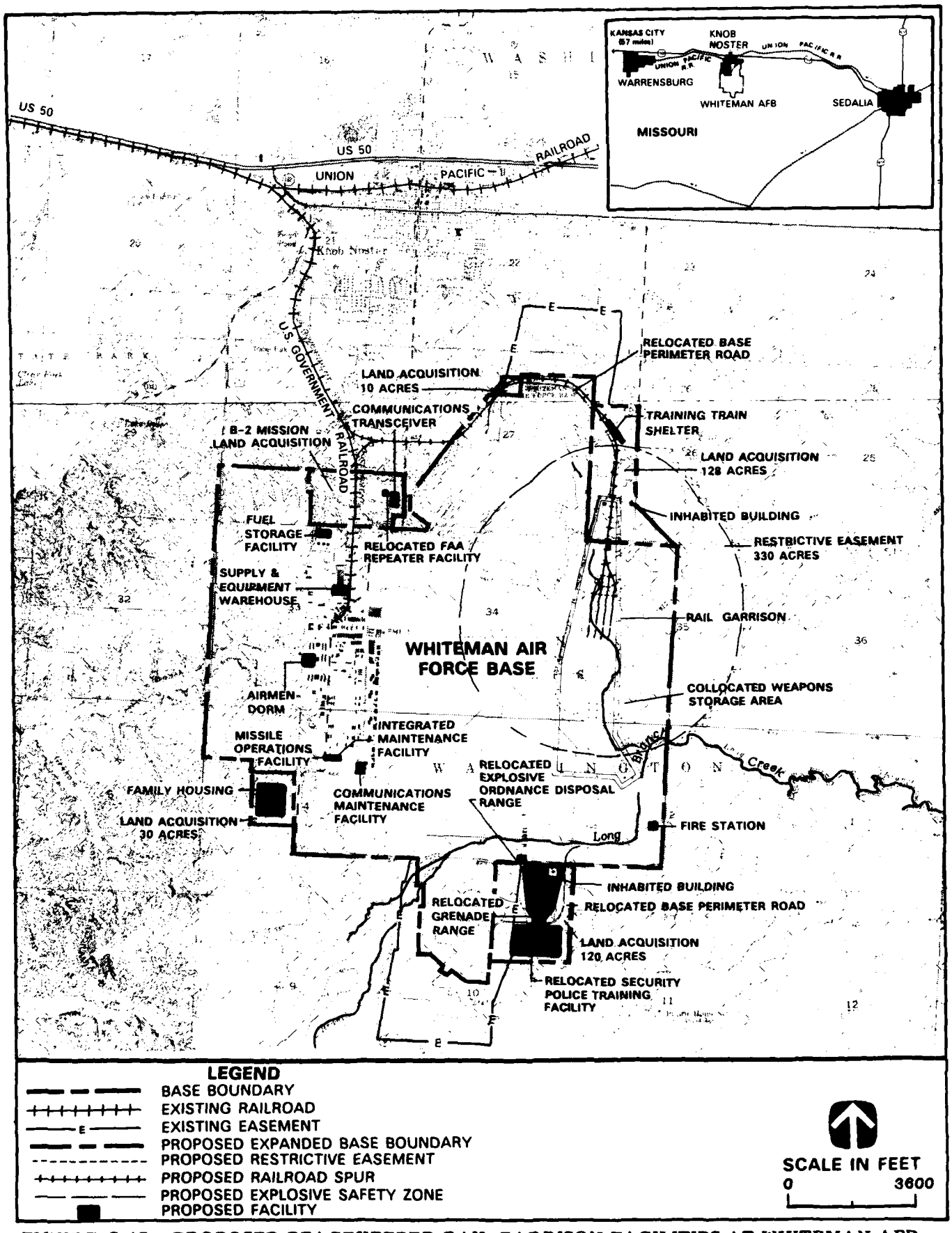


FIGURE S-17 PROPOSED PEACEKEEPER RAIL GARRISON FACILITIES AT WHITEMAN AFB, MISSOURI

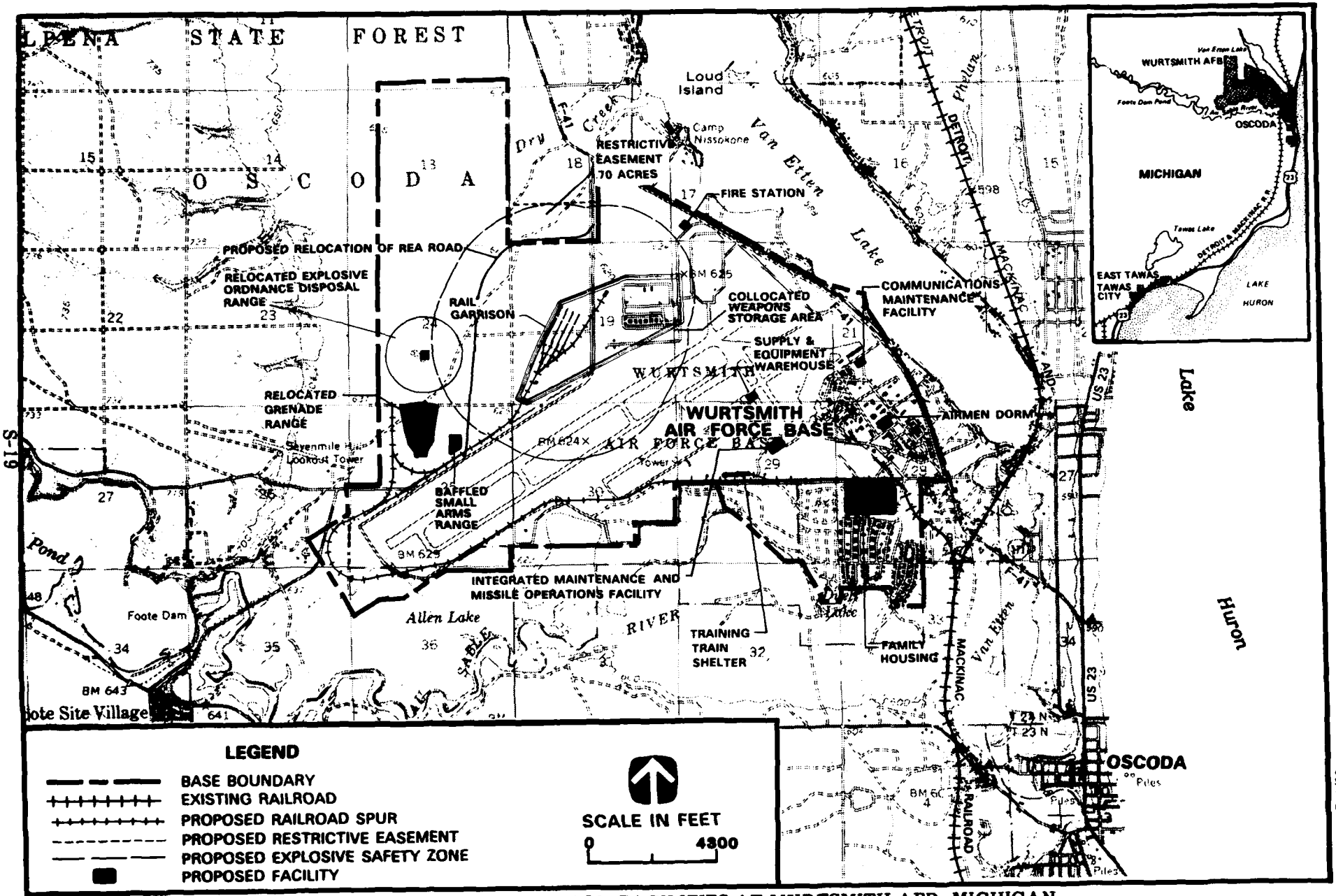


FIGURE S-18 PROPOSED PEACEKEEPER RAIL GARRISON FACILITIES AT WURTSMITH AFB, MICHIGAN

Operations-related manpower could begin to arrive in July 1991 and could reach a full complement by December 1991.

Construction activities for the other candidate installations would occur over a 27-month period in the early 1990s. Site preparation, and road and utilities construction would be appropriately phased and followed by technical and personnel support facility construction during this period.

Operations

Peacekeeper missiles would be assembled and integrated onto the missile launch cars at F.E. Warren AFB, the MOB. They would then be dispatched to the selected Peacekeeper Rail Garrison installations. F.E. Warren AFB would also have a garrison area with Peacekeeper trains on alert.

Day-to-day functions at the garrison installations would consist of maintaining the parked Peacekeeper trains on alert, security operations, and minor maintenance activities. Periodically, a training train, with no missile propellants or warheads onboard, would travel to each of the garrison installations for operations, security, and maintenance training.

In times of national need, when directed to disperse by the National Command Authority, the Air Force would contact the railroad dispatch offices to request clearance onto the main line. After clearance is received, trains would move onto the national rail network. Once on the network, the Peacekeeper trains would operate in a manner similar to existing commercial freight trains.

The Air Force would comply with Federal Railroad Administration rules for operation and would provide crews qualified to operate the locomotives. The railroads would provide a pilot who is fully knowledgeable of the physical characteristics and rules of operations over the segment of railroad on which the train is to be moved. The use of pilots is a standard railroad practice to provide safe operations on the commercial railroad network.

The Peacekeeper train would carry its own security system and security personnel. The trains would be equipped with a variety of sensors that detect direct threats and with others that provide 24-hour surveillance.

Once dispersed, the Peacekeeper train would continue to operate on the nation's rail network until directed by the National Command Authority to return to the garrison. Supplies such as fuel, food, or water would be carried onboard the train. When necessary, resupply would be accomplished in a variety of ways, including local purchases, servicing in train yards, servicing by mobile servicing vehicles, and servicing from military installations located in the train's dispersal area.

Maintenance

Peacekeeper missile maintenance would be performed at the garrisons; MOB; existing Air Force depots; and on the railroad network when the system is in the dispersed mode of operation. At the garrisons, train maintenance would consist of removal and replacement of operational support equipment and minor inspection and servicing of trains. Maintenance of the canisterized missile would require removal of the reentry system at the Garrison Maintenance Facility (at the garrison installation) and transportation of the missile to the MOB or other depot facilities for disassembly and repair.

Train maintenance would be performed in accordance with Federal Railroad Administration and American Association of Railroads requirements, and would meet or exceed their standards. The missile train's onboard maintenance team would perform

repair/replacement of launch-critical components and operation support equipment during dispersal.

Training

Training of Air Force personnel for operations and maintenance activities would be conducted at existing designated technical training centers. These include Chanute AFB, Illinois; Lowry AFB, Colorado; Keesler AFB, Mississippi; Lackland AFB, Texas; and Vandenberg AFB, California. Simulators would be used to provide hands-on training for both maintenance and operations personnel. These simulators and other training tools would be located at the technical training centers, the MOB, and at each garrison installation. Training on the actual system equipment would occur at the MOB and other garrison installations. In addition to fixed trainers, two training trains would be based at F.E. Warren AFB and would travel to each garrison to conduct dispersal training exercises. Air Force train operators may be trained at existing commercial railroad training centers.

Resource Requirements

The total cost of the Peacekeeper Rail Garrison program is estimated at between $10 billion and $15 billion (in 1986 dollars). This includes research and development, production, construction, deployment, and operations over a 20-year period.

Direct manpower requirements at F.E. Warren AFB, the MOB, and the candidate garrison installations are shown in Table S-1.

At a typical base, about 150 acres to 180 acres of land would be needed for the garrison facilities and another 50 acres for technical and support facilities. Table S-2 presents the permanent, temporary, and total land area disturbed at each installation.

ALTERNATIVE ACTION

The Alternative Action is to deploy 100 Peacekeeper missiles on 50 trains. With this alternative, between four and six trains would be deployed in the garrisons at F.E. Warren AFB, the MOB, and at up to ten of the candidate military installations. Construction, operations, maintenance, and training activities for the Alternative Action would be similar to those described for the Proposed Action. Facility locations at each base are shown on Figures S-19 through S-32.

The Alternative Action would involve constructing six TASs at the MOB and at each of the selected garrison bases to accommodate additional trains. It would require slightly higher construction and operations manpower than those required for the Proposed Action. Direct manpower requirements for the Alternative Action are presented in Table S-1.

Land area disturbed by the garrison and other technical and personnel support facilities for the Alternative Action is shown in Table S-2.

OTHER FUTURE AIR FORCE PROGRAMS AT PEACEKEEPER RAIL GARRISON BASES

A number of programs, some publicly announced and some classified, are being considered or programmed for deployment at some of the 11 bases. The publicly announced programs include possible deployment of Small Intercontinental Ballistic Missiles (ICBMs) at Malmstrom AFB, Montana and F.E. Warren AFB, Wyoming; deployment of a second squadron of KC-135R air refueling aircraft at Malmstrom AFB; deployment of B-2 bombers at Whiteman AFB, Missouri; and construction of a Central Radar System, Over-the-Horizon Backscatter radar facility at Grand Forks AFB, North Dakota. Discussion of the unclassified programs is included in the future baseline or cumulative

Table S-1

Direct Employment - Construction and Operations Phases
Peacekeeper Rail Garrison Program
Proposed and Alternative Actions

	F.E. Warren AFB	Barksdale AFB	Dyess AFB	Eaker AFB	Fairchild AFB	Grand Forks AFB	Little Rock AFB	Malmstrom AFB	Minot AFB	Whiteman AFB	Wurtsmith AFB
Proposed Action											
Construction Phase	624	505	533	476	507	429	515	439	440	437	520
Operations Phase	442	416	418	400	419	345	426	338	345	339	408
Alternative Action											
Construction Phase	687	549	576	516	550	465	558	474	476	472	562
Operations Phase	486	459	460	439	461	380	468	372	380	373	449

Notes: Construction phase data are for the peak year, 1992. For purposes of analysis and comparison, construction at all bases except F.E. Warren AFB is assumed to start in 1990 and finish in 1992. At F.E. Warren AFB, construction is assumed to start in 1989 and finish in 1994.

Operations phase data are for 1993 except for F.E. Warren AFB, which are for 1995. Employment at this level will continue for the life of the program.

Construction phase employment includes site activation task force, construction, assembly and checkout, and some military operations personnel. Operations phase workers are nearly all military personnel.

Table S-2

Summary of Area Disturbed by the Peacekeeper Rail Garrison Program
Proposed and Alternative Actions
(acres)

Base	Garrison Facilities		Support Facilities		Rail Spur		Relocated Facilities		Total		Grand Total
	Permanent	Temporary	Permanent	Temporary	Permanent	Temporary	Permanent	Temporary	Permanent	Temporary	
Proposed Action											
F.E. Warren (north)	52.8	93.2	19.2	71.1	17.5	19.9	1.0	0.0	90.5	184.2	309.1[1]
F.E. Warren (south)	52.8	91.2	20.7	76.9	6.0	4.7	1.0	0.0	80.5	172.8	287.7[1]
Barksdale	94.2	165.4	19.9	15.7	14.7	11.5	40.8	0.2	169.6	192.8	362.4
Dyess	53.6	101.4	8.8	10.7	10.4	16.5	8.5	10.5	81.3	139.1	220.4
Eaker (onbase)	67.1	140.7	29.7	30.1	10.9	8.5	6.2	1.0	113.9	180.3	294.2
Eaker (offbase)	50.0	52.0	29.3	32.6	8.2	6.4	0.0	0.0	87.5	91.0	178.5
Fairchild	95.7	129.0	39.8	66.2	16.9	26.3	16.2	9.2	168.6	230.7	399.3
Grand Forks	53.4	67.6	31.2	41.5	12.5	9.8	0.7	1.0	97.8	119.9	217.7
Little Rock	52.9	90.1	15.6	15.7	8.2	21.6	23.9	15.8	100.6	143.2	243.8
Malmstrom (south)	50.0	92.0	55.0	70.0	24.0	18.7	3.5	2.8	132.5	183.5	316.0
Malmstrom (east)	63.6	132.8	60.6	75.4	16.9	13.2	11.1	2.0	152.2	223.4	375.6
Minot	51.4	52.6	43.1	70.7	6.0	74.7	0.0	0.0	100.5	198.0	298.5
Whiteman	82.6	98.7	49.5	87.8	12.5	14.0	6.3	6.8	150.9	207.3	358.2
Wurtsmith	71.5	147.4	16.9	80.0	35.5	30.9	15.3	39.0	139.2	297.3	436.5
Alternative Action											
F.E. Warren (north)	62.4	124.6	19.2	71.1	16.4	19.1	1.0	0.0	99.0	214.8	348.2[1]
F.E. Warren (south)	62.7	116.3	20.7	76.9	5.5	4.2	1.0	0.0	89.9	197.4	321.7[1]
Barksdale	99.6	165.2	19.9	15.7	13.6	10.6	40.8	0.2	173.9	191.7	365.6
Dyess	60.3	124.7	8.8	10.7	10.4	16.5	8.5	10.5	88.0	162.4	250.4
Eaker (onbase)	72.7	147.9	29.7	30.1	10.9	8.5	6.2	1.0	119.5	187.5	307.0
Eaker (offbase)	54.9	68.1	29.3	32.6	8.2	6.4	0.0	0.0	92.4	107.1	199.5
Fairchild	100.3	146.5	40.0	66.4	16.9	26.3	16.2	9.2	173.4	248.4	421.8
Grand Forks	61.5	100.6	31.2	41.6	12.5	9.8	0.7	1.0	105.9	153.0	258.9
Little Rock	61.5	114.5	15.6	15.7	7.6	21.2	38.9	15.8	123.6	167.2	290.8
Malmstrom (south)	56.9	114.1	55.0	70.0	24.0	18.7	4.0	2.8	139.9	205.6	345.5
Malmstrom (east)	70.3	160.6	60.6	75.4	16.9	13.2	11.1	2.0	158.9	251.2	410.1
Minot	56.9	75.1	43.1	70.9	6.0	74.7	0.0	0.0	106.0	220.7	326.7
Whiteman	86.9	152.0	49.5	87.8	12.5	14.0	6.3	6.8	155.2	260.6	415.8
Wurtsmith	80.5	189.8	16.9	80.0	34.9	30.5	15.3	39.0	147.6	339.3	486.9

Note: [1]Disturbed area totals for F.E. Warren AFB (north and south site options) include 11.9 acres of permanent and 22.5 acres of temporary disturbance for construction of MOB facilities.

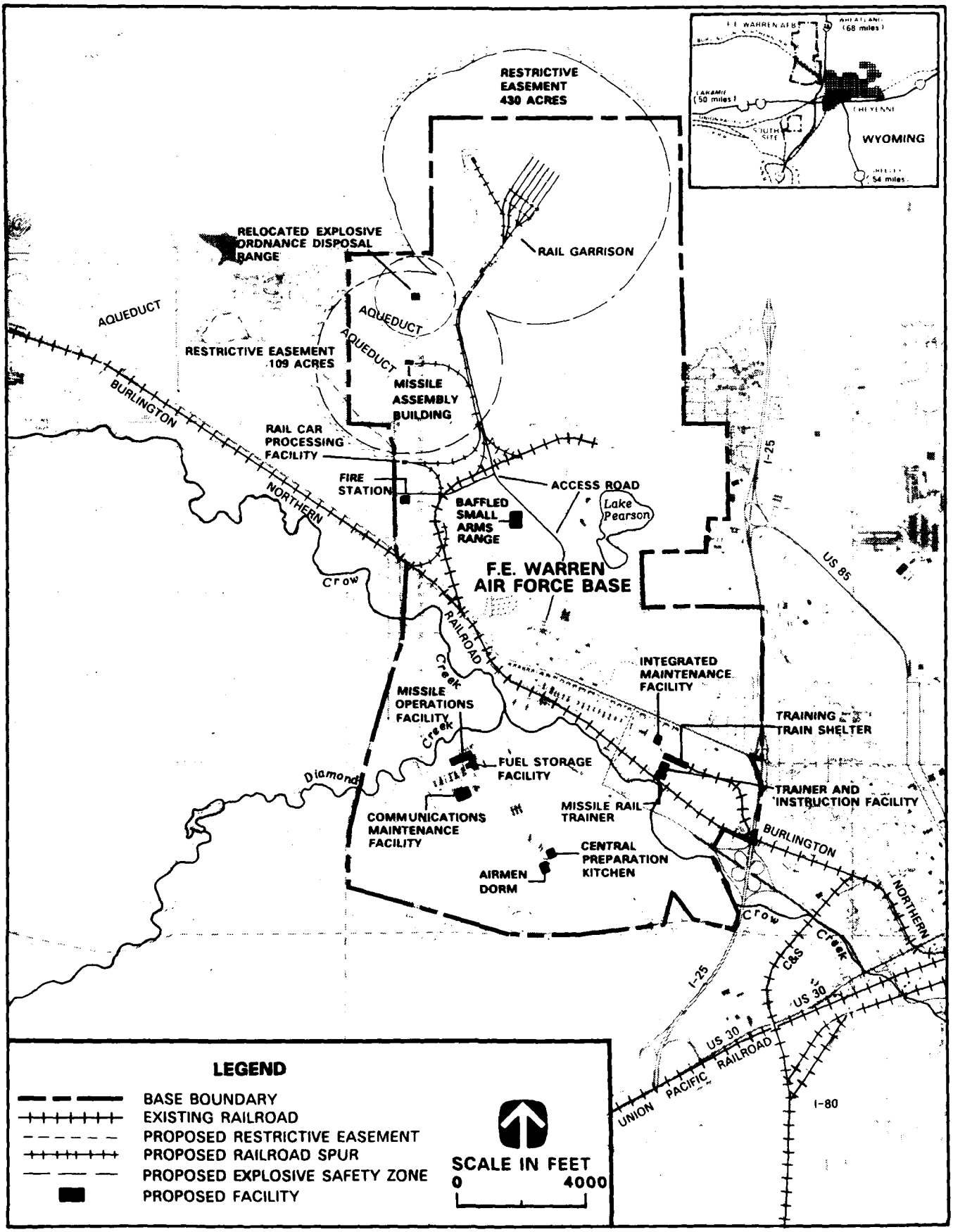


FIGURE S-19 PROPOSED PEACEKEEPER RAIL GARRISON FACILITIES AT F.E. WARREN AFB, WYOMING (NORTH SITE OPTION) (ALTERNATIVE ACTION)

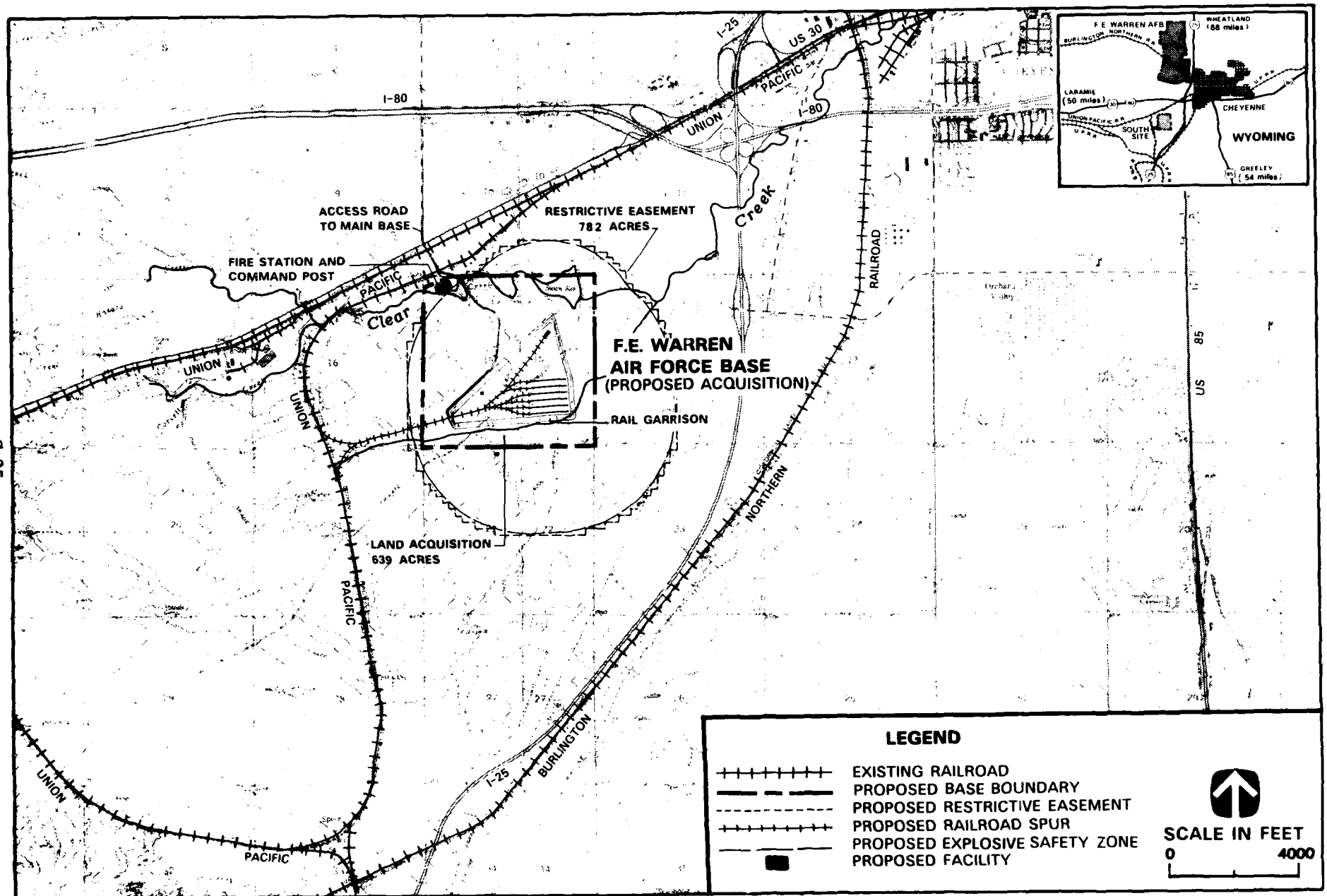


FIGURE S-20 PROPOSED PEACEKEEPER RAIL GARRISON FACILITIES AT F.E. WARREN AFB, WYOMING (SOUTH SITE OPTION) (ALTERNATIVE ACTION)

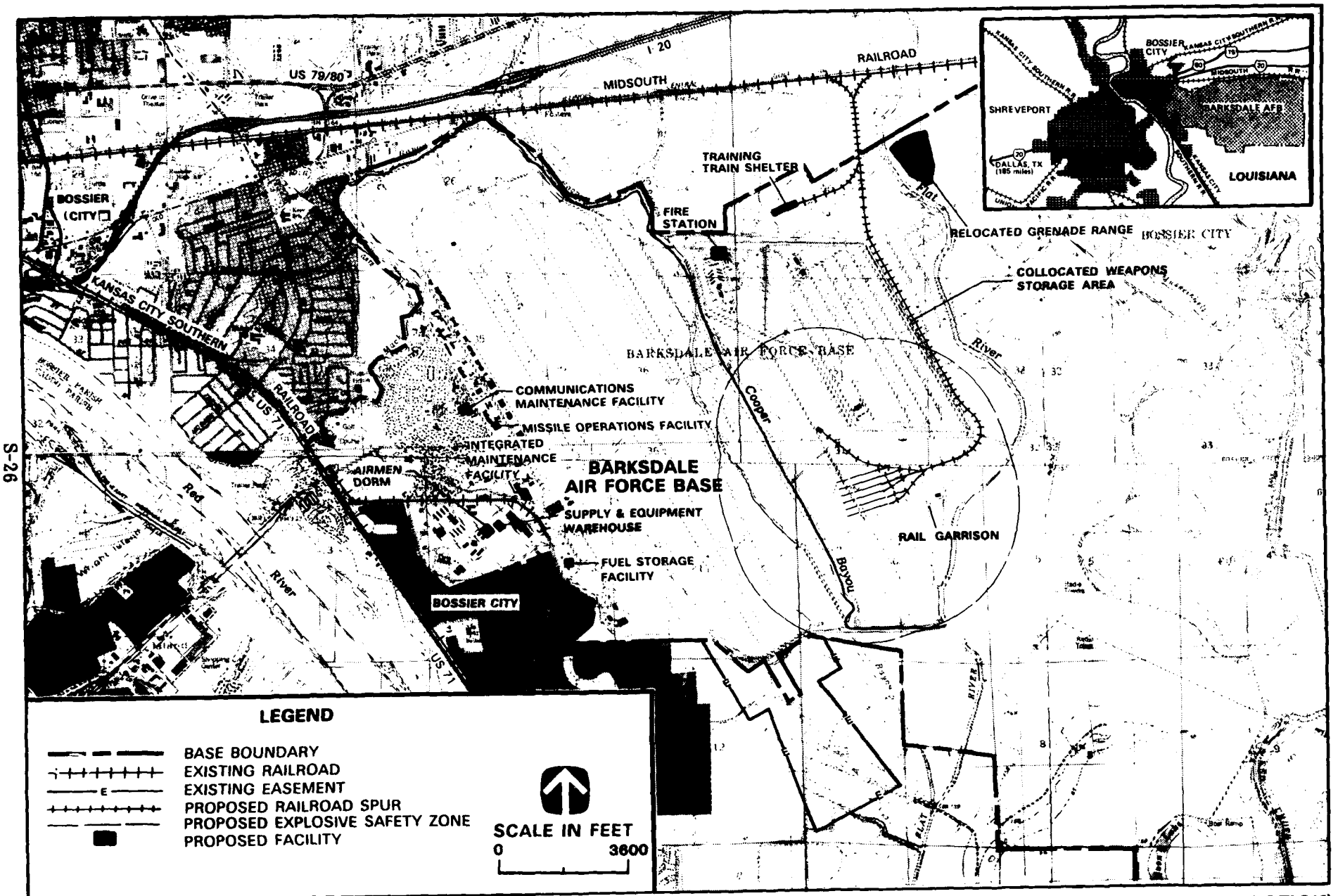


FIGURE S-21 PROPOSED PEACEKEEPER RAIL GARRISON FACILITIES AT BARKSDALE AFB, LOUISIANA (ALTERNATIVE ACTION)

BD-4/2 ESR-1/42

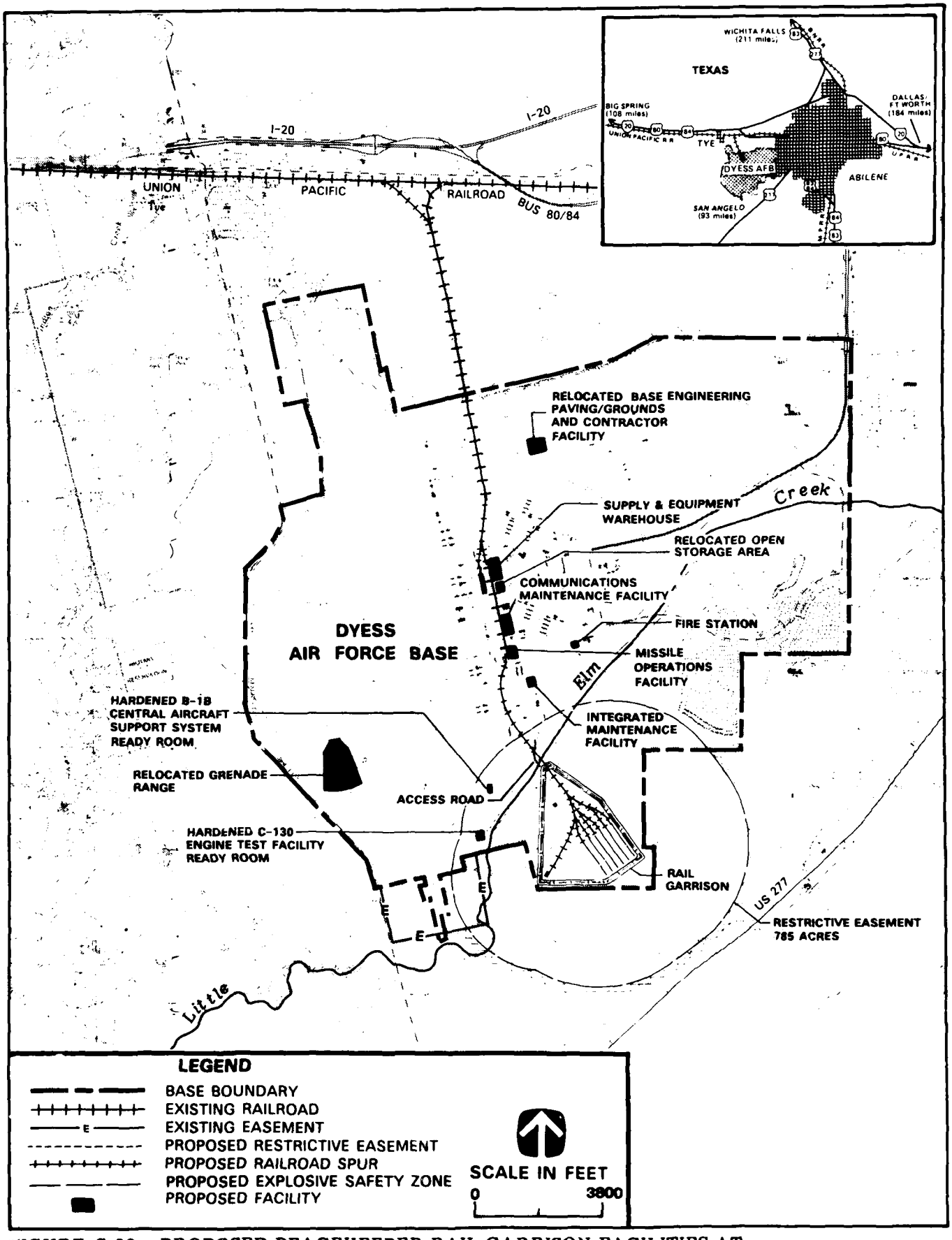


FIGURE S-22 PROPOSED PEACEKEEPER RAIL GARRISON FACILITIES AT DYESS AFB, TEXAS(ALTERNATIVE ACTION)

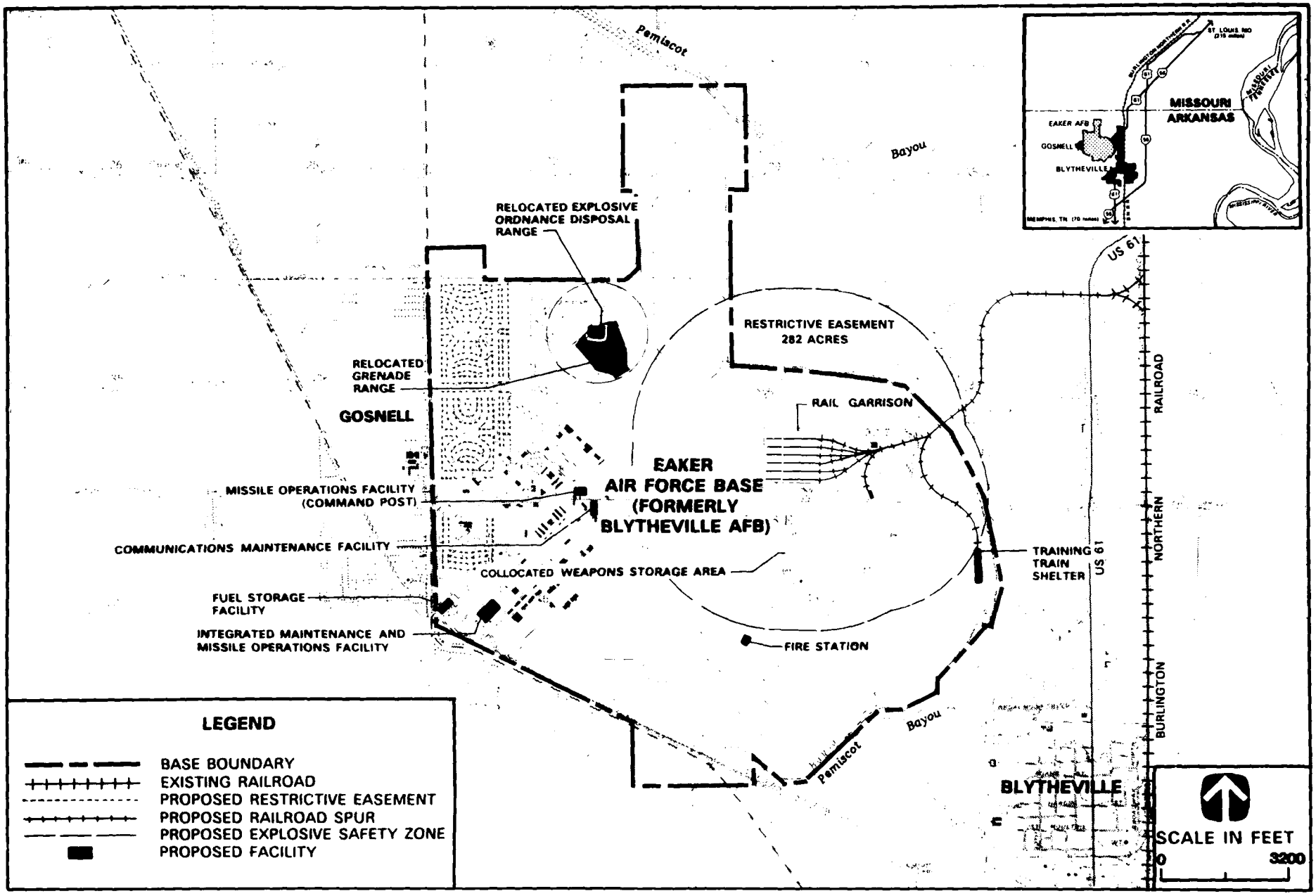
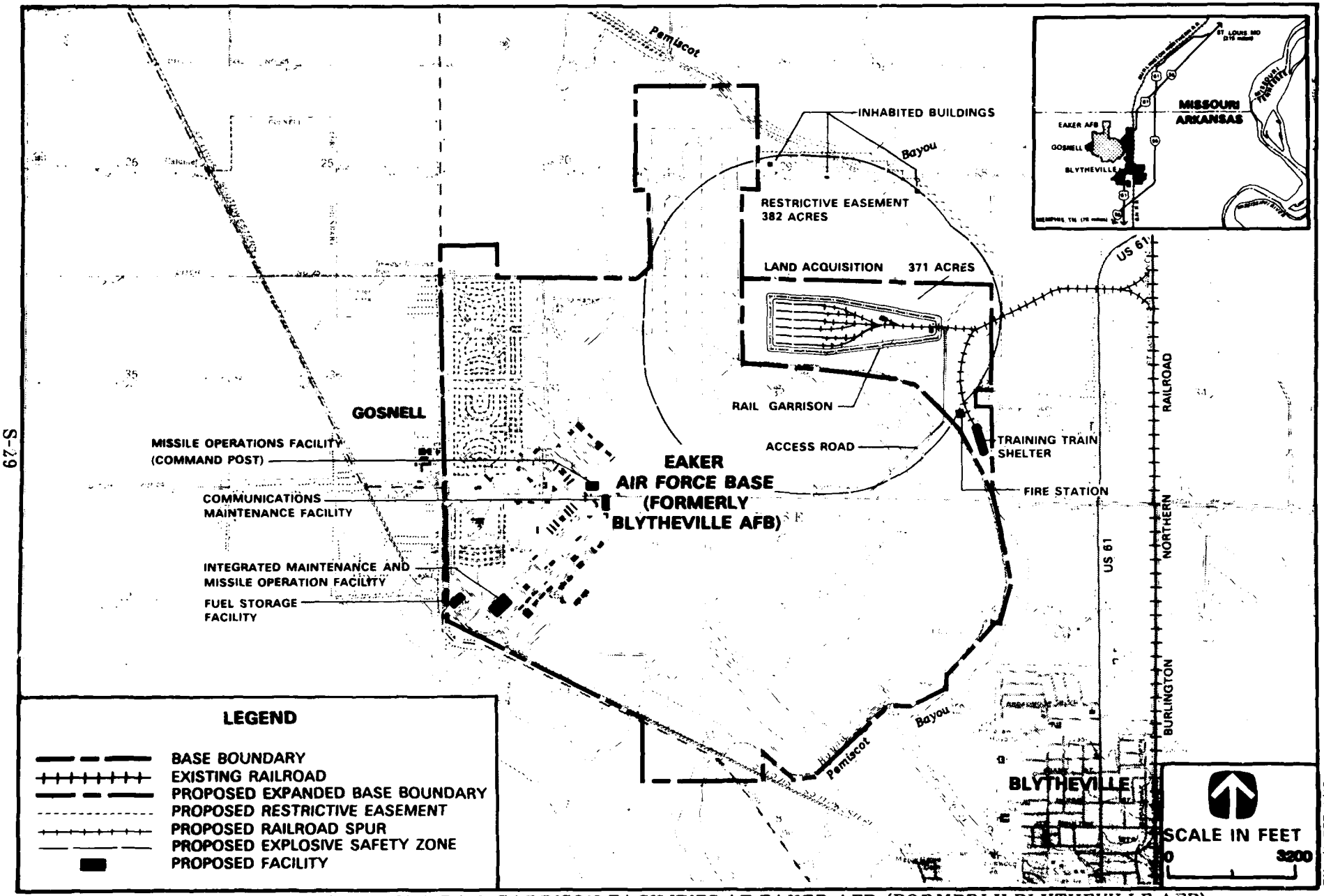


FIGURE S-23 PROPOSED PEACEKEEPER RAIL GARRISON FACILITIES AT EAKER AFB (FORMERLY BLYTHEVILLE AFB), ARKANSAS (ONBASE OPTION) (ALTERNATIVE ACTION)



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FIGURE S-24 PROPOSED PEACEKEEPER RAIL GARRISON FACILITIES AT EAKER AFB (FORMERLY BLYTHEVILLE AFB), ARKANSAS (OFFBASE OPTION) (ALTERNATIVE ACTION)

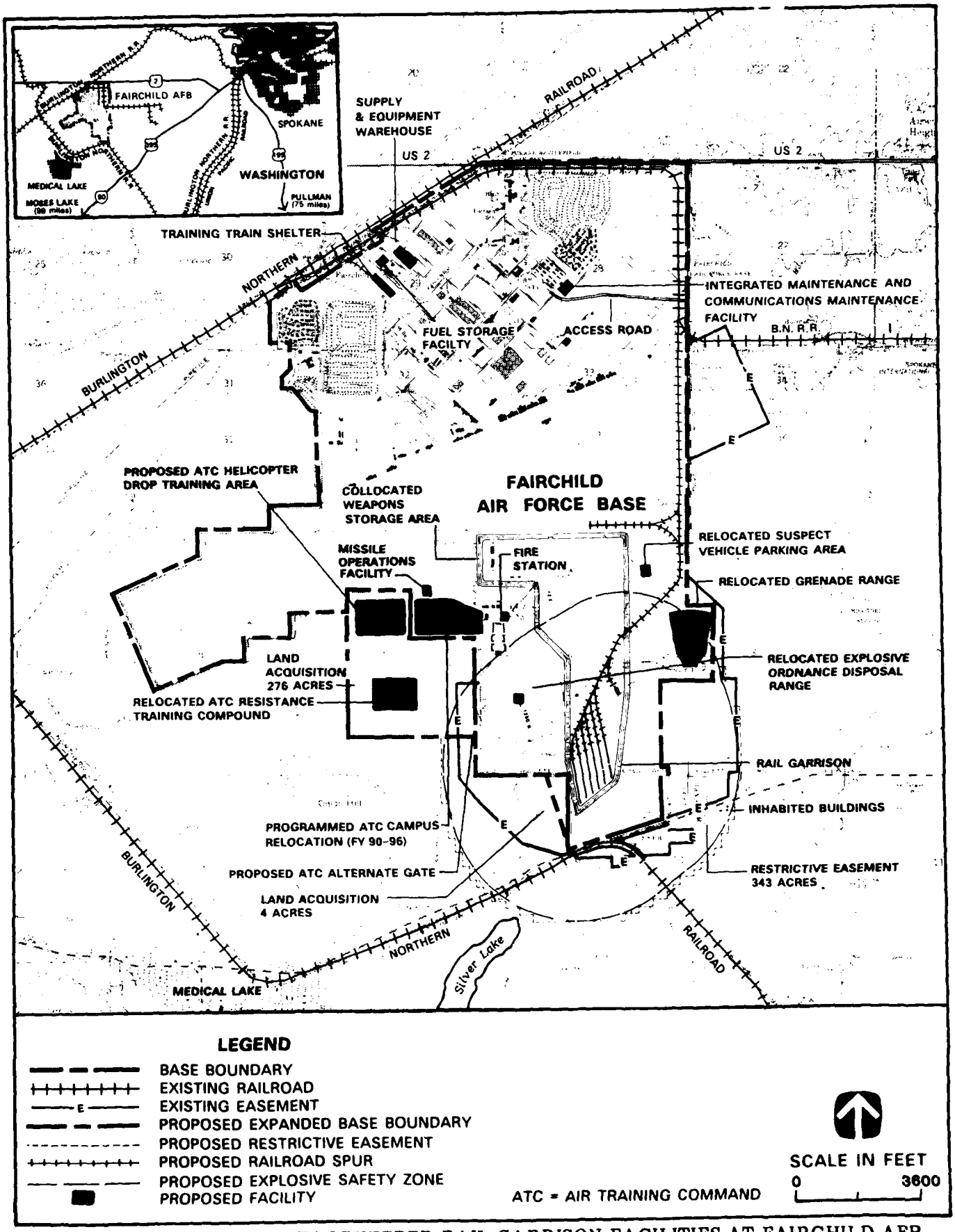


FIGURE S-25 PROPOSED PEACEKEEPER RAIL GARRISON FACILITIES AT FAIRCHILD AFB, WASHINGTON (ALTERNATIVE ACTION)

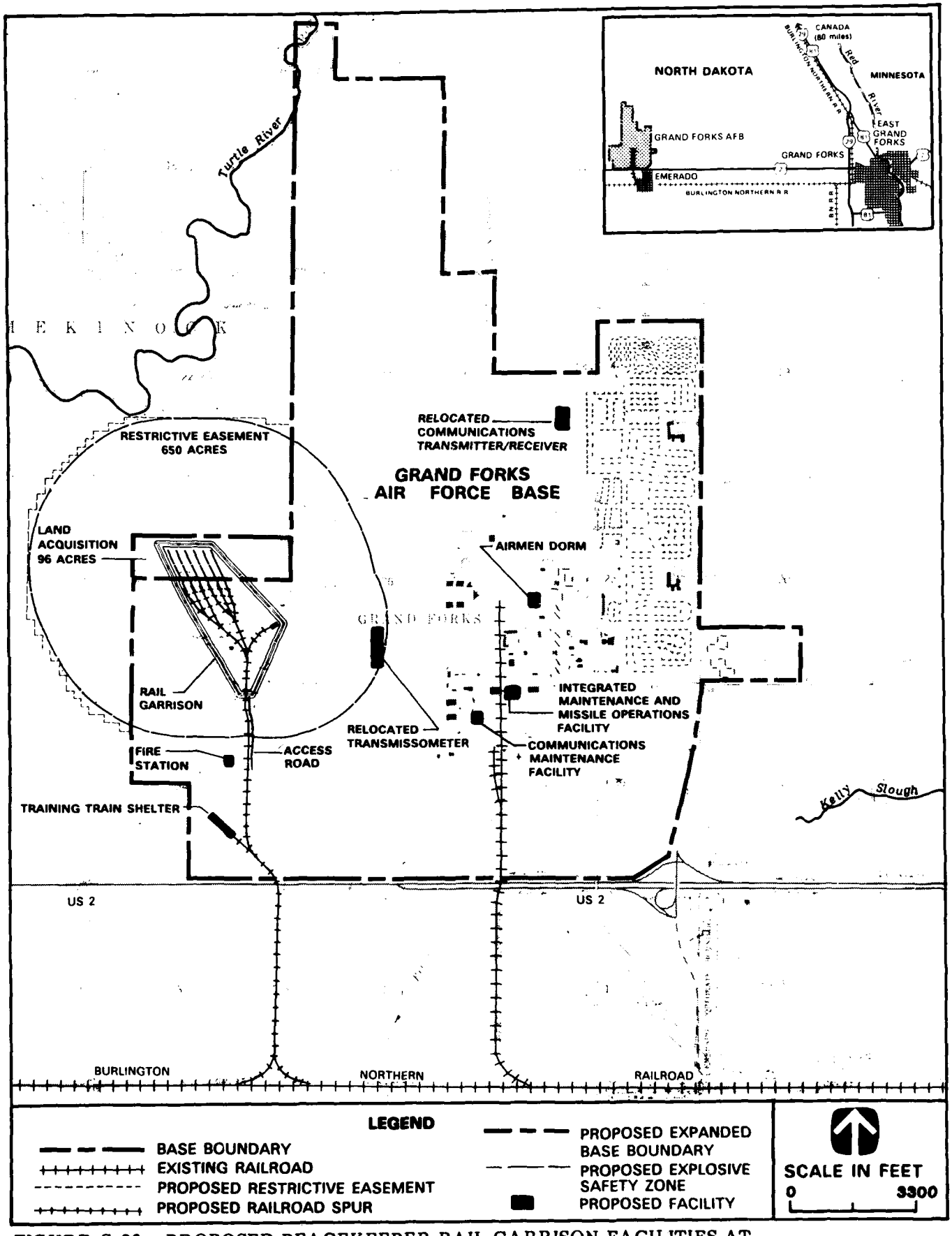


FIGURE S-26 PROPOSED PEACEKEEPER RAIL GARRISON FACILITIES AT GRAND FORKS AFB, NORTH DAKOTA (ALTERNATIVE ACTION)

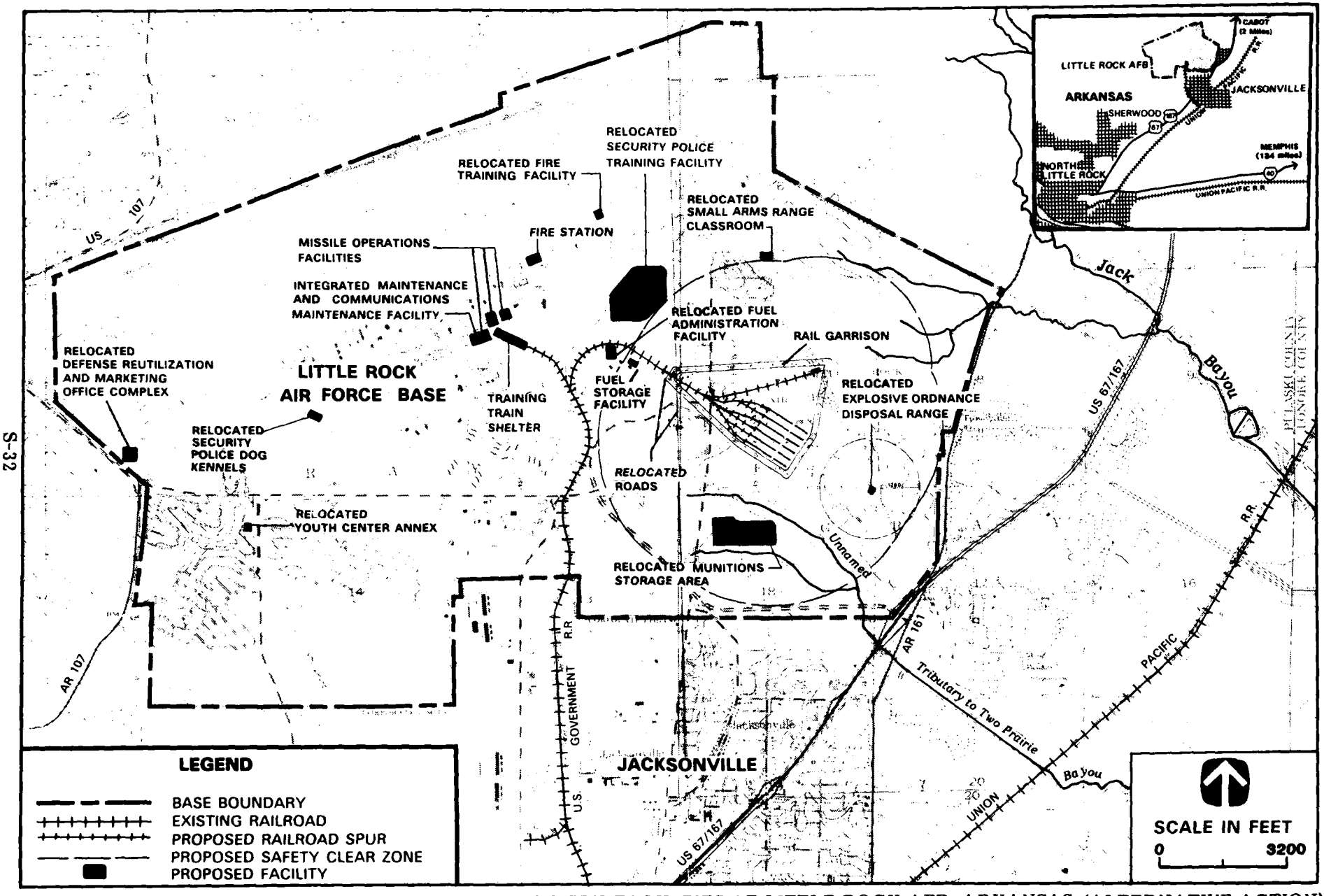


FIGURE S-27 PROPOSED PEACEKEEPER RAIL GARRISON FACILITIES AT LITTLE ROCK AFB, ARKANSAS (ALTERNATIVE ACTION)

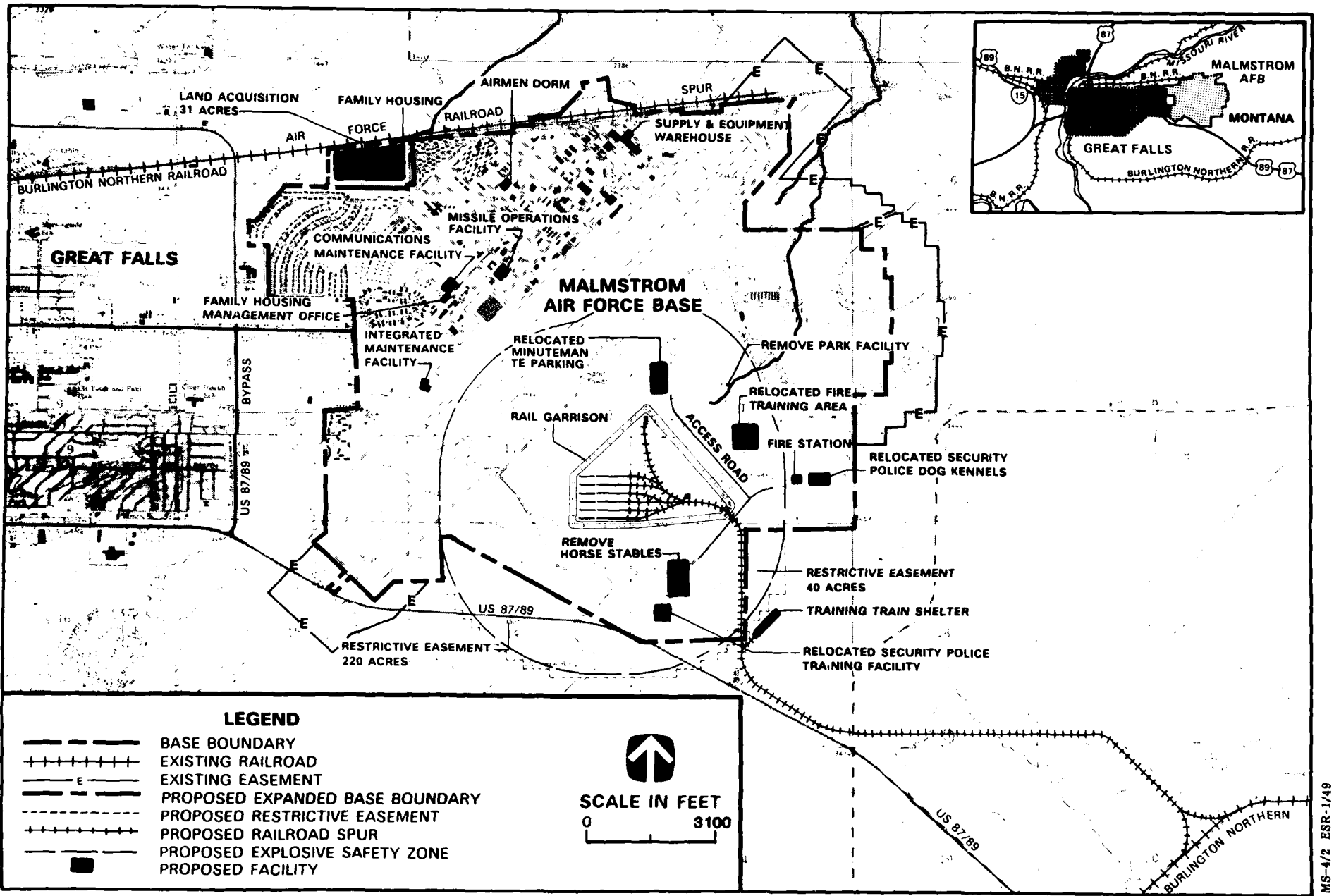


FIGURE S-28 PROPOSED PEACEKEEPER RAIL GARRISON FACILITIES AT MALMSTROM AFB, MONTANA (SOUTH SITE OPTION) (ALTERNATIVE ACTION)

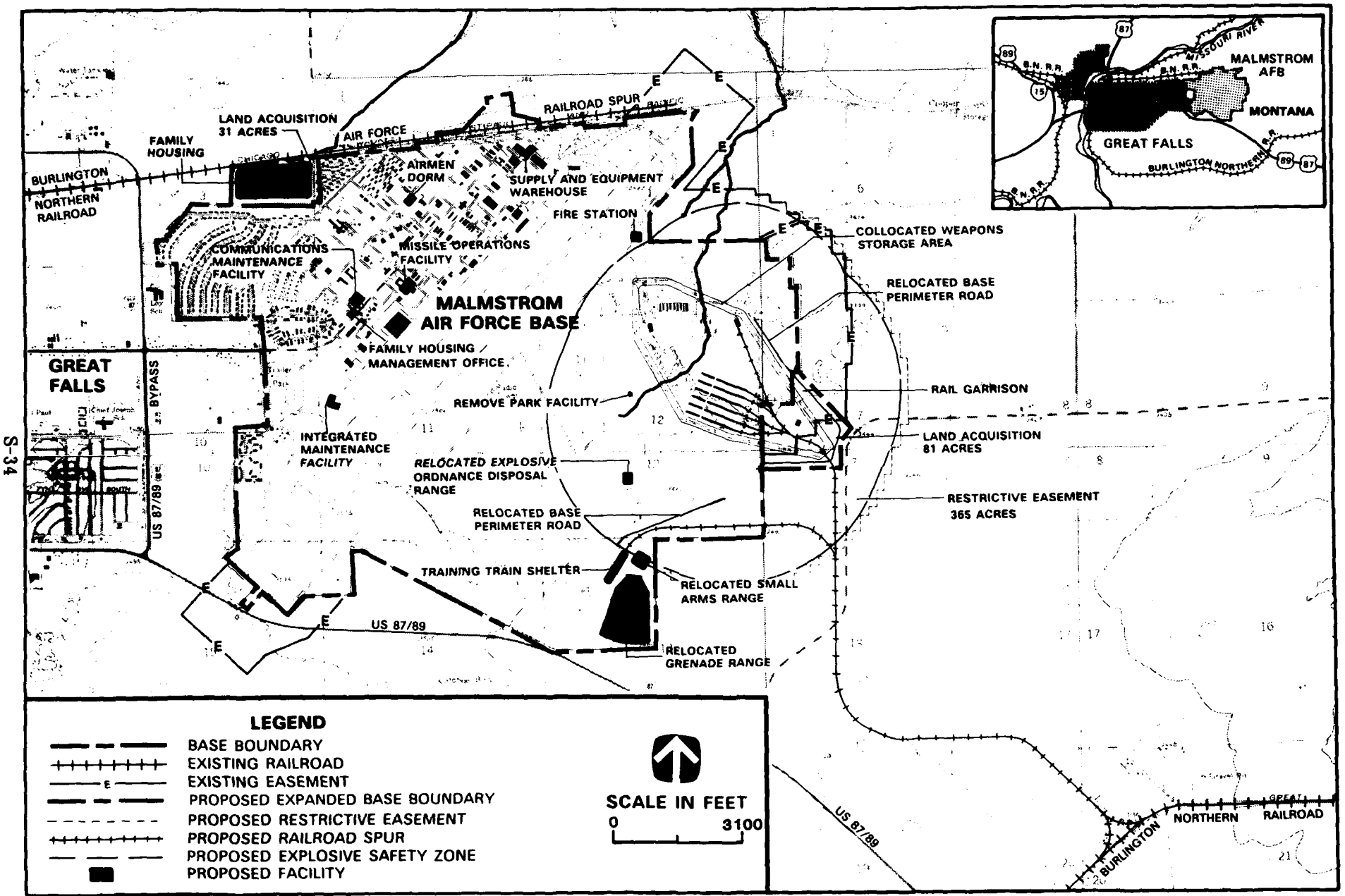


FIGURE S-29 PROPOSED PEACEKEEPER RAIL GARRISON FACILITIES AT MALMSTROM AFB, MONTANA (EAST SITE OPTION) (ALTERNATIVE ACTION)

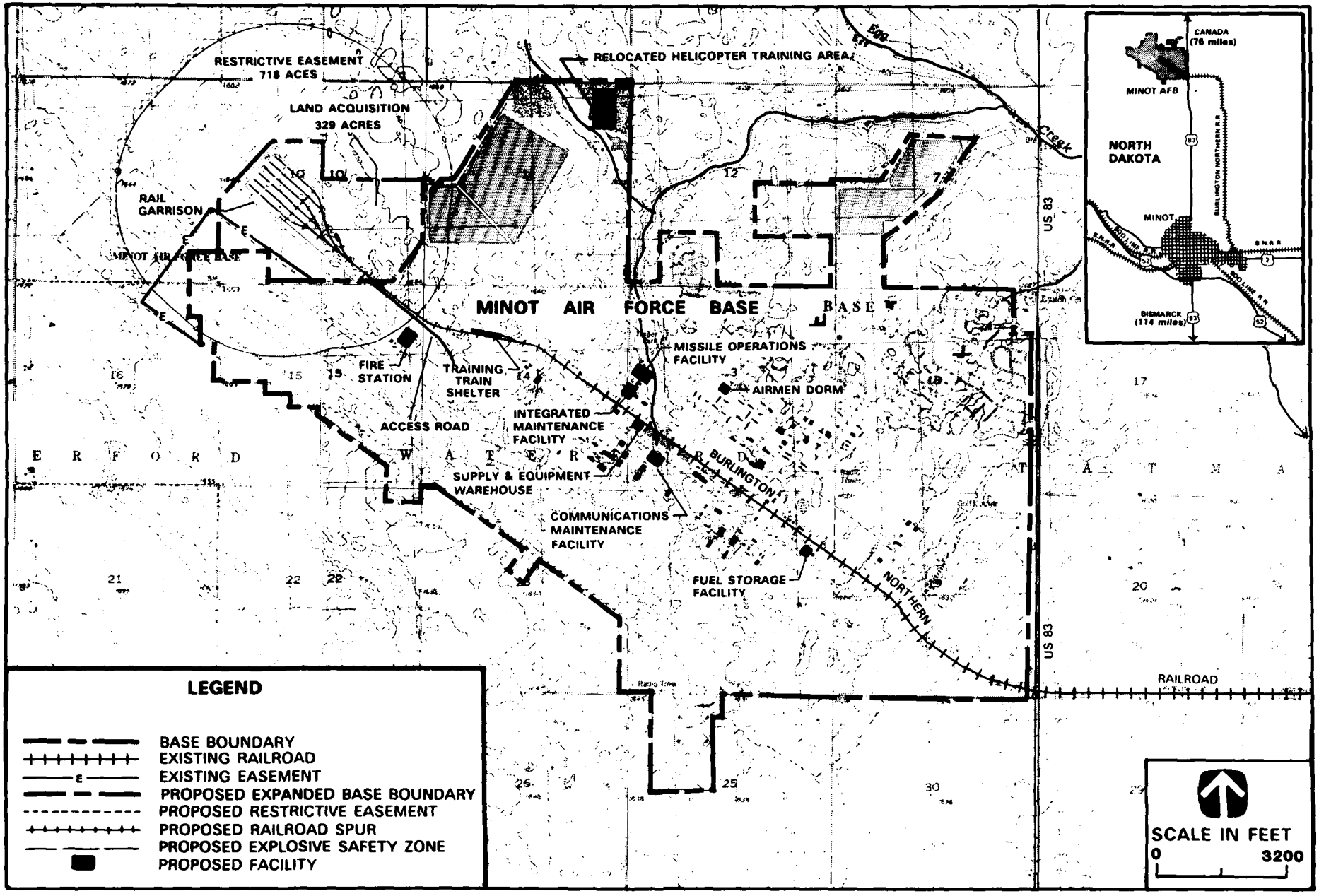


FIGURE S-30 PROPOSED PEACEKEEPER RAIL GARRISON FACILITIES AT MINOT AFB, NORTH DAKOTA (ALTERNATIVE ACTION)

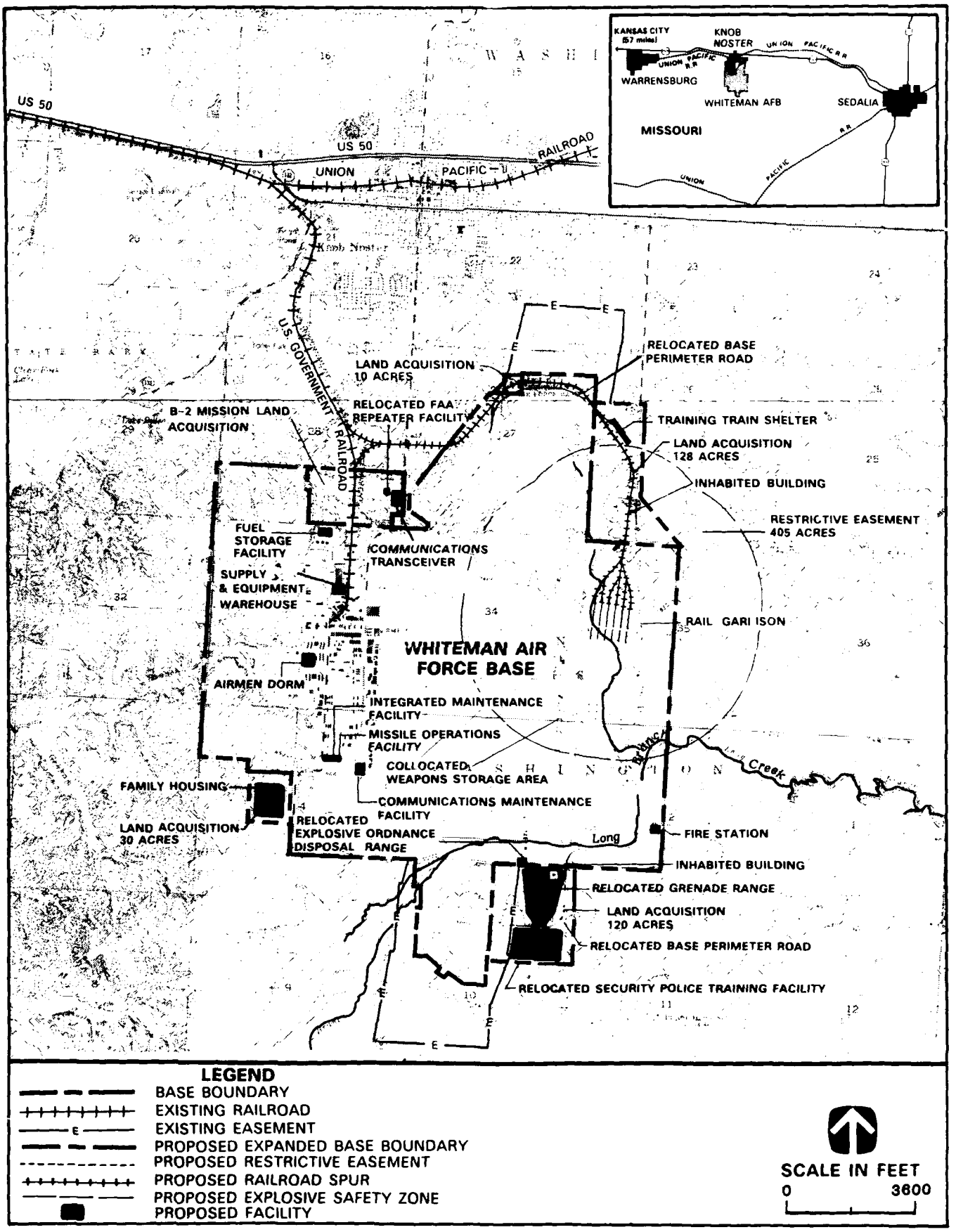
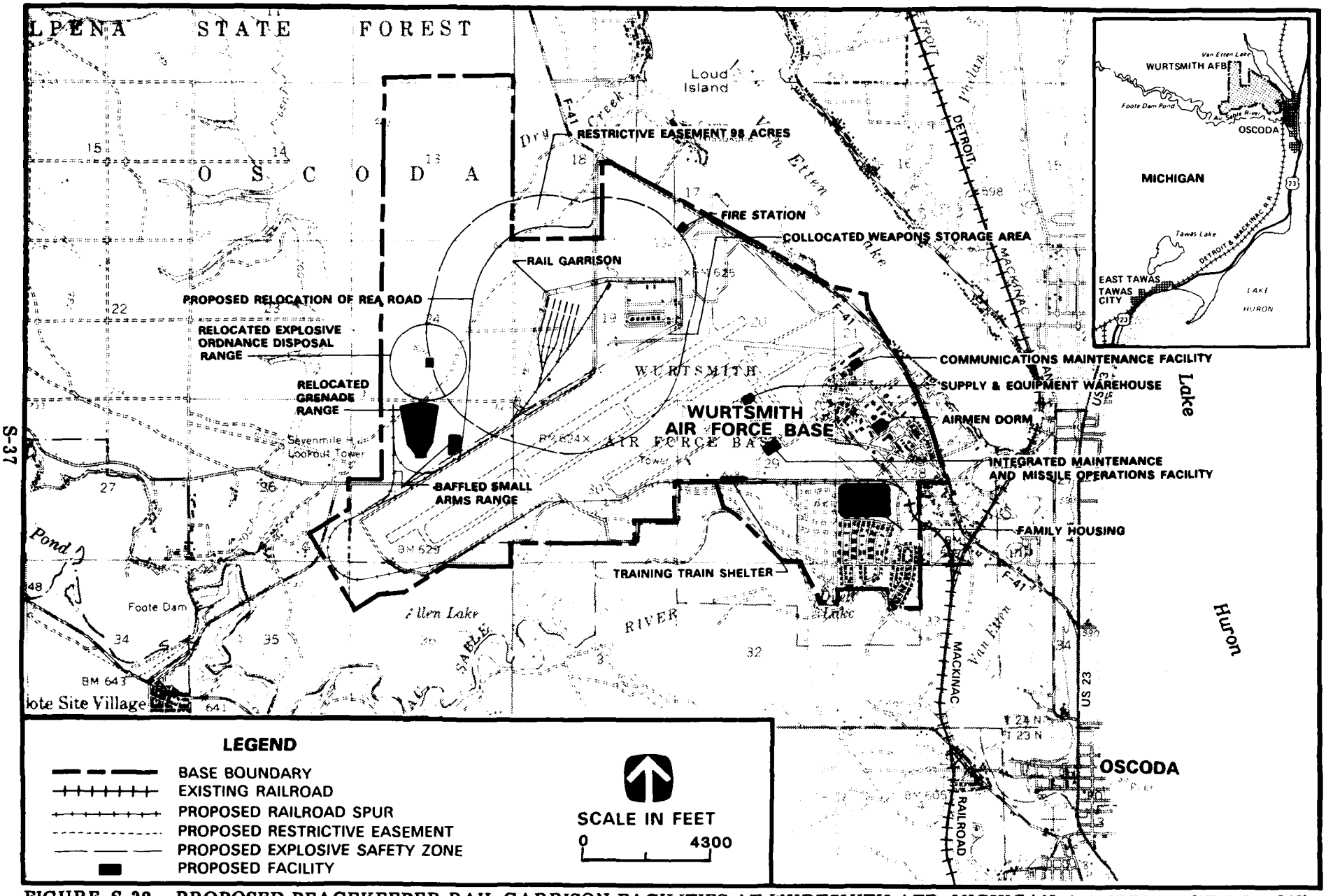


FIGURE S-31 PROPOSED PEACEKEEPER RAIL GARRISON FACILITIES AT WHITEMAN AFB, MISSOURI (ALTERNATIVE ACTION)



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FIGURE S-32 PROPOSED PEACEKEEPER RAIL GARRISON FACILITIES AT WURTSMITH AFB, MICHIGAN (ALTERNATIVE ACTION)

impact sections as appropriate. The cumulative environmental impacts of classified programs are covered in a classified annex to this EIS.

DECOMMISSIONING

It is difficult to predict how the Peacekeeper Rail Garrison system would be decommissioned. The relevant laws and procedures may change substantially in the 20 or more years the system would be in use. Moreover, techniques for handling the disposal of obsolete missile fuel and the reclamation or disposal of the nuclear material contained in the warheads may well change during the period the Peacekeeper is actively deployed. Consequently, the Air Force has focused this EIS on those actions which are reasonably foreseeable. The Air Force will follow all relevant laws at the time of decommissioning.

ENVIRONMENTAL IMPACT ANALYSIS PROCESS

In 1987, Congress appropriated $350 million for Peacekeeper Rail Garrison research and development. The Senate Armed Services Committee report that accompanied the fiscal year 1988-1989 Department of Defense Authorization Act (April 1987) urged the Air Force to continue to preserve the option for an early 1990s deployment, including the conduct of siting studies and a site-specific EIS on the peacetime deployment and operation of the Peacekeeper Rail Garrison system. This EIS analyzes the potential environmental impacts of proposed deployment of the Peacekeeper Rail Garrison system at F.E. Warren AFB and up to ten other garrison installations. Within the EIS, program-related impacts are reported for ten resource categories at each location for the Proposed Action and the Alternative Action. These resource categories are: socioeconomics, utilities, transportation, land use, cultural, biological, water, geology and soils, air quality, and noise.

PUBLIC SCOPING PROCESS

The purpose of scoping is to identify the significant issues for study in the EIS, and to determine the scope of the research for each issue. Scoping activities were undertaken in response to federal requirements and as part of the assessment of environmental impacts of major federal actions. Preliminary data and information were collected from federal, state, and local government organizations in the areas near candidate deployment installations prior to scoping. Scoping meetings with the public and with governmental organizations were conducted during March and April 1988. A wide range of issues related to the physical and social environment, including safety considerations, were identified through the scoping process and have been incorporated into the analysis.

SUMMARY AND COMPARISON OF PROGRAM IMPACTS

The environmental consequences of the proposed Peacekeeper Rail Garrison program are evaluated in terms of the magnitude and significance of impacts. Magnitude is a measure of the numbers and kinds of environmental consequences of the program as compared to existing and future baseline conditions. Magnitude is defined by the level of impact (LOI), which can be negligible, low, moderate, or high. Significance requires consideration of both the context and the intensity of impacts. Context includes consideration of whether impacts are of short or long duration. Intensity refers to the severity of an impact, which includes consideration of its magnitude.

The LOI and significance of short- and long-duration impacts were evaluated separately. Short-duration impacts are transitory effects of the proposed program that are generally caused by construction activities or the starting of operations. Long-duration impacts would occur over an extended period of time, whether they begin in the construction phase or the operations phase. Most impacts from the operations phase are expected to be of long duration because program operations essentially represent a steady-state condition (i.e., impacts result from actions that occur repeatedly over a long period of

time). However, long-duration impacts can also be caused by construction activities if a resource is destroyed or irreparably damaged, or if the recovery rate of the resource is very slow.

This summary highlights the major findings from the environmental analysis. First, the impacts on the national economy and national railroad network are presented. Second, the significant adverse impacts at F.E. Warren AFB and each candidate deployment location are presented. Finally, the conclusions of an extensive safety analysis are discussed.

National Economic Impacts

The Peacekeeper Rail Garrison program is expected to cost between $10 billion and $15 billion (in 1986 dollars) including expenditures for research and development, production, construction, and operations over the system's lifetime. Peak annual expenditures during the deployment period would occur in 1991, amounting to $2.8 billion. Annual costs for operation and support of the program over a 20-year period are projected at about $0.2 billion.

Total (direct and secondary) employment generated by the program is expected to increase from 40,000 jobs in 1989 to 148,000 jobs in 1991 at the peak of nationwide program expenditures. About 59,000 of these peak year jobs would be in manufacturing, with the remainder distributed among other sectors of the economy. By 1994, total program-related employment is projected to be at a steady-state level of about 12,000 jobs.

National Rail Transportation Impacts

For the purpose of analyzing the Proposed Action, 2 Peacekeeper trains are assumed to be deployed at F.E. Warren AFB, the MOB, and 23 at other garrison installations. Initial deployment of the Peacekeeper trains, which would involve 11 to 12 train trips per year for two years, would have negligible effects on the normal operations of the commercial railroads. If all 25 Peacekeeper trains are dispersed on the commercial rail network simultaneously, an additional 25 train trips per day would be generated for the duration of the dispersal activity. Compared to the 5,000 to 7,000 daily train trips on the nation's rail network, the additional trips are considered insignificant.

For the Alternative Action, 4 Peacekeeper trains are assumed to be deployed at F.E. Warren AFB, the MOB, and 46 at other garrison installations. If all 50 trains are dispersed on the commercial rail network simultaneously, the additional 50 train trips per day for the duration of dispersal activity would likewise have an insignificant effect on the nation's rail network.

Comparative Analysis of Environmental Impacts of the Proposed and Alternative Actions by Candidate Garrison Installation

The construction and deployment of the Peacekeeper Rail Garrison program at each candidate garrison installation would result in both beneficial and adverse environmental impacts. Beneficial socioeconomic effects, such as increases in employment and income and greater utilization of vacant housing, would occur at all locations and are not discussed further. Significant adverse impacts occurring at the MOB (F.E. Warren AFB, Wyoming) and at each of the other ten candidate garrisons are presented to provide an overview of the extent of programwide impacts on ten resource categories: socioeconomics, utilities, transportation, land use, cultural, biological, water, geology and soils, air quality, and noise. Cumulative impacts including those associated with other potential programs in conjunction with the Proposed Action and the Alternative Action are also presented (Figures S-33 and S-34). Impacts which are not considered significant are not discussed in this summary text but are shown in Figures S-33 and S-34.

PROPOSED ACTION IMPACTS

ENVIRONMENTAL RESOURCES → / IMPACT DURATION → / CANDIDATE BASES ↓	SOCIOECONOMICS*		UTILITIES		TRANSPORTATION		LAND USE		CULTURAL RESOURCES		BIOLOGICAL RESOURCES		WATER RESOURCES		GEOLOGY AND SOILS		AIR QUAILITY		NOISE	
	SHORT DUR	LONG DUR	SHORT DUR	LONG DUR	SHORT DUR	LONG DUR	SHORT DUR	LONG DUR	SHORT DUR	LONG DUR	SHORT DUR	LONG DUR	SHORT DUR	LONG DUR	SHORT DUR	LONG DUR	SHORT DUR	LONG DUR	SHORT DUR	LONG DUR
F.E. WARREN AFB (NORTH)	○	○		○	○	○	○	○		●	○	○	○	○	◯	○				
F.E. WARREN AFB (SOUTH)	○	○		○	○	○	○	○		•	○	○	◯	○	◯					
F.E. WARREN AFB (CUMULATIVE)	●	●		○	●	●	•	•		●	○	○	○	○	◯	●				
BARKSDALE AFB	○	○		○	•	•				○	○	●	◯	○	◯				○	
DYESS AFB					○	○					○	○	○	○	◯				○	
EAKER AFB (ONBASE)	○	○		○			○	○		●			○	○	◯				○	
EAKER AFB (OFFBASE)	○	○		○			•	•		•			○	○	◯				○	
FAIRCHILD AFB	○	○		○			●	●			○	●	○	○	◯					
GRAND FORKS AFB	○	○		○			○	○			○	○	○	○	◯	○				
LITTLE ROCK AFB	○	○		○							○	○	○	○	◯					
MALMSTROM AFB (SOUTH)	•	•		○	●	●					○	○	○	○	◯				○	
MALMSTROM AFB (EAST)	•	•		○	●	●	○	○			○	○	○	○	◯				○	
MALMSTROM AFB (CUMULATIVE)	●	●		◯	●	●	○	○		○	○	○	○	○	◯	●			○	
MINOT AFB	○	○		○	○	○					○	○	○	○	◯	○				
WHITEMAN AFB	○	○		○	○	○	•	•		○	○	●	○	○	◯				○	
WURTSMITH AFB	●	○		◯						○	○	●	○	•	◯		○		○	

LEVEL OF IMPACT

	NOT SIGNIFICANT	SIGNIFICANT
NEGLIGIBLE		
LOW	○	•
MODERATE	○	●
HIGH	◯	●

* Beneficial short- and long-duration impacts would occur at each location.

ESR-2/1 ESR-1/24

FIGURE S-33 IMPACTS ASSOCIATED WITH THE PROPOSED PEACEKEEPER RAIL GARRISON PROGRAM (PROPOSED ACTION)

ALTERNATIVE ACTION IMPACTS

ENVIRONMENTAL RESOURCES → / IMPACT DURATION → / CANDIDATE BASES ↓	SOCIOECONOMICS*		UTILITIES		TRANSPORTATION		LAND USE		CULTURAL RESOURCES		BIOLOGICAL RESOURCES		WATER RESOURCES		GEOLOGY AND SOILS		AIR QUAILITY		NOISE	
	SHORT DUR.	LONG DUR.	SHORT DUR.	LONG DUR.	SHORT DUR.	LONG DUR.	SHORT DUR.	LONG DUR.	SHORT DUR.	LONG DUR.	SHORT DUR.	LONG DUR.	SHORT DUR.	LONG DUR.	SHORT DUR.	LONG DUR.	SHORT DUR.	LONG DUR.	SHORT DUR.	LONG DUR.
F.E. WARREN AFB (NORTH)	○	○		○	○	○	○	○		●	○	○	○	○	◯	○				
F.E. WARREN AFB (SOUTH)	○	○		○	○	○	○	○		●	○	○	◯	○	◯					
F.E. WARREN AFB (CUMULATIVE)	●	●		○	●	●	●	●		●	○	○	○	◯	◯	●				
BARKSDALE AFB	○	○		○	●	●				○	○	●	◯	○	◯				○	
DYESS AFB					○	○					○	○	○	○	◯				○	
EAKER AFB (ONBASE)	○	○		◯			○	○		●			○	○	◯				○	
EAKER AFB (OFFBASE)	○	○		◯			●	●		●			○	○	◯				○	
FAIRCHILD AFB	○	○		○			●	●			○	●	○	○	◯					
GRAND FORKS AFB	○	○		○			○	○			○	○	○	○	◯	○				
LITTLE ROCK AFB	○	○		○							○	○	○	○	◯					
MALMSTROM AFB (SOUTH)	●	●		○	●	●					○	○	○	○	◯				○	
MALMSTROM AFB (EAST)	●	●		○	●	●	○	○			○	○	○	○	◯				○	
MALMSTROM AFB (CUMULATIVE)	●	●		◯	●	●	○	○		○	○	○	○	○	◯	●			○	
MINOT AFB	○	○		○	○	○					○	○	○	○	◯	○				
WHITEMAN AFB	○	○		○	○	○	●	●		○	○	●	○	○	◯				○	
WURTSMITH AFB	●	○		◯						○	○	●	○	●	◯		○		○	

LEVEL OF IMPACT

	NOT SIGNIFICANT	SIGNIFICANT
NEGLIGIBLE		
LOW	○	●
MODERATE	○	●
HIGH	○	●

* Beneficial short- and long-duration impacts would occur at each location.

ESR-2/2 ESR-1/25

FIGURE S-34 IMPACTS ASSOCIATED WITH THE PROPOSED PEACEKEEPER RAIL GARRISON PROGRAM (ALTERNATIVE ACTION)

F.E. Warren Air Force Base, Wyoming. At F.E. Warren AFB, two siting options (north and south sites) are being considered. Impacts on all resources except cultural would not be significant for either siting option. The Proposed Action (for both siting options) is expected to result in significant long-duration impacts on cultural resources. These long-duration impacts at the north site would be moderate because 11 National Register of Historic Places (NRHP)-eligible sites and the Fort D.A. Russell/F.E. Warren National Register District would be affected. These impacts would be significant because of the NRHP recognition afforded the district. The long-duration cultural resource impacts at the south site would be low but also significant because the Fort D.A. Russell/F.E. Warren National Register District would continue to be affected either directly or through disturbance of sites outside but potentially associated with the district.

The LOI and significance ratings for all resources for both north and south siting options in the Alternative Action are the same as those in the Proposed Action.

The cumulative impacts of either the Proposed Action (north siting option) or the Alternative Action (north siting option) and the Small ICBM program would result in significant impacts for five resources. These are: socioeconomics, transportation, land use, cultural, and geology and soils. Short-duration socioeconomic impacts would be moderate and long-duration impacts would be high because inmigration would increase population in the Cheyenne area by 7.5 percent during construction (1995) and nearly 13 percent over baseline projections during operations (1991). These impacts would be significant because of the requirement for new housing and expanded school facilities, and the potential for revenue shortfalls in local jurisdictions.

Short- and long-duration transportation impacts would be high because the level of service rating along Randall Avenue would be reduced from B to D. These impacts would be significant because the level of service rating would drop to D, a substandard level. Short- and long-duration land use impacts would be low because one inhabited building is located within the land to be acquired in fee for the Small ICBM program. These impacts would be significant because the inhabited building within the explosive safety zone may require relocation. Long-duration cultural resource impacts would be high because of greater disturbance of historic sites. These impacts would be significant because of their national recognition. Long-duration geology and soil impacts would be moderate because of accelerated rates of erosion at the Small ICBM Hard Mobile Launcher (HML) vehicle operations training area, which would be barren for the life of the program. These impacts would be significant because soil erosion would result in an appreciable net loss of topsoil.

Impacts for all other resources would not be significant.

Barksdale Air Force Base, Louisiana. The Proposed Action at Barksdale AFB would result in significant impacts on transportation and biological resources. Both short- and long-duration impacts on transportation would be low because the level of service rating along Barksdale Boulevard would not change, remaining at D. These impacts would be significant because program-induced traffic would aggravate existing congested conditions. Long-duration impacts on biological resources would be high because the program would affect large areas, cause disturbances in surrounding wetland habitats, affect sensitive wildlife populations, and result in the degradation of local and regional biological communities. These impacts would be significant because of the ecological importance of the habitat and the concern these potential impacts would cause in natural resource management agencies.

Impacts for all other resources would not be significant.

The LOI and significance ratings for all resources with the Alternative Action are the same as those with the Proposed Action.

Dyess Air Force Base, Texas. The Proposed Action and the Alternative Action at Dyess AFB would not result in significant impacts on any resource.

Eaker Air Force Base, Arkansas. At Eaker AFB, two possible siting options (onbase and offbase sites) are being considered. The Proposed Action at Eaker AFB (onbase option) would result in significant impacts on cultural resources. Long-duration impacts on cultural resources would be high because construction would destroy portions of two sites, including a major prehistoric archaeological site, one of the most important of its kind in the region. These impacts would be significant because of the loss of its considerable research potential, reflected in its eligibility for the NRHP.

Impacts on all other onbase option resources would not be significant.

The Proposed Action at Eaker AFB (offbase option) would result in significant impacts on two resources: land use and cultural. Short- and long-duration impacts on land use would be low because one inhabited building is located within the proposed explosive safety zone. These impacts would be significant because one inhabited building may require relocation. Long-duration impacts on cultural resources would be low because two prehistoric sites of a type common in the region would be disturbed. These impacts would be significant because of the sites' research potential.

Impacts on all other offbase option resources would not be significant.

The LOI and significance ratings for all resources with the Alternative Action (both onbase and offbase options) are the same as those with the Proposed Action.

Fairchild Air Force Base, Washington. The Proposed Action at Fairchild AFB would result in significant impacts on land use and biological resources. Short- and long-duration land use impacts would be moderate because of impacts on visual attributes, and because one inhabitable building is within the explosive safety zone. These impacts would be significant because of the necessity to relocate the inhabitable building. Long-duration impacts on biological resources would be moderate because wetland areas would experience permanent disturbance and several federal-candidate and state-recognized sensitive species would likely be affected. These impacts would be significant because of the ecological importance of the habitats and the concern these potential wetland impacts would cause in natural resource management agencies.

Impacts for all other resources would not be significant.

The LOI and significance ratings for all resources with the Alternative Action are the same as those with the Proposed Action.

Grand Forks Air Force Base, North Dakota. The Proposed and Alternative Actions at Grand Forks AFB would not result in significant impacts on any resource.

Little Rock Air Force Base, Arkansas. The Proposed and Alternative Actions at Little Rock AFB would not result in significant impacts on any resource.

Malmstrom Air Force Base, Montana. At Malmstrom AFB, two possible siting options (south and east sites) are being considered. The Proposed Action (both south and east options) would result in significant impacts on socioeconomics and transportation. Short- and long-duration socioeconomic impacts (both south and east options) would be low because program-induced inmigration would cause population increases of 1.3 percent over baseline levels during construction (1992) and 1.1 percent over baseline levels during operations (1993). This level of program-induced population growth would result in low impacts on housing, education, public services, and public finances in the Great Falls area for both the peak and succeeding years. However, additional program-related population could aggravate existing overcrowded conditions in the Cascade County jail,

generating a significant impact for public services. Short- and long-duration transportation impacts (both south and east options) would be moderate because the level of service rating for segments of 10th Avenue South would further degrade existing D and E ratings. These impacts would be significant because program-induced traffic would aggravate existing congested conditions.

Impacts for all other resources would not be significant.

The LOI and significance ratings for all resources with the Alternative Action (both south and east siting options) are the same as those with the Proposed Action.

The cumulative impacts of either the Proposed or Alternative Actions, a second KC-135R squadron, and the proposed Small ICBM program would result in significant impacts on three resources: socioeconomics, transportation, and geology and soils. Both short- and long-duration socioeconomic impacts would be high because inmigration would increase population in the Great Falls area by more than 13 percent above baseline projections during the construction phase and 12.3 percent over baseline during operations. These impacts would be significant because of the need for expanded school facilities near the base, the aggravation of existing overcrowded conditions in the Cascade County jail, and revenue shortfalls in Cascade County. Both short- and long-duration transportation impacts would be high because the level of service rating for segments of 10th Avenue South would be reduced from D to E, and E to F. These impacts would be significant because the level of service would drop to lower substandard levels. Long-duration geology and soils impacts would be moderate for soil erosion because of increased rates of soil loss resulting from the deployment of the three programs. These impacts would be significant because of the permanent disturbance of 350 acres in the Small ICBM HML vehicle operations training area which would be barren for the life of the program, resulting in an appreciable loss of topsoil.

Minot Air Force Base, North Dakota. The Proposed and Alternative Actions at Minot AFB would not result in significant impacts on any resource.

Whiteman Air Force Base, Missouri. The Proposed Action at Whiteman AFB would result in significant impacts on two resources: land use and biological. Short- and long-duration land use impacts would be low because two inhabited buildings are within the explosive safety zone or on land to be acquired. These impacts would be significant because inhabited buildings may require relocation. Long-duration biological resources would be moderate because important wetland and forest habitat would be lost and the wildlife inhabiting those areas would be affected. These impacts would be significant because of the ecological importance of the habitats affected and the concern these potential impacts would create in natural resource management agencies.

Impacts on all other resources would not be significant.

The LOI and significance ratings for all resources with the Alternative Action are the same as those with the Proposed Action.

Wurtsmith Air Force Base, Michigan. The Proposed Action at Wurtsmith AFB would result in significant impacts on three resources: socioeconomics, biological, and water. Short-duration impacts on socioeconomics would be moderate because the program-related inmigration would cause population in the Oscoda area to increase by 7.6 percent over baseline forecasts in 1992 and by 7.2 percent in 1993. These impacts would be significant because of a potential shortage of temporary housing during the construction phase of the program.

Long-duration impacts on biological resources would be moderate because disturbances of the wetland areas onbase and offbase would be of concern, local drainage patterns would be altered, and the wildlife populations inhabiting those areas would be affected.

These impacts would be significant because of the ecological importance of the habitats which would be affected and the concern these impacts would create in natural resource management agencies. Long-duration impacts on water resources would be low because the additional water needed to supply program requirements is expected to have only a minor effect on local groundwater drawdown. These impacts would be significant because program water needs would be drawn from wells vulnerable to groundwater contamination from adjacent areas of the local aquifer.

Impacts on all other resources would not be significant.

The LOI and significance ratings for all resources with the Alternative Action are the same as those with the Proposed Action.

Safety Considerations

Public safety has been and will continue to be of utmost concern throughout the development and deployment of the Peacekeeper Rail Garrison system. Safety programs implemented during the original Peacekeeper in Minuteman Silos development are being continued and those involving deployment are being revised and expanded to reflect the Rail Garrison mobile basing concept. The analysis of safety concerns associated with the proposed deployment of the Peacekeeper Rail Garrison system included an evaluation of the risks posed by rail, air, and truck transportation of the missile stages and warheads. The potential for fires, explosions, and radioactive and nonradioactive material releases was evaluated. In addition, risk to the missile crews from exposure to radiation during day-to-day operations (the "mishap-free" risk) was analyzed along with the mishap-free risk to the general public which might exist during dispersal operations.

The analysis showed that while there is a very slight potential for mishaps with the deployment of the Peacekeeper Rail Garrison system, the system would be safe and would pose a negligible risk to human health and the environment. In the absence of a mishap, the materials in the Peacekeeper missile would not impose a health risk to those who would be exposed to them on a daily basis or to the general public.

All Peacekeeper Rail Garrison trains are expected to have a substantially better safety record than commercial rail traffic because the Peacekeeper locomotives and cars would be the most modern available, contain special safety features, be better maintained, and would be subjected to less wear than commercial rolling stock. If there were a mishap involving a train carrying missiles, protection would be afforded the missile by the launch canister and the missile launch car structure. Further, the inherent stability of the solid propellants make the missile an unlikely source of explosion or fire. Operational Peacekeeper trains have the added potential of a mishap involving radioactive materials. In the exceedingly unlikely event of a fire or explosion causing airborne dispersal of radioactive materials, the chance of exposed persons eventually developing cancer would increase. Though the consequence of developing cancer is considered serious, radioactive material dispersal is so unlikely to occur that it is considered a negligible risk.

The proposed routine uses of the national rail network are for training trains, for occasional movement of missiles (without warheads) between garrison installations and the MOB (F.E. Warren AFB, Wyoming) for maintenance, and for transferring a small number of missiles to Vandenberg AFB, California, for flight testing. Since the training trains would not carry missiles or warheads, there would be no additional hazard from the train cargo in a mishap. The train transport of missiles (without warheads) for maintenance and flight testing would involve a few trips and constitute a very small risk.

Air transport will be the primary means of moving the reentry systems, with nuclear warheads, to the deployment installations. The reentry system would be transported to the deployment bases by nuclear-certified Air Force aircraft and crews. The probability

of a mishap during air transport of the reentry systems is extremely small. In fact, the Air Force Special Cargo Squadron that handles these systems has transported nuclear materials for 25 years and has never experienced a mishap which created possibility of damage to the reentry system.

In the unlikely event of a mishap, the Department of Defense (DOD) and the U.S. Environmental Protection Agency (EPA) would respond by deploying teams specially trained and equipped to deal with any contingency. The control of access to the site, fires, and the rescue and treatment of casualties would be the most immediate concerns, and DOD teams would assist responding local, state, and federal agencies with these efforts. Recovery and safe removal of any weapons would begin as soon as DOD or U.S. Department of Energy explosive ordnance disposal and emergency response personnel arrive at the site. If radioactive materials were dispersed, the public would be kept at a safe distance and all contaminated areas would be treated to comply with EPA cleanup standards.

United States nuclear weapons include safety and arming mechanisms that assure that there is virtually no possibility of an inadvertant nuclear detonation during transportation or handling of the reentry system, or when it is on alert. There has never been even a partial nuclear detonation of a United States nuclear weapon as a result of a mishap. The few past mishaps involving nuclear weapons have imposed forces on the weapons as great as those which could result from a Peacekeeper Rail Garrison mishap. The Peacekeeper weapons can withstand these forces -- and even greater ones -- without resulting in a nuclear detonation.

No Action Alternative

With this alternative, the Peacekeeper Rail Garrison system would not be deployed. Activities at F.E. Warren AFB and the other candidate Air Force installations will continue to support other existing or proposed missions.

Mitigation Measures

Mitigation measures are undertaken to minimize the adverse environmental impacts of a given program. For the Peacekeeper Rail Garrison program, efforts have been made in the planning process and will continue to be made to avoid environmentally sensitive areas and thereby eliminate or reduce program impacts. In addition, other mitigation programs may be employed to rehabilitate or restore the affected environment or to reduce or eliminate impacts through preservation procedures.

1.0 PROGRAM OVERVIEW

In December 1986, President Reagan announced his decision to begin development of the Rail Garrison basing mode for the deployment of Peacekeeper missiles. In this basing mode, Peacekeeper missiles would be deployed on trains garrisoned at specified Air Force installations. Missile trains would remain in garrisons on a day-to-day basis, and would move off the installations onto the national rail network only during times of national need, such as the 1962 Cuban Missile Crisis. F.E. Warren Air Force Base (AFB), near Cheyenne, Wyoming, was designated by the President as the Main Operating Base (MOB) and the first garrison installation. In February 1987, the Air Force identified ten additional installations as candidate garrison locations. These candidate bases are Barksdale AFB, Louisiana; Dyess AFB, Texas; Eaker AFB (formerly Blytheville AFB), Arkansas; Fairchild AFB, Washington; Grand Forks AFB, North Dakota; Little Rock AFB, Arkansas; Malmstrom AFB, Montana; Minot AFB, North Dakota; Whiteman AFB, Missouri; and Wurtsmith AFB, Michigan (Figure 1.0-1).

In 1987, Congress appropriated $350 million for Peacekeeper Rail Garrison research and development. The Senate Armed Services Committee report that accompanied the fiscal year 1988-1989 Department of Defense (DOD) Authorization Act (April 1987) urged the Air Force "to continue to preserve the option for an early 1990s deployment, including the conduct of siting studies and a site-specific environmental impact statement (EIS) on the peacetime deployment and operation of the Peacekeeper Rail Garrison system . . . ."

In May 1988, the Secretary of Defense, after a Defense Acquisition Board review of the Peacekeeper Rail Garrison system, authorized the Air Force to proceed with the full-scale development of the Peacekeeper Rail Garrison program.

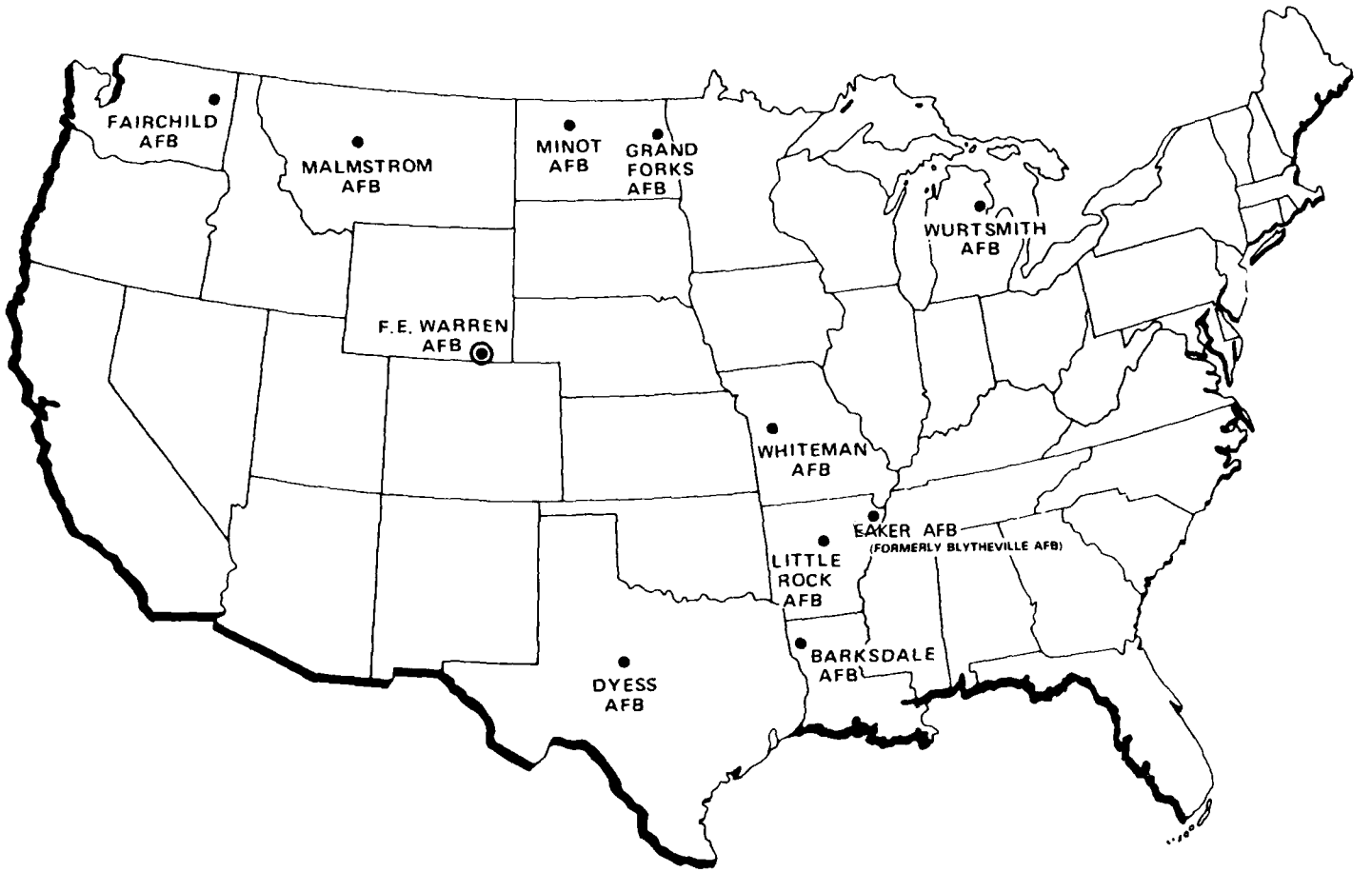
This Draft EIS was prepared to aid in the following interrelated decisions: whether or not to deploy Peacekeeper missiles in the Rail Garrison basing mode, how many Peacekeeper missiles to deploy in this mode, the deployment locations, facility sitings at deployment locations where alternative sitings are available, and mitigation actions to reduce identified significant adverse impacts associated with system deployment.

1.1 Purpose and Need

The United States has historically relied on the concept of deterrence to maintain peace. Deterrence may be defined as having sufficient military strength and the perceived willingness to use that strength after an enemy attack to inflict unacceptable damage on the enemy, thus inhibiting them from striking in the first place. United States strategic forces consist of intercontinental ballistic missiles (ICBMs), submarine-launched ballistic missiles, and long-range bombers. This three-component force is commonly referred to as the Strategic Triad.

In recent years, there has been growing concern about the vulnerability of the Strategic Triad to the emerging Soviet threats. Specifically, the concern is about the increasing accuracy of Soviet missiles, threatening the future of silo-based ICBMs; the vulnerability of the submarine force to a future technological breakthrough in surveillance capabilities; the hardening of Soviet strategic targets making them less vulnerable to our arsenal of missiles; and the aging of the United States bomber force which, combined with an ever-improving Soviet air defense system, raises concern about the ability of this part of the Strategic Triad to execute missions.

To address these concerns, in January 1983 President Reagan established a bipartisan commission called the President's Commission on Strategic Forces, also referred to as the "Scowcroft Commission," to review the strategic forces modernization program. One of the Commission's recommendations was to deploy 100 Peacekeeper missiles in Minuteman silos in order to hold hardened Soviet targets at risk and promote arms talks. Congress and the President endorsed this recommendation. Accordingly, in



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FIGURE 1.0-1 LOCATION OF AIR FORCE BASES PROPOSED FOR DEPLOYMENT OF THE PEACEKEEPER RAIL GARRISON SYSTEM

January 1984, the Air Force prepared and filed an EIS for the deployment of 100 Peacekeeper missiles in modified Minuteman silos at F.E. Warren AFB. Later, in the 1986 DOD Authorization Act, Congress limited the deployment of Peacekeeper missiles to 50 and asked the President to propose a more survivable basing mode for the remaining 50. Accordingly, in December 1986, the President decided to begin development of the Rail Garrison system for Peacekeeper missiles as the basing mode for the second 50 missiles.

1.2 Structure of the Environmental Impact Statement

The environmental issues addressed in this EIS were identified through the public scoping process, through consultations with federal and state agencies, and by Air Force and contractor personnel who have had experience with programs of similar scope. For discussion and analysis, the issues are grouped into ten resource categories: socioeconomics, utilities, transportation, land use, cultural, biological, water, geology and soils, air quality, and noise. This chapter provides a description of the Proposed and Alternative Actions and the resources needed for the construction and operation of the Peacekeeper Rail Garrison system. Potential program-induced impacts are summarized and compared for each deployment location in Chapter 2.0 (Summary and Comparison of Program Impacts), which also summarizes national-level impacts on the economy and national railroad network, and safety concerns related to the program. Certain technical aspects of the engineering design and operating concepts for the Peacekeeper Rail Garrison system are still undergoing change. However, the relative environmental impacts of the Proposed Action and alternatives are not expected to change substantially as a result of these continuing developments.

Chapter 3.0 (Environmental Analysis Methods) presents general methods for baseline and impact analyses which are common to all locations, and Chapter 4.0 (Affected Environments and Environmental Consequences) provides a description of both the affected environments and environmental consequences for the MOB and each of the ten other candidate garrison bases. This approach allows readers at different locations across the United States to review a complete section that deals with the location of their interest. The sections introducing each base in Chapter 4.0 include a description of the proposed program activities and the facilities to be constructed at that particular base. This discussion is immediately followed by a description of the affected environment and environmental consequences of the Proposed and Alternative Actions for each of the ten environmental resources. It concludes with a description of the No Action Alternative, irreversible and irretrievable resource commitments, and the relationship between the local short-term use of man's environment and the maintenance and enhancement of long-term productivity. Program descriptions that are common to all locations and all environmental resources are addressed in Chapter 1.0 to avoid repetition.

Chapter 5.0 (Safety Considerations) presents a discussion of system safety and environmental consequences of mishaps relating to system operations. Chapters 6.0 through 11.0 consist of the following supporting information: Federal Actions, List of Preparers, List of Recipients, Bibliography, Glossary of Terms and Acronyms, and Index. Finally, Appendix A summarizes the mitigation measures that can be taken to reduce the effect of the significant adverse impacts identified in this document.

1.3 Peacekeeper Rail Garrison System Description and Locations

This section describes Peacekeeper missiles, Peacekeeper trains, and the training trains. Additionally, it describes the MOB, candidate garrison installations, and associated facilities, as well as the overall system concept and deployment.

1.3.1 Peacekeeper Missile

The Peacekeeper missile is 71 feet long, 92 inches in diameter, and weighs approximately 195,000 pounds (Figure 1.3.1-1). This four-stage ICBM is designed to deliver up to ten independently targeted and highly accurate nuclear warheads. The first three of the four propulsion stages use solid propellants, while the fourth uses liquid fuels. The reentry system of the missile consists of a deployment module which contains up to ten reentry vehicles, and a protective nose cone (ascent shroud) which is jettisoned during Stage III flight.

1.3.2 Peacekeeper Trains

Each Peacekeeper train would have two locomotives, two security cars, a launch control car, two missile launch cars, a maintenance car, and several supplemental cars as required for operations (Figure 1.3.1-1). Where possible, standard commercial railroad equipment would be used to make up the trains. The missile launch cars would be heavier than standard cars used in commercial service, but would be designed for compatibility with the operating parameters (weight and geometry) of the national rail network. Each car would carry a single Peacekeeper missile in its erectable launch tube (canister), the necessary ground support equipment, and special security equipment, including alarms and systems to prevent access to the missile by unauthorized personnel.

The launch control car would carry the equipment necessary for monitoring and controlling the status of all essential equipment on the train, including the missiles, and for all required communications both within the train and with higher authority. It would be manned by the missile combat crew commander and a two-person combat crew.

The two security cars would carry a variety of sensors for monitoring the area surrounding the train, and would also monitor all intrusion alarms installed on the train itself. Security personnel would be appropriately armed, and have reliable communications both within the train and with supporting forces.

The maintenance car would carry both essential spare parts and the tools and equipment required to keep the Peacekeeper system and the train in proper operating condition.

1.3.3 Training Trains

The Peacekeeper Rail Garrison concept includes training trains. Each training train provides a complete training environment with the capability to simulate all events required for Peacekeeper train crew dispersal training. Each training train consists of: two locomotives; two security cars; a launch control car; two missile launch cars, which are physically and electronically similar to the Peacekeeper missile launch cars, but without propellants and warheads; and a maintenance car.

1.3.4 Main Operating Base

F.E. Warren AFB, Wyoming, the MOB, would be the primary location for the assembly, integration, major maintenance, and operations support of the missile system. The MOB would provide operational support to all garrisons and training for system personnel, and would also be one of the garrison installations. As a garrison installation, the MOB would require most of the same facilities that would be needed at any other garrison installation.

The existing technical facilities, manpower, and equipment established for the Peacekeeper in Minuteman Silos mission at F.E. Warren AFB would also be utilized, where possible. These Peacekeeper facilities include the existing assembly, surveillance, and inspection building; weapons storage area (WSA); stage storage area; stage transfer facility; integrated support complex; and contractor support area.

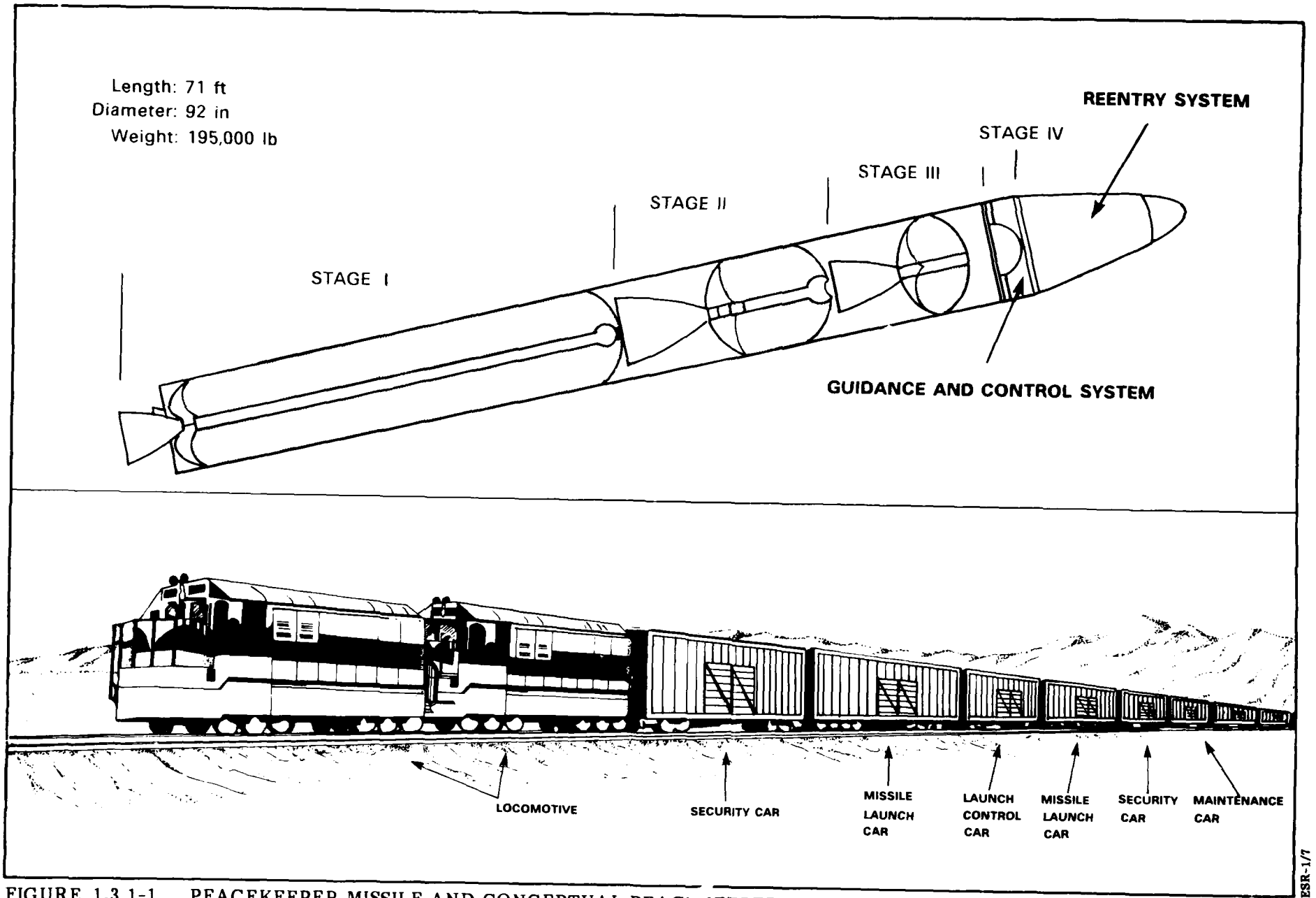


FIGURE 1.3.1-1 PEACEKEEPER MISSILE AND CONCEPTUAL PEACEKEEPER TRAIN

1.3.5 Candidate Garrison Installations

The garrison at each of the installations would be a secured area of approximately 150 acres (Figure 1.3.5-1), enclosed by a double chain link security fence. It would accommodate Train Alert Shelters (TASs) and the major Peacekeeper Rail Garrison operational, security, and maintenance facilities. The typical geographical relationship of the garrison facilities is depicted in Figure 1.3.5-1.

Train Alert Shelter. Each TAS would consist of an 800-foot-long earth-covered igloo and a 400-foot-long attached shelter. The igloos would house mission-related rail cars while the shelters would house supplemental rail cars. The TAS complex would be surrounded by an explosive safety zone which would extend 3,760 feet out from the edge of the igloos.

The TAS would also provide space and equipment for removal and replacement of operational support equipment, and minor inspection and servicing of the train.

Garrison Alert and Security Control Center. The Garrison Alert and Security Control Center would function as living quarters and staging area for the train alert crew and garrison security personnel, and provide security monitoring and response for the entire garrison.

Entry Control Facility. The Entry Control Facility would serve as a secure entry/exit point for the entire garrison.

Standby Power Facility. The Standby Power Facility would provide backup power to the garrison electrical distribution system in the event of failure of commercial power, the prime source.

Garrison Maintenance Facility. The Garrison Maintenance Facility would accommodate mating and demating of the missile reentry system, scheduled maintenance and inspection of locomotives and major operational support equipment, as well as routine maintenance on the environmental control system and power systems. The facility would require an explosive safety zone with a radius of 2,965 feet. The Garrison Maintenance Facility would include a temporary holding area for the reentry system and would be designed to meet DOD safeguards for nuclear weapons handling.

Security Lighting and Fences. Each garrison area would be surrounded by a double security fence. There would be a cleared and graded zone of 30 feet between the inner and outer fences. Clearance from the outer fence to the outermost edge of the outer clear zone would be 87 feet (45 ft from outer fence to 12-ft-wide security road and 30-ft outer clear zone). Regularly spaced, high-mounted light fixtures would be placed throughout the garrison. At some of the 11 candidate bases, the garrison would be constructed adjoining an existing WSA. Existing or upgraded security systems, lighting systems, and fencing would be extended to include the existing WSA.

Rail Spurs, Roads, and Utilities. The rail spur would be standard gauge rail designed to connect the garrison facilities with existing commercial rail systems. Each garrison would be connected by a rail spur to the commercial rail system. Roads within the garrison would be constructed to serve the facilities with particular attention given to garrison security. Electrical power would be supplied to the garrison from available commercial sources. Other utilities would be designed and installed based on each garrison's unique needs, and are expected to include sanitary sewer, storm drainage, water distribution, natural gas distribution, communications systems, and underground electrical distribution.

Training Train Shelter and Spur. A shelter for the training train would be constructed outside the explosive safety zone of the garrison. It would be approximately 800 feet

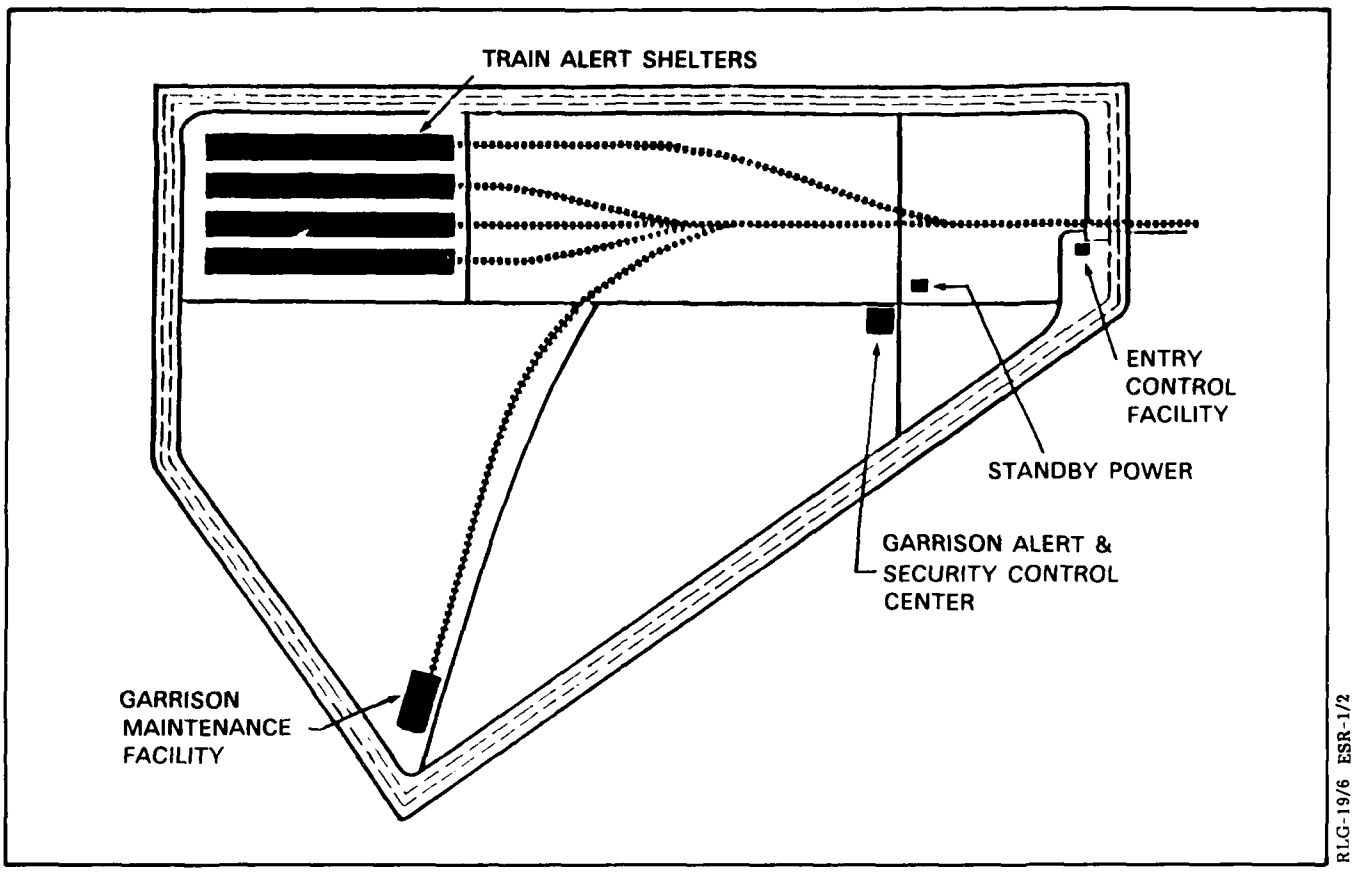


FIGURE 1.3.5-1 TYPICAL RAIL GARRISON FACILITY LAYOUT

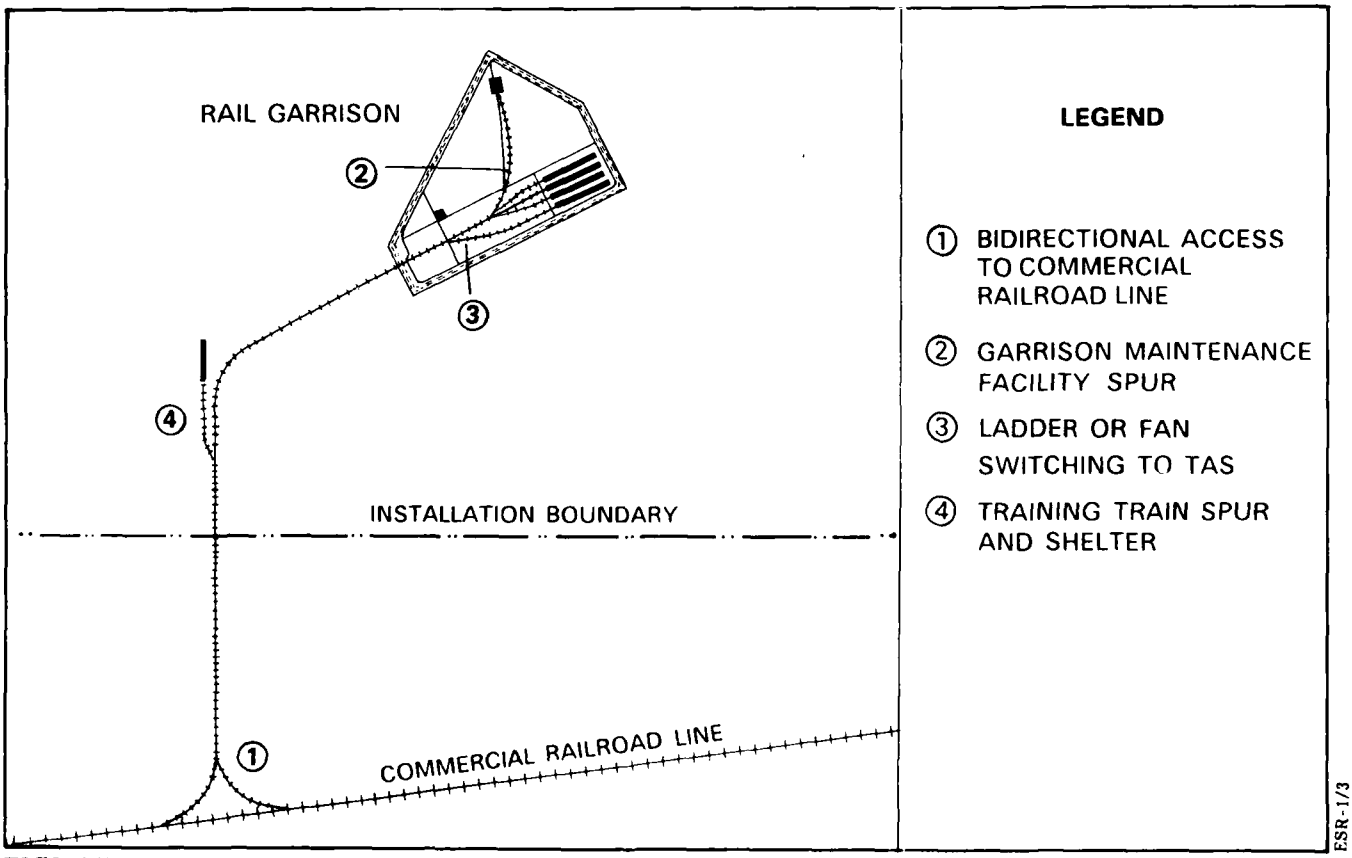


FIGURE 1.3.5-2 TYPICAL RAIL NETWORK CONNECTING GARRISON FACILITIES TO THE COMMERCIAL RAILROAD LINE

long and would be connected through a side spur to the main rail spur which, in turn, connects the garrison to the commercial rail lines. Figure 1.3.5-2 depicts the typical rail network associated with the Peacekeeper Rail Garrison system on and in the vicinity of the candidate garrison bases.

Technical and Support Facilities. Support facilities at the garrison installations would include those necessary for system operations, maintenance, training, and personnel support. These functions would occur in either existing, modified, or newly constructed facilities on the bases but outside of the garrisons. Support facility locations vary on an installation-by-installation basis, and are described for each installation in Chapter 4.0.

1.3.6 System Concept and Deployment

The Peacekeeper Rail Garrison concept would place two Peacekeeper missiles on each train. The trains and necessary support facilities would be located at up to 11 secure garrisons on specified military installations. While in the garrisons, the missiles would be on alert as are current silo-based missiles. The missiles and trains would not be moved out of the garrison except during times of national need.

Except for final installation of the reentry systems containing nuclear warheads into the missiles, the trains would be fully assembled and completely tested at F.E. Warren AFB, the MOB, prior to deployment. They would then be sent to their destinations. The reentry systems would also be assembled and tested at the MOB. However, they would not be transported on the trains being deployed, but would be shipped by air and installed in the missiles at the Garrison Maintenance Facility. The trains would then be placed on alert in their assigned TASs and would be maintained on alert by Air Force personnel.

If major maintenance, repair, or operational testing requires movement of a missile in its missile launch car to the MOB or other facility, the reentry system would be removed and stored temporarily in the Garrison Maintenance Facility pending arrival of a replacement missile launch car.

When directed by the National Command Authority, trains could be moved onto the national rail network. Within several hours of notification, Peacekeeper trains could disperse over many thousands of miles of track, thereby complicating the enemy's targeting task.

Training trains that physically and electronically simulate the missile trains, but have no missile propellants or warheads onboard, would be moved on the national rail network frequently to provide operational experience and system assurance. All train movements, whether training, maintenance, or operational, would be coordinated with appropriate rail company personnel to ensure safe and efficient movement.

Deployment includes preconstruction and construction activities, assembly and checkout (A&CO) of facilities and support equipment, and demonstration and delivery to the Strategic Air Command (SAC). The deployment efforts of the Peacekeeper Rail Garrison program would be directed toward providing one train with two missiles and one training train to SAC to constitute Initial Operational Capability as early as December 1991. Full Operational Capability of the system achieved by the deployment of the remaining trains and missiles could be reached as early as December 1993.

1.4 Proposed Action

For the Proposed Action, F.E. Warren AFB, Wyoming, has been designated as the MOB and the first garrison installation of the Peacekeeper Rail Garrison system. Ten other candidate garrison installations are being considered. Final selection of garrison installations and sequence of deployment will be made after the Final EIS is filed. For the Proposed Action, the following activities would occur:

- Deployment of 50 Peacekeeper missiles on 25 trains based at F.E. Warren AFB and up to ten other candidate installations;
- Deployment of up to four Peacekeeper trains at each garrison;
- Deployment of two training trains;
- Construction of a four-TAS garrison and other program-related facilities at F.E. Warren AFB and other selected garrison installations;
- Modification and/or rehabilitation of existing onbase facilities and construction of new facilities at F.E. Warren AFB and the other selected garrison installations, including the rail spurs required to support deployment and operations activities;
- Modification or rehabilitation of existing and/or construction of new rail spurs that connect to the existing commercial rail network at F.E. Warren AFB and the other selected garrison installations;
- Modification of existing or construction of new roads, utilities, and communication support facilities at F.E. Warren AFB and other selected garrison installations;
- Construction of a Missile Assembly Building (MAB) at F.E. Warren AFB and modification of the existing canister processing facility for rail car processing activities;
- Modification and/or rehabilitation of existing onbase facilities at F.E. Warren AFB, and construction of any new facilities required to support the Peacekeeper Rail Garrison maintenance and training activities; and
- Construction of military family housing onbase or offbase at those bases selected for deployment where the private sector cannot respond to the need.

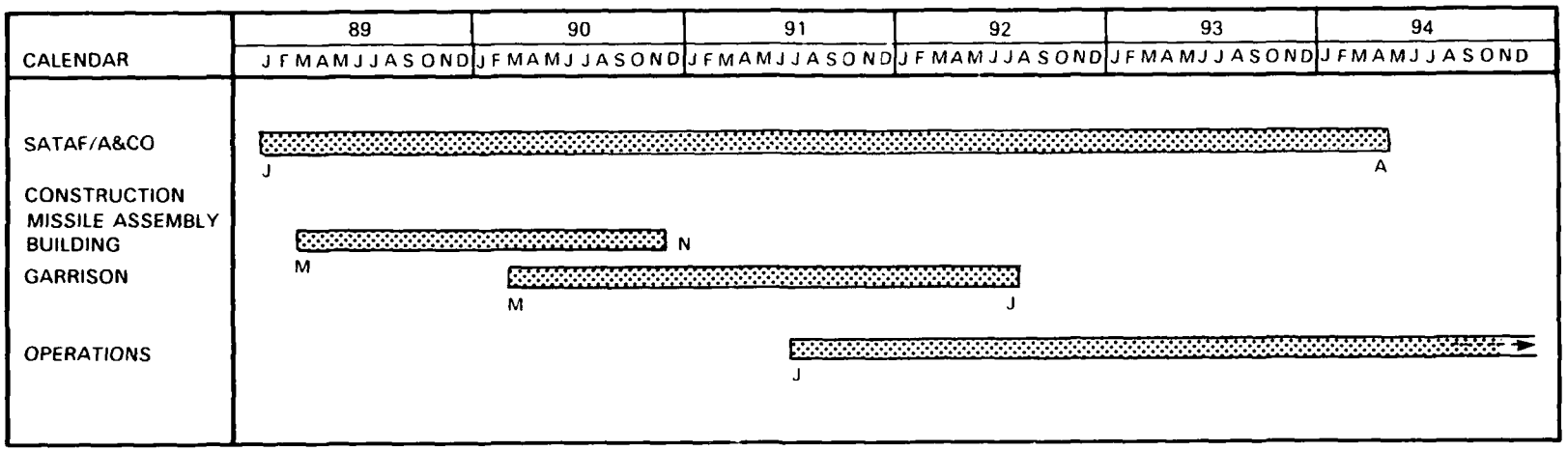
1.4.1 Deployment Schedule

The proposed schedule for construction, Site Activation Task Force (SATAF) activities, A&CO, and system operations at F.E. Warren AFB is shown on Figure 1.4.1-1. The SATAF activities would start in January 1989 and end in April 1994. Construction of the MAB would begin in March 1989 and be completed by November 1990. Construction of other program-related facilities at F.E. Warren AFB would begin in March 1990 and be completed by July 1992. Operations-related personnel would begin to arrive in July 1991 and would reach a full complement as early as December 1991.

For other candidate installations, the associated construction, SATAF, A&CO, and operations activities are described on a "floating timeline" (Figure 1.4.1-2). This timeline starts at month 1 with the start of SATAF operations at each base. The SATAF and A&CO activities would continue until completion in month 31. Construction of facilities would begin in month 3 and continue through month 30. Operations-related manpower would begin to arrive during month 21 and reach full deployment by month 26.

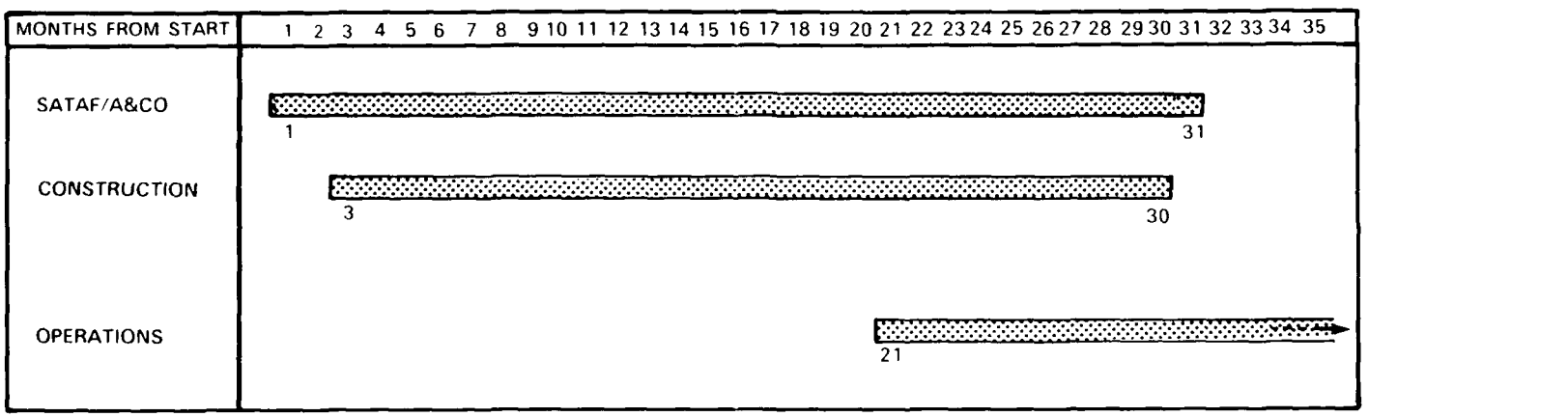
1.4.2 Construction Scenario

Construction activities for the Peacekeeper Rail Garrison program would include both new construction and modifications to existing facilities, roads, railroads, and utilities at F.E. Warren AFB and the other selected garrison installations. There are variations in the construction program for the MOB and the other candidate installations. While the garrison at each installation would be capable of containing the same number and types



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FIGURE 1.4.1-1 PEACEKEEPER RAIL GARRISON PROGRAM, SCHEDULE OF ACTIVITIES AT F.E. WARREN AFB, WYOMING



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FIGURE 1.4.1-2 PEACEKEEPER RAIL GARRISON PROGRAM, SCHEDULE OF ACTIVITIES AT A TYPICAL GARRISON INSTALLATION OTHER THAN F.E. WARREN AFB, WYOMING

of facilities, the actual size and layout of the garrison would vary. Similarly, the construction program would vary among selected installations for technical facilities not within the garrison area including dormitories, dining facilities, and other similar personnel support facilities. Facilities to be constructed at each base are discussed in Chapter 4.0.

The facilities needed to support the Peacekeeper Rail Garrison program at each of the selected installations would be provided through the construction of new facilities, or by using, renovating, or making additions to existing base facilities. Figure 1.4.2-1 summarizes the facility requirements at each installation. Individual base descriptions in Chapter 4.0 contain maps that depict the approximate facility locations at F.E. Warren AFB and each of the other candidate installations.

Construction activities at the MOB may begin as early as March 1989, along with the site preparation for the MAB and the construction of roads and utilities needed to service the MAB. Completion of the MAB is scheduled for November 1990. Construction of the personnel support facilities, and associated roads and utilities, could begin as early as 1990 and finish by 1992.

Construction activities for the other selected installations would occur over a 27-month period. Site preparation and construction of roads, railroads, and utilities for the technical facilities would occur simultaneously. The actual construction or modification of the required technical facilities for each base would begin after the associated infrastructure is in place. Site preparation and construction/modification of roads and utilities for the personnel support facilities would begin approximately one year after work on the technical facilities has begun. Construction or modification of the required personnel support facilities would begin as early as possible following the related site work.

1.4.3 Site Activation Task Force and Assembly and Checkout

The SATAF activities involve government agencies that assist with construction and field contract administration functions, and consist of the management and general integration of all field activities at the MOB and the selected garrison installations. The A&CO contractor would assemble/install mechanical and electrical equipment, install the power and interconnect cables, and functionally check out other installed equipment.

The SATAF activities at F.E. Warren AFB could start as early as January 1989 and continue until April 1994. The A&CO activities at F.E. Warren AFB could begin as early as July 1990 and continue through April 1994. For the other candidate garrison installations, SATAF and A&CO activities would begin in the 1st month and continue through the 31st month.

1.4.4 Operations Scenario

As the MOB, F.E. Warren AFB would be responsible for the assembly and integration of the Peacekeeper missiles, their installation onto the missile launch cars, and the makeup of completely assembled and tested trains ready for delivery to the receiving garrisons. It would also have a garrison area with Peacekeeper trains on alert.

Each garrison would house up to four Peacekeeper trains, with two Peacekeeper missiles on alert on each train, and with all standard and auxiliary cars connected, properly maintained, and ready for deployment. Two missile combat crews would perform continuous duty in separate launch control cars located within the garrison TASs. The two-person crews would have primary responsibility for Peacekeeper status monitoring, command, and control. Together they would perform the normal day-to-day weapon system functions. Once on the rail network, the Peacekeeper trains would resemble and operate in a manner similar to existing commercial freight trains.

Facility	Main Operating Base F.E. Warren AFB
Main Operating Base Facility	
Missile Assembly Building	N
Trainer and Instruction Facility	A
Missile Launch Car Training Facility	N
Rail Car Preparation Facility	A
Central Preparation Kitchen	A

CANDIDATE GARRISON INSTALLATIONS

Facility	F.E. Warren	Barksdale	Dyess	Eaker	Fairchild	Grand Forks	Little Rock	Malmstrom	Minot	Whiteman	Wurtsmith
Garrison Facilities											
Train Alert Shelter	N	N	N	N	N	N	N	N	N	N	N
Garrison Alert and Security Control Center	N	N	N	N	N	N	N	N	N	N	N
Entry Control Facility	N	N	N	N	N	N	N	N	N	N	N
Standby Power Facility	N	N	N	N	N	N	N	N	N	N	N
Garrison Maintenance Facility	N	N	N	N	N	N	N	N	N	N	N
Support Facilities											
Missile Operations Facility	N	N	N	N	N	N	N	A	N	N	N
Fuel Storage Facility	N	N	E	N	N	E	N	E	N	N	N
Communications Maintenance Facility	A	N	N	N	N	N	N	A	N	N	N
Training Train Shelter	N	N	N	N	N	N	N	N	N	N	N
Integrated Maintenance Facility	E	N	N	N	N	N	A	A	A	A	N
Fire Station	N	N	N	N	A	N	N	N	N	N	E
Base Supply and Equipment Warehouse	E	A	N	E	A	E	E	A	N	N	N
Unaccompanied Enlisted Personnel Housing	N	N	E	E	E	N	E	N	N	N	N
Family Housing	E	E	E	E	E	E	E	N	E	N	N
Rail Spur											
Onbase	T	N	T	N	T	N	T	N	T	N	T
Offbase	N	N	T	N	T	N	U	N	U	T	U

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N = New facility or track. A = Additions to existing or planned base facility. E = Adequate existing or planned base facility.

U = Upgrading or rehabilitation of existing track. T = Combination of new track and upgrading/rehabilitation of existing track.

FIGURE 1.4.2-1 PEACEKEEPER RAIL GARRISON TECHNICAL AND SUPPORT FACILITIES REQUIRED AT THE MAIN OPERATING BASE AND CANDIDATE GARRISON INSTALLATIONS

The Air Force would comply with Federal Railroad Administration operating rules and provide crews qualified to operate the locomotives. The railroads would provide a pilot who is fully knowledgeable on the physical characteristics and rules of operations over the segment of railroad on which the train is to be moved.

While dispersed, each train would operate independently of each other and remain under the command of the Air Force train commander. Command and control of the Peacekeeper missile would be maintained by a two-person missile combat crew, located in the launch control car. The crew would be in constant contact with the National Command Authority and would maintain the capability of reacting to directives.

The dispersed Peacekeeper trains would carry their own security systems and security personnel. Two security cars would be part of each train. Each would carry a well-trained and appropriately armed security team. The trains would be equipped with a variety of sensors that detect direct threats and with others that provide 24-hour surveillance of the surrounding areas. Physical barriers would preclude unauthorized access and provide protection to the crew and weapon system from small arms. Additional precautions would be taken, as appropriate.

Once dispersed, the Peacekeeper train could continue to operate on the nation's rail network until directed by the National Command Authority to return to the garrisons. Supplies such as fuel, sand (for application to the rails to increase traction), food, or water would be carried onboard the train. When necessary, resupply would be accomplished in a variety of ways, including local purchases, servicing in train yards, servicing by mobile servicing vehicles, and servicing from military installations.

1.4.5 Maintenance Scenario

Missile Maintenance. Peacekeeper missile maintenance would be performed at the garrisons, MOB, existing Air Force depots, and on the railroad network when the system is in the dispersed mode of operation.

At the garrisons, train maintenance would consist of removal and replacement of operational support equipment, and minor inspection and servicing of trains. The reentry systems would be mated/demated in the Garrison Maintenance Facility. Maintenance of the canisterized missile would require removal of the reentry system at the Garrison Maintenance Facility and transportation of the missile in the missile launch car to the MOB for disassembly and repair. If repairs cannot be undertaken at the garrison or MOB, equipment would be transported to an appropriate depot facility for repair, refurbishing, or modification.

Train Maintenance. Major maintenance of locomotives and rail equipment (e.g., wheel truck assemblies) would be performed under an interservice support agreement or by contractor logistics support. Train maintenance would be performed in accordance with Federal Railroad Administration and American Association of Railroads procedures, and would meet or exceed their standards.

Maintenance During Dispersal. The missile train's onboard maintenance team would perform repair/replacement of launch critical components and operation support equipment. Spares replenishment and other major maintenance would be accomplished either by a rendezvous with support personnel dispatched from a garrison, or by the train returning to the nearest garrison.

1.4.6 Training Scenario

Training would be conducted at existing designated technical training centers that provide courses in the necessary basic skills. These include Chanute AFB, Illinois, for missile maintenance; Lowry AFB, Colorado, for munitions maintenance; Keesler AFB,

Mississippi, for communications; Lackland AFB, Texas, for security police; and Vandenberg AFB, California, for operations crew training. Simulators would be used to provide hands-on training for both maintenance and operations personnel. These simulators and other training tools would be located at the technical training centers, MOB, and each garrison installation. Training on the actual system equipment would also occur at the MOB and other garrison installations. Air Force train operators will be trained at existing commercial railroad training centers.

In addition to fixed trainers, two training trains would be based at F.E. Warren AFB and would travel to each garrison to conduct dispersal training exercises. These trains would physically and electronically simulate the missile trains, but would have no missile propellants or warheads onboard.

1.4.7 System Test Scenario

The test program is divided into three phases: development testing, integration testing, and weapon system testing. The majority of these tests will be conducted at Vandenberg AFB, California. These include:

- Development tests that use the commercial rail network and standard rail practices.
- Integration testing including canister assembly launch testing, rail car dynamics testing, transportation and handling equipment tests, horizontal reentry system and missile guidance tests, and control installation tests. Integration testing would also include a launch control and train security test.
- Weapon system tests, including up to five basing verification launches (flight tests) from Vandenberg AFB.

Information concerning Vandenberg AFB testing can be found in the Environmental Assessment for the Peacekeeper Rail Garrison Test Program at Vandenberg AFB, California (U.S. Air Force 1988). Peacekeeper Rail Garrison test facility requirements at other locations are generally minor and form part of their regular missions.

1.4.8 Program Resource Requirements

The total cost of the Peacekeeper Rail Garrison program is estimated at between $10 billion and $15 billion (in 1986 dollars). This includes research and development, production, construction, and operations over a 20-year period.

Manpower Requirements. Manpower requirements at F.E. Warren AFB, the MOB, would be higher than at other garrison installations. At F.E. Warren AFB, the work force during the construction phase (1989-1991) would peak at 408 in 1990. The A&CO and SATAF activities would generate an average of 150 jobs per year during the 1989 to 1994 period with a peak of over 205 workers in 1991. During the operations phase, the work force, consisting of mostly military personnel, would stabilize at 442 employees.

At the garrison bases, construction work would be spread over three years and would require up to 375 workers in the peak year, depending on the base. The A&CO and SATAF activities would generate an additional 42 jobs in the peak year. In the operations phase, up to 426 military and civilian personnel would be required. These manpower requirements would be lower for bases with existing missile operations where some existing professional expertise can be shared among programs. In addition, some savings in manpower would be realized where the garrisons can be sited adjacent to existing facilities with similar security requirements. Details of manpower requirements for individual bases are provided in Chapter 4.0, Sections 4.2 through 4.12.

Land Requirements. At a typical base, approximately 150 acres of land would be required for garrison facilities. At a number of locations, offbase lands would be required for the garrison, explosive safety zones, relocated facilities, or combinations thereof. Land would be acquired in fee simple for the construction of program-related facilities. Restrictive easements would be acquired for explosive safety zones. These restrictive easements give the United States government the right to prohibit the erection of structures used for residences, public assembly, or commercial purposes (if people will be present); public gatherings of 25 people or more; the use of firearms within a certain distance of the garrison; the use of explosives within a certain distance of the garrison; and the use of burning as a medium for clearing stubble or other vegetation from the property. The restrictive easements also grant the United States government the right to enter the property to enforce these restrictions. Agricultural activities are not affected in any way by the restrictive easements. Land requirements vary considerably; for instance, at Barksdale AFB, both the garrison and the explosive safety zone could be accommodated on existing Air Force land; however, at Minot AFB, both the garrison and associated explosive safety zone would be sited on what is currently private land. Finally, land would be acquired in fee simple for the connecting rail spur between the base and the commercial main line located offbase if a new spur is required. Details of land requirements at each base location are described in Chapter 4.0.

Where an inhabited structure is located within the explosive safety zone, there are three possible options available to the owners:

- The owner may sell his or her residence and the associated improvements to the Air Force while retaining ownership of the land subject to the Air Force restrictive easement. The Air Force would pay fair market value for the structures and the reduction in the value of the property resulting from the easement. The owner would be given the opportunity to repurchase the house and improvements at salvage value. Relocation benefits would be paid as authorized by law.

- The owner may sell only the house while retaining ownership of land (subject to the restrictive easement) and uninhabited buildings within the explosive safety zone. (The proceeds can be used to build a new residence outside the explosive safety zone.) Relocation benefits would be paid as authorized by law.

- The owner who wishes to remain in his or her present residence despite the safety risk, may request to do so. The Air Force would process a request for exemption from the explosive safety zone criteria to the Secretary of the Air Force. The Secretary of the Air Force has the discretion to grant an exemption to the landowner after a case-by-case analysis of the risks to the landowner in allowing the residence and its occupants to remain within the explosive safety zone. Each homeowner who receives an exemption must acknowledge in writing that he or she understands the requirement for the explosive safety zone, that the Air Force is willing to acquire the structures and provide relocation assistance as provided by law, and that he or she desires to remain in spite of the potential risks.

1.5 Alternative Action

In February 1988, the Secretary of Defense announced his preference to deploy 100 Peacekeeper missiles in the Peacekeeper Rail Garrison basing mode, including the 50 Peacekeeper missiles initially deployed in Minuteman silos at F.E. Warren AFB. This preference is represented as the Alternative Action in this EIS. With this alternative, between four and six trains would be deployed in the garrison at F.E. Warren AFB, the MOB, and at up to ten of the candidate deployment installations.

Construction, A&CO, operations, maintenance, training, and system test scenarios for the Alternative Action would be similar to those described for the Proposed Action. Only the duration of A&CO activities would change. For the Alternative Action, the following activities would occur:

- Deployment of 100 Peacekeeper missiles on 50 trains based at F.E. Warren AFB and up to ten other candidate installations;
- Deployment of up to six Peacekeeper trains at each garrison;
- Deployment of four training trains;
- Construction of a six-TAS garrison and other program-related facilities at F.E. Warren AFB and other selected garrison installations;
- Modification and/or rehabilitation of existing onbase facilities and construction of new facilities at F.E. Warren AFB and the other selected garrison installations, including the rail spurs required to support deployment and operations activities;
- Modification or rehabilitation of existing and/or construction of new rail spurs that connect to the existing commercial rail network at F.E. Warren AFB and the other selected garrison installations;
- Modification of existing or construction of new roads, utilities, and communication support facilities at F.E. Warren AFB and other selected garrison installations;
- Construction of a MAB at F.E. Warren AFB and modification of the existing canister processing facility for rail car processing activities;
- Modification and/or rehabilitation of existing onbase facilities at F.E. Warren AFB, and construction of any new facilities required to support the Peacekeeper Rail Garrison maintenance and training activities; and
- Construction of military family housing onbase or offbase at those bases selected for deployment where the private sector cannot respond to the need.

Manpower Requirements. The Alternative Action, providing six TASs at the MOB and at each of the garrison bases, would require slightly higher construction and operations manpower. At F.E. Warren AFB, 422 construction workers and 233 SATAF and A&CO workers would be required in the peak year. This represents an increase of 14 construction workers and 28 SATAF and A&CO workers over the Proposed Action requirements. Operations manpower for the Alternative Action would stabilize at 486 military and civilian personnel compared to 442 for the Proposed Action.

At the garrison bases, construction work would require up to 387 workers in the peak year, an increase of 14 workers over the Proposed Action. Increases in SATAF and A&CO workers would amount to 9 persons for a total of 51 workers in the peak year. During the operations phase, up to 468 military and civilian personnel would be required for the Alternative Action, representing an increase of 42 persons over the Proposed Action. Details of manpower requirements at each base are provided in Chapter 4.0, Sections 4.2 through 4.12.

Land Requirements. Approximately 30 additional acres (about 180 acres total) would be required for the expanded garrison facilities. Other technical and personnel support facility requirements for the Alternative Action would be essentially the same as for the Proposed Action. Details of land requirements at each base are provided in Chapter 4.0, Sections 4.2 through 4.12.

Reposturing of Peacekeeper Missiles in Minuteman Silos. Fifty of the 100 missiles would be obtained from the existing inventory of missiles deployed at F.E. Warren AFB. There is no proposed action at this time for disposition of the Peacekeeper silos. Once the missiles are removed, silos will be closed and maintained until a proposal is developed for a later decision. This decision will be supported by separate environmental analysis.

1.6 No Action Alternative

With this alternative, the Peacekeeper Rail Garrison system would not be deployed. Activities at F.E. Warren AFB and the other candidate Air Force installations would continue to support existing and other proposed missions.

1.7 Possible Future Options for Dual Rail Egress

A second rail connection from a garrison to a main rail line could provide increased operational flexibility for the system by allowing a choice of egress routes at some or all garrison installations. Construction of such lines is not part of the Proposed Action or any alternative; therefore, detailed site-specific analysis is not warranted at this time. However, possible corridor routings for such rail connections and an identification of potential concerns that would probably warrant further environmental impact analysis have been included in Chapter 4.0.

If the option for construction of a second rail connection is considered for adoption at a later date, specific proposed routes and their reasonable alternatives will be determined for each base, and appropriate environmental analysis will be accomplished at that time.

1.8 Other Future Air Force Programs at Candidate Peacekeeper Rail Garrison Bases

A number of programs, some publicly announced and some classified, are being considered or programmed for deployment at some of the 11 bases. The publicly announced programs include possible deployment of Small Intercontinental Ballistic Missiles (ICBMs) at Malmstrom AFB, Montana and F.E. Warren AFB, Wyoming; deployment of a second squadron of KC-135R air refueling aircraft at Malmstrom AFB; deployment of B-2 bombers at Whiteman AFB, Missouri; and construction of a Central Radar System, Over-the-Horizon Backscatter radar facility at Grand Forks AFB, North Dakota. Discussion of the unclassified program is included in the future baseline or cumulative impact sections as appropriate. The cumulative environmental impacts of classified programs are covered in a classified annex to this EIS.

1.8.1 Small Intercontinental Ballistic Missile Program

Malmstrom Air Force Base, Montana. President Reagan, in December 1986, selected Malmstrom AFB, Montana, as the location for deployment of the first 200 Small ICBMs at Minuteman launch facilities within the 341st Strategic Missile Wing. The Proposed Action for this program provides for the deployment of 200 Hard Mobile Launchers in earth-covered igloos at 100 launch facilities in Montana. This would require construction of a number of new facilities as well as the modification or rehabilitation of existing facilities at Malmstrom AFB. Some land acquisition in the immediate vicinity of the base would be required to accommodate some program-related facilities. Construction of facilities would take place over a 6-year period (1990-1995), with the Initial Operational Capability planned for 1992 (Section 4.9).

Facilities would also be built at the Minuteman launch facility sites, and roads connecting Malmstrom AFB with the launch facilities would have to be improved. These activities, however, would not generate impacts onbase or in the host community of Great Falls and are not discussed in this document. Only the activities that aggravate the impacts created by the Peacekeeper Rail Garrison program are reported in this document as part of the cumulative impacts (Section 4.9).

F.E. Warren Air Force Base, Wyoming. F.E. Warren AFB is being considered as the second potential site for deployment of additional Small ICBMs after the initial deployment at Malmstrom AFB. Although no decision for deployment has yet been made, the impacts of a potential deployment are discussed in this document as part of the cumulative impacts, assuming that concurrent deployment of the Peacekeeper Rail Garrison and Small ICBM systems takes place at F.E. Warren AFB.

The Small ICBM program description assumes that up to 150 missiles on HMLs at 75 Minuteman or existing Peacekeeper facilities would be deployed in the F.E. Warren AFB deployment area spread over the states of Wyoming, Nebraska, and Colorado. However, the areas affected by the concurrent deployment of the two programs (Peacekeeper and Small ICBM) would be the base itself and the host community of Cheyenne. Construction of some new Small ICBM facilities and modification or rehabilitation of others would be required on or in the immediate vicinity of the base (Section 4.2).

Small ICBM facilities would also be built at the Minuteman and Peacekeeper launch facility sites, and roads connecting F.E. Warren AFB with the launch facilities would have to be improved. These activities, however, would not generate impacts onbase or in the host community of Cheyenne and are not discussed in this document. Only the activities that aggravate the impacts created by the Peacekeeper Rail Garrison program are reported in this document as part of the cumulative impacts (Section 4.2).

1.8.2 Other Air Force Programs

The KC-135R Air Refueling Mission, 1st Squadron, Malmstrom Air Force Base, Montana. Recently, the Air Force deployed a KC-135R air refueling squadron with its operational, maintenance, and associated support organizations at Malmstrom AFB. Sixteen KC-135R aircraft are located on existing aircraft parking space and use renovated and newly constructed aircraft operation and maintenance facilities at Malmstrom AFB. Facility renovation and modification work on flightline facilities and the former Directional Control Center is now underway.

An environmental assessment of the KC-135R air refueling program at Malmstrom AFB was prepared by the Air Force in 1987; therefore, no further consideration of these environmental impacts is provided. However, the effects of this program have been incorporated into the future baseline conditions section of the Malmstrom AFB discussion (Section 4.9).

The KC-135R Air Refueling Mission, 2nd Squadron, Malmstrom Air Force Base, Montana. A second squadron of KC-135R aircraft is proposed for deployment at Malmstrom AFB in fiscal year 1991. Fourteen additional aircraft would be based there resulting in the increase of 284 military and civilian personnel. The additional aircraft would fly approximately 916 flights per year for a total of approximately 3,260 flying hours. Construction for needed facilities at Malmstrom AFB would start in 1989 and be completed in 1991. A separate EIS for this program is being prepared for release in late 1988. Impacts of this program on the environment are also discussed as part of the cumulative impacts of the Peacekeeper Rail Garrison and the KC-135R programs (Section 4.9).

The B-2 Bomber Program, Whiteman Air Force Base, Missouri. The U.S. Air Force intends to deploy B-2 bombers at Whiteman AFB in the early 1990s. Approximately 2,357 new personnel will be assigned to Whiteman AFB to support the program. Facility construction is scheduled to begin in 1988 and be completed in 1991. The first operations personnel associated with the B-2 bomber will begin arriving at the base in 1988, and the base will have its full complement of 2,357 personnel in 1992. The unclassified information for the B-2 bomber program at Whiteman AFB has been incorporated into the future baseline conditions section of the Whiteman AFB discussion (Section 4.11).

Central Radar System, Over-the-Horizon Backscatter Radar Program, Grand Forks Air Force Base, North Dakota. The Over-the-Horizon Backscatter radar is a surveillance and tracking system that the Air Force plans to construct and operate at four locations in the United States. Grand Forks AFB is the proposed location of the operations center, which will be manned by 390 personnel. Construction of the system is scheduled to begin in 1988 and continue for up to five years. Operations will begin in the early 1990s. A final EIS for this program was prepared and distributed in May 1987. Effects of the program onbase and in the community of Grand Forks have been incorporated into the future baseline conditions section of the Grand Forks AFB discussion (Section 4.7).

1.9 Decommissioning

It is difficult to predict how the Peacekeeper Rail Garrison system would be decommissioned. The relevant laws and procedures may change substantially in the 20 or more years the system would be in use. Moreover, techniques for handling the disposal of obsolete missile fuel and the reclamation or disposal of the nuclear material contained in the warheads may well change during the period the Peacekeeper is actively deployed. Consequently, the Air Force has focused this EIS on those actions which are reasonably foreseeable. The Air Force will follow all relevant laws at the time of decommissioning.

1.10 Public Scoping Process

The Council of Environmental Quality regulations implementing the National Environmental Policy Act require an early and open process for determining the scope of issues related to the Proposed Action. The purposes of scoping are to identify the significant issues for study in the EIS, and to determine the scope of the research for each issue.

1.10.1 Overview of the Scoping Process

Scoping activities were undertaken in response to the above-mentioned federal requirements as part of the assessment of environmental impacts of major federal actions. The scoping process involved a series of activities that included:

- A prescoping effort to collect preliminary data and information from federal, state, and local government organizations in the affected area;
- A series of scoping meetings with the public and with governmental organizations in the affected MOB and candidate garrison installation areas; and
- Analysis and documentation of scoping results.

In March and April 1988, public scoping meetings were conducted in Grand Forks and Minot, North Dakota; Cheyenne, Wyoming; Great Falls, Montana; Medical Lake, Washington; Bossier City, Louisiana; Oscoda, Michigan; Warrensburg, Missouri; Abilene, Texas; and Blytheville and Jacksonville, Arkansas.

1.10.2 Summary of Scoping Issues

Based on past experience with programs of similar scope and discussions with public officials, all important issues could be grouped into ten resource categories as presented at the scoping meetings: socioeconomics, utilities, transportation, land use, cultural, biological, water, geology and soils, air quality, and noise. The environmental consequences of the program, grouped into these resource areas for each candidate deployment location, are discussed in Chapter 4.0.

Other issues raised at the scoping meetings related to safety concerns over program operations. Safety concerns included the possibility of accidents due to natural causes or human errors and the possible consequences of terrorist activities. The Air Force has

formal safety programs covering all phases of weapon system acquisition and operations. The goals of these programs include design safety, operations safety and security, and contingency plans. Air Force safety programs, theoretically possible but highly unlikely accident scenarios, and the environmental consequences of such accidents are discussed in Chapter 5.0.

At the scoping meetings, a number of requests were made for an analysis of issues that are outside the scope of this EIS. These included requests to analyze the effects of Peacekeeper Rail Garrison deployment on present and future arms control agreements. Other comments invited analysis of wartime effects, the morality of building nuclear weapons, and of psychological reactions some local residents may have to Peacekeeper deployment. The purpose of an EIS, however, is to analyze possible environmental consequences of the Proposed Action and its reasonable alternatives, including the No Action Alternative. A discussion of morality, national security policy, or psychological effect is beyond the scope of this EIS.

1.11 Federal Actions

Certain program facilities and activities would require a variety of federal actions; that is, permits, approvals, and consultations. Permits for discharges to air and water and disposal of solid and hazardous waste would be obtained in accordance with applicable federal laws. A list of such federal actions and the agencies involved, along with corresponding descriptions of the relevant facilities or activities, is presented in Chapter 6.0.

1.12 Mitigation Measures

To the extent practical, and taking into account operational requirements, schedule, and budget, standard construction practices that reduce or eliminate environmental impacts will be followed. Beyond this, mitigation measures are suggested to minimize the environmental impacts of a given program. For the Peacekeeper Rail Garrison program, efforts will be made to avoid environmentally sensitive areas and thereby eliminate or reduce program impacts. In addition, other mitigative programs may be employed to rehabilitate or restore the affected environment or to reduce or eliminate impacts through preservation procedures or compensation. These standard construction practices and mitigation measures are discussed in Chapter 4.0 and Appendix A.

2.0 SUMMARY AND COMPARISON OF PROGRAM IMPACTS

This chapter summarizes the impacts of the Proposed and Alternative Actions for the Peacekeeper Rail Garrison program. The cumulative impacts of basing the Small Intercontinental Ballistic Missile (ICBM) at both F.E. Warren Air Force Base (AFB), Wyoming and Malmstrom AFB, Montana and a second squadron of KC-135R aircraft at Malmstrom AFB, are also presented. Section 2.1 is a summary of the national-level impacts of system deployment. Section 2.2 compares environmental impacts by resource for the Main Operating Base (MOB) and each candidate garrison base. Section 2.3 compares environmental impacts by base for each environmental resource. Finally, Section 2.4 summarizes the safety impacts of the program.

The environmental consequences of the proposed Peacekeeper Rail Garrison program were evaluated in terms of the magnitude and significance of impacts. Magnitude is a measure of the numbers and kinds of environmental consequences of the program as compared to existing and future baseline conditions. Magnitude is defined by the level of impact (LOI), which can be negligible, low, moderate, or high. Significance requires consideration of both the context and the intensity of impacts. Context includes consideration of whether the setting of an impact is at the site, local, or regional level, and whether it is of short or long duration. Intensity refers to the severity of an impact, which includes consideration of its magnitude.

The LOI and significance of short- and long-duration impacts were evaluated separately. Short-duration impacts are transitory effects of the proposed program that are generally caused by construction activities or operations start-up. Long-duration impacts would occur over an extended period of time, whether they begin in the construction or operations phases. Most impacts of the operations phase are expected to be of long duration because program operations essentially represent a steady-state condition (i.e., impacts result from actions that continue over a long period of time). However, long-duration impacts can also be caused by construction activities if a resource is destroyed or irreparably damaged, or if the recovery rate of the resource is very slow.

2.1 Summary of National-Level Impacts

National economic and rail transportation impacts are presented separately in Chapter 4.0 (Affected Environments and Environmental Consequences) and are summarized in the following sections.

2.1.1 National Economic Impacts

The Peacekeeper Rail Garrison program is expected to cost between $10 billion and $15 billion (in 1986 dollars) including expenditures for research and development, production, construction, and operations over the system's lifetime. Peak annual expenditures during the deployment period would occur in 1991, amounting to $2.8 billion. These peak expenditures would represent 0.06 percent of forecast 1991 United States gross national product. Ongoing annual costs for operation and support of the program are projected at about $0.2 billion.

Total (direct and secondary) employment generated by the program is expected to increase from 40,000 jobs in 1989 to 148,000 jobs in 1991 at the peak of nationwide program expenditures. About 59,000 of these peak year jobs would be in manufacturing, with the remainder distributed among other sectors of the economy. By 1994, total program-related employment is projected to fall sharply to a long-run level of about 12,000 jobs.

Manufacturing capacity utilization for the United States economy is projected to average about 83 percent during the period 1989 through 1993. The economic expansion associated with the Peacekeeper Rail Garrison program can be expected to be supported

under these conditions without creating labor and material shortages. Certain key sectors, such as missile components, rocket fuels, and locomotive production, may experience increased backlogs. Since United States government purchases would represent substantial portions of output in these sectors, it may be necessary for government agencies to set schedule priorities among alternative programs.

2.1.2 National Rail Transportation Impacts

National railroad network impacts during the construction phase would be minimal because spur construction and rehabilitation would occur on track other than main rail lines. Construction of wyes (a length of track shaped like the letter Y which allows a train to turn right or left) on the main lines could be completed without causing delays to normal commercial train traffic. For the purpose of analyzing the Proposed Action, 2 Peacekeeper trains are assumed to be deployed at F.E. Warren AFB, the MOB, and 23 at other garrison installations. Initial deployment of the Peacekeeper trains, which would involve an average of 11 to 12 train trips per year for two years, would have minimal effects on the normal operations of commercial railroads. Trips by components of the Peacekeeper train to the MOB for major maintenance and repair would only increase traffic by one round trip per year between the garrison installations and the MOB. Trips made by the training trains would add four round trips or eight train trips a year between the MOB and each garrison installation. In comparison, more than 19 million cars were moved on the rail network in 1985 generating 5,000 to 7,000 train trips per day. Thus, the additional train trips generated by the Peacekeeper Rail Garrison program are minimal compared to the total train trips that the commercial rail network currently services. If all 25 Peacekeeper trains were dispersed on the commercial rail network simultaneously, an additional 25 train trips per day would be generated for the duration of dispersal activity. Compared to the 5,000 to 7,000 daily train trips on the nation's rail network, the additional trips are considered insignificant.

For the Alternative Action, 4 Peacekeeper trains are assumed to be deployed at F.E. Warren AFB and 46 at other garrison installations. Initial deployment would add 23 train trips per year for two years from the MOB to the garrison installations. Trips by components of the Peacekeeper train to the MOB for major maintenance and repair would increase traffic by one round trip a year per garrison installation. Training train trips to each garrison installation would add eight trips a year. This increase is also minimal compared to the annual number of train trips that the commercial rail network currently services. If all 50 Peacekeeper trains are dispersed on the commercial rail network simultaneously, an additional 50 train trips per day for the duration of dispersal activity would likewise have an insignificant effect on the nation's rail network.

2.2 Comparative Analysis of Environmental Impacts of the Proposed and Alternative Actions by Resource Category

This section provides an overview of potential impacts of the Peacekeeper Rail Garrison program on each of the ten environmental resources for both the Proposed and Alternative Actions (Figures 2.2-1 and 2.2-2). The construction and deployment of the Peacekeeper Rail Garrison program would potentially involve direct program activity in nine states including Arkansas, Louisiana, Michigan, Missouri, Montana, North Dakota, Texas, Washington, and Wyoming. Impacts occurring at the MOB (F.E. Warren AFB, Wyoming) and at each of the ten candidate bases are presented collectively to provide an overview of the extent of programwide impacts for each resource. Cumulative impacts including those associated with other potential programs in conjunction with the Proposed Action are also presented.

PROPOSED ACTION IMPACTS

ENVIRONMENTAL RESOURCES → / IMPACT DURATION → / CANDIDATE BASES ↓	SOCIOECONOMICS*		UTILITIES		TRANSPORTATION		LAND USE		CULTURAL RESOURCES		BIOLOGICAL RESOURCES		WATER RESOURCES		GEOLOGY AND SOILS		AIR QUALITY		NOISE	
	SHORT DUR	LONG DUR	SHORT DUR	LONG DUR	SHORT DUR.	LONG DUR	SHORT DUR	LONG DUR	SHORT DUR.	LONG DUR.	SHORT DUR.	LONG DUR.	SHORT DUR.	LONG DUR.	SHORT DUR	LONG DUR.	SHORT DUR.	LONG DUR.	SHORT DUR.	LONG DUR.
F.E. WARREN AFB (NORTH)	○	○		○	○	○	○	○		●	○	○	○	○	◯	○				
F.E. WARREN AFB (SOUTH)	○	○		○	○	○	○	○		●	○	○	◯	○	◯					
F.E. WARREN AFB (CUMULATIVE)	●	●		○	●	●	●	●		●	○	○	○	○	◯	●				
BARKSDALE AFB	○	○		○	●	●				○	○	●	◯	○	◯				○	
DYESS AFB					○	○					○	○	○	○	◯				○	
EAKER AFB (ONBASE)	○	○		○			○	○		●			○	○	◯				○	
EAKER AFB (OFFBASE)	○	○		○			●	●		●			○	○	◯				○	
FAIRCHILD AFB	○	○		○			●	●			○	●	○	○	◯					
GRAND FORKS AFB	○	○		○			○	○			○	○	○	○	◯	○				
LITTLE ROCK AFB	○	○		○							○	○	○	○	◯					
MALMSTROM AFB (SOUTH)	●	●		○	●	●					○	○	○	○	◯				○	
MALMSTROM AFB (EAST)	●	●		○	●	●	○	○			○	○	○	○	◯				○	
MALMSTROM AFB (CUMULATIVE)	●	●		◯	●	●	○	○		○	○	○	○	○	◯	●			○	
MINOT AFB	○	○		○	○	○					○	○	○	○	◯	○				
WHITEMAN AFB	○	○		○	○	○	●	●		○	○	●	○	○	◯				○	
WURTSMITH AFB	●	○		◯						○	○	●	○	●	◯		○		○	

LEVEL OF IMPACT

	NOT SIGNIFICANT	SIGNIFICANT
NEGLIGIBLE		
LOW	○	●
MODERATE	○	●
HIGH	◯	●

* Beneficial short- and long-duration impacts would occur at each location.

ESR-2/1

FIGURE 2.2-1 IMPACTS ASSOCIATED WITH THE PROPOSED PEACEKEEPER RAIL GARRISON PROGRAM (PROPOSED ACTION)

ALTERNATIVE ACTION IMPACTS

ENVIRONMENTAL RESOURCES → / IMPACT DURATION → / CANDIDATE BASES ↓	SOCIOECONOMICS*		UTILITIES		TRANSPORTATION		LAND USE		CULTURAL RESOURCES		BIOLOGICAL RESOURCES		WATER RESOURCES		GEOLOGY AND SOILS		AIR QUALITY		NOISE	
	SHORT DUR	LONG DUR	SHORT DUR	LONG DUR	SHORT DUR	LONG DUR	SHORT DUR	LONG DUR	SHORT DUR	LONG DUR	SHORT DUR	LONG DUR	SHORT DUR	LONG DUR	SHORT DUR	LONG DUR	SHORT DUR	LONG DUR	SHORT DUR	LONG DUR
F E WARREN AFB (NORTH)	○	○		○	○	○	○	○		●	○	○	○	○	◯	○				
F E WARREN AFB (SOUTH)	○	○		○	○	○	○	○		●	○	○	◯	○	◯					
F E WARREN AFB (CUMULATIVE)	●	●		◯	●	●	●	●		●	○	○	○	◯	◯	●				
BARKSDALE AFB	○	○		○	●	●				◯	○	●	◯	○	◯				◯	
DYESS AFB					○	○					○	○	○	○	◯				○	
EAKER AFB (ONBASE)	○	○		◯			○	○		●			○	○	◯				◯	
EAKER AFB (OFFBASE)	○	○		◯			●	●		●			○	○	◯				◯	
FAIRCHILD AFB	○	○		○			●	●			○	●	○	○	◯					
GRAND FORKS AFB	○	○		○			○	○			○	○	○	○	◯	○				
LITTLE ROCK AFB	○	○		○							○	○	○	○	◯					
MALMSTROM AFB (SOUTH)	●	●		○	●	●					○	○	○	○	◯				◯	
MALMSTROM AFB (EAST)	●	●		○	●	●	○	○			○	○	○	○	◯				◯	
MALMSTROM AFB (CUMULATIVE)	●	●		◯	●	●	○	○		○	○	○	○	○	◯	●			◯	
MINOT AFB	○	○		○	○	○					○	○	○	○	◯	○				
WHITEMAN AFB	○	○		○	○	○	●	●		○	○	●	○	○	◯				◯	
WURTSMITH AFB	●	○		◯						○	○	●	○	●	◯		○		○	

LEVEL OF IMPACT

	NOT SIGNIFICANT	SIGNIFICANT
NEGLIGIBLE		
LOW	○	●
MODERATE	○	●
HIGH	○	●

* Beneficial short- and long-duration impacts would occur at each location.

ESR-2/2

FIGURE 2.2-2 IMPACTS ASSOCIATED WITH THE PROPOSED PEACEKEEPER RAIL GARRISON PROGRAM (ALTERNATIVE ACTION)

2.2.1 Socioeconomics

Although beneficial socioeconomic effects, such as increases in employment and income and greater utilization of vacant housing, would occur at all locations, the Proposed Action would result in significant, adverse socioeconomic impacts at Malmstrom AFB, Montana (both south and east site options) and Wurtsmith AFB, Michigan. Cumulative impacts would also be significant at F.E. Warren AFB if the Peacekeeper Rail Garrison and Small ICBM programs are implemented concurrently. Socioeconomic impacts at all other bases would not be significant.

At Malmstrom AFB (both south and east options), short- and long-duration impacts would be low because program-induced inmigration would cause population increases of 1.3 percent over baseline levels during construction (1992) and 1.1 percent above baseline during operations (1993 onwards). This level of program-induced population growth would result in low impacts on housing, education, public services, and public finance in the Great Falls area for both the peak and succeeding years. These impacts would be significant because additional program-related population could aggravate existing overcrowded conditions in the Cascade County jail. Both short- and long-duration beneficial socioeconomic effects generated by the Proposed Action would include increases in employment and income in the Region of Influence (ROI) and greater utilization of vacant permanent and temporary housing.

At Wurtsmith AFB, short-duration socioeconomic impacts would be moderate because inmigration would cause population in the Oscoda area to increase by 7.6 percent over baseline forecasts during the peak construction year (1992). This level of program-induced population growth would result in moderate impacts on housing, education, public services, and public finance within the Oscoda area during the construction phase. These impacts would be significant because of the shortage of suitable temporary and permanent housing for both construction and operations workers in the Oscoda area during the initial program years. Socioeconomic impacts resulting from the Proposed Action in other communities in the Wurtsmith AFB area would be negligible.

Socioeconomic impacts of the Alternative Action would be about the same as those of the Proposed Action.

At F.E. Warren AFB, the cumulative impacts of the Peacekeeper Rail Garrison and Small ICBM programs would result in moderate short-duration and high long-duration socioeconomic impacts because inmigration would increase population in the Cheyenne area by 7.5 percent during construction (1995) and nearly 13 percent above baseline projections during operations (1999). These impacts would be significant because of the need for new housing and expanded school facilities, and the potential for revenue shortfalls in local jurisdictions.

At Malmstrom AFB, the cumulative impacts of the Peacekeeper Rail Garrison and Small ICBM programs, and a second squadron of KC-135R aircraft would result in high short- and long-duration socioeconomic impacts because inmigration would increase population in the Great Falls area over 13 percent above baseline projections during the construction phase and 12.3 percent over baseline during operations. These impacts would be significant because of the need for expanded school facilities near the base, the aggravation of existing overcrowded conditions in the Cascade County jail, and revenue shortfalls in Cascade County.

2.2.2 Utilities

Impacts of the Proposed and Alternative Actions on the utilities resource would not be significant at the MOB or any candidate garrison installation.

Cumulative impacts on utilities at F.E. Warren AFB, Wyoming (Proposed or Alternative Actions and Small ICBM) and Malmstrom AFB, Montana (Proposed or Alternative Actions and Small ICBM and KC-135R) would not be significant.

2.2.3 Transportation

The Proposed Action would result in significant transportation impacts at Barksdale AFB, Louisiana and Malmstrom AFB, Montana (both south and east options). Transportation impacts at all other bases would not be significant.

Short- and long-duration impacts at Barksdale AFB would be low because the level of service (LOS) rating along Barksdale Boulevard would not change, remaining at D. These impacts would be significant because program-induced traffic would aggravate existing congested conditions.

Short- and long-duration impacts at Malmstrom AFB (both south and east options) would be moderate because the LOS rating along 10th Avenue South would further degrade existing LOS D and E conditions. These impacts would be significant because program-induced traffic would aggravate existing congested conditions.

Transportation impacts of the Alternative Action would be about the same as those of the Proposed Action.

Cumulative impacts on transportation would be significant at F.E. Warren AFB, Wyoming (Proposed or Alternative Actions and Small ICBM) and Malmstrom AFB, Montana (Proposed or Alternative Actions and Small ICBM and KC-135R).

At F.E. Warren AFB, the cumulative impacts of the Peacekeeper Rail Garrison and Small ICBM programs would result in high short- and long-duration transportation impacts because the LOS rating along Randall Avenue would be reduced from B to D. These impacts would be significant because the LOS would drop to D, a substandard level.

At Malmstrom AFB, the cumulative impacts of the Peacekeeper Rail Garrison and Small ICBM programs, and a second squadron of KC-135R aircraft would result in high short- and long-duration transportation impacts because the LOS rating for segments of 10th Avenue South would be reduced from D to E, and E to F. These impacts would be significant because the LOS would drop to E and F, which are substandard service levels.

2.2.4 Land Use

The Proposed Action would have significant land use impacts at Eaker AFB, Arkansas (offbase option); Fairchild AFB, Washington; and Whiteman AFB, Missouri.

At Fairchild AFB, the short- and long-duration impacts would be moderate because of impacts on visual attributes. At Eaker AFB and Whitman AFB, the short- and long-duration impacts would be low because it may be necessary to relocate less than five inhabited buildings from the restrictive easement areas, or from land acquired in fee simple. Fairchild AFB may also require the relocation of one such building. These impacts would be significant at all three bases because of the necessity to relocate one or more inhabited buildings. Land use impacts at all other bases would not be significant.

Land use impacts of the Alternative Action would be about the same as those of the Proposed Action.

Short- and long-duration cumulative impacts on land use would be low at F.E. Warren AFB, Wyoming (Proposed or Alternative Actions and Small ICBM) because one inhabited building may be relocated from the land to be acquired in fee for the Small ICBM program. These impacts would be significant because one inhabited building may require relocation.

2.2.5 Cultural Resources

Impacts of the Proposed Action on cultural resources would be significant at F.E. Warren AFB, Wyoming (both north and south options); and Eaker AFB, Arkansas (both onbase and offbase options). Cultural resource impacts at all other bases would not be significant.

Long-duration impacts at F.E. Warren AFB (north site option) would be moderate because 11 National Register of Historic Places (NRHP)-eligible sites and the Fort D.A. Russell/F.E. Warren National Register District would be affected. These impacts would be significant because of the national recognition afforded the district. The south site option would affect six cultural sites resulting in long-duration low but still significant impacts.

At Eaker AFB (onbase option), long-duration impacts would be high because construction would destroy large portions of two sites, including a major prehistoric archaeological site, one of the most important of its kind in the region. These onbase impacts would be significant because of the loss of its considerable research potential, reflected in its eligibility for the NRHP. The offbase site option would disturb two prehistoric sites of a type more common in the region, resulting in long-duration low impacts. These offbase impacts would be significant because of the sites' research potential.

Cultural resource impacts of the Alternative Action would be about the same as those of the Proposed Action.

Cumulative impacts would be significant at F.E. Warren AFB, Wyoming (Proposed or Alternative Actions and Small ICBM). Long-duration impacts at F.E. Warren AFB would increase from moderate to high because of greater disturbance of historic sites. These impacts would remain significant because of their national recognition.

2.2.6 Biological Resources

The Proposed Action would result in significant impacts on biological resources at four of the candidate bases: Barksdale AFB, Louisiana; Fairchild AFB, Washington; Whiteman AFB, Missouri; and Wurtsmith AFB, Michigan. Biological impacts at all other bases would not be significant.

At Barksdale AFB, long-duration impacts would be high because the program would affect large areas of wetland habitat, cause associated disturbances in surrounding wetland habitats, affect sensitive wildlife populations, and result in the degradation of local and regional biological communities. These impacts would be significant because of the ecological importance of the habitat that would be affected and the level of concern these potential impacts would elicit from natural resource management agencies.

At Fairchild AFB, long-duration impacts would be moderate because the program would affect large areas of wetland habitat. Also, several federal-candidate and state-recognized sensitive species would likely be affected. These impacts would be significant because of the ecological importance of the habitats that would be disturbed and the level of concern these potential wetland impacts would elicit from natural resource management agencies.

At Whiteman AFB, long-duration impacts would be moderate because important wetland and forest habitat would be lost and the wildlife inhabiting those areas would be affected. These impacts would be significant because of the ecological importance of the habitats affected and the level of concern these potential impacts would elicit from natural resource management agencies.

At Wurtsmith AFB, long-duration impacts would be moderate because important wetland habitat would be filled and/or disturbed, local drainage patterns would be altered, and the wildlife populations inhabiting those areas would be affected on a local basis. The jack pine forest in the proposed garrison area is low-quality deer habitat (because of limited forage), but provides good habitat for nongame species. These impacts would be significant because of the ecological importance of the habitats which would be affected and the concern these impacts would elicit from natural resource management agencies.

Biological resource impacts of the Alternative Action would be about the same as those of the Proposed Action.

Cumulative impacts on biological resources at F.E. Warren AFB, Wyoming (Proposed or Alternative Actions and Small ICBM) and Malmstrom AFB, Montana (Proposed or Alternative Actions and Small ICBM and KC-135R) would not be significant.

2.2.7 Water Resources

Impacts of the Proposed Action on water resources would be significant at only one location, Wurtsmith AFB, Michigan. Water resource impacts at all other bases would not be significant.

Long-duration impacts of the Proposed Action on water resources at Wurtsmith AFB would be low because the additional water needed to supply program requirements is expected to have only a minor effect on local groundwater drawdown. These impacts would be significant because program water needs would be drawn from wells vulnerable to groundwater contamination from adjacent areas of the local aquifer.

Water resource impacts of the Alternative Action would be about the same as those of the Proposed Action.

Cumulative impacts on water resources at F.E. Warren AFB, Wyoming (Proposed or Alternative Actions and Small ICBM) and Malmstrom AFB, Montana (Proposed or Alternative Actions and Small ICBM and KC-135R) would not be significant.

2.2.8 Geology and Soils

Overall impacts on the geology and soils resource resulting from the Proposed Action would not be significant at the MOB or any candidate base.

Geology and soil impacts for the Alternative Action would be about the same as those of the Proposed Action.

Cumulative impacts at F.E. Warren AFB, Wyoming (Proposed or Alternative Actions and Small ICBM) and Malmstrom AFB, Montana (Proposed or Alternative Actions and Small ICBM and KC-135R) would be moderate and significant.

At F.E. Warren AFB, the cumulative impacts of the Peacekeeper Rail Garrison and the Small ICBM programs would result in long-duration moderate geology and soil impacts because of accelerated rates of erosion at the Hard Mobile Launcher (HML) vehicle operations training area, which would be barren for the life of the program. These impacts would be significant because soil erosion would result in an appreciable net loss of topsoil.

At Malmstrom AFB, the cumulative impacts of the Peacekeeper Rail Garrison and Small ICBM programs, and a second squadron of KC-135R would result in moderate geology and soil impacts because of accelerated rates of erosion at the HML vehicle operations training area, which would be barren for the life of the program. These impacts would be significant because soil erosion would result in an appreciable net loss of topsoil.

2.2.9 Air Quality

Impacts of the Proposed Action on air quality would not be significant at the MOB or at any of the candidate bases.

Air quality impacts of the Alternative Action would be about the same as those of the Proposed Action.

Cumulative impacts on air quality at F.E. Warren AFB, Wyoming (Proposed or Alternative Actions and Small ICBM) and Malmstrom AFB, Montana (Proposed or Alternative Actions and Small ICBM and KC-135R) would not be significant.

2.2.10 Noise

Impacts of the Proposed Action on noise would not be significant at the MOB or at any of the candidate bases.

Noise impacts of the Alternative Action would be about the same as those of the Proposed Action.

Cumulative impacts on noise at F.E. Warren AFB, Wyoming (Proposed or Alternative Actions and Small ICBM) and Malmstrom AFB, Montana (Proposed or Alternative Actions and Small ICBM and KC-135R) would not be significant.

2.3 Comparative Analysis of Environmental Impacts of the Proposed and Alternative Actions by Candidate Base Locations

The construction and deployment of the Peacekeeper Rail Garrison program at each candidate base location would result in both beneficial and adverse impacts. Beneficial socioeconomic effects, such as increases in employment and income and greater utilization of vacant housing, would occur at all locations. The levels of impact and significance ratings for adverse impacts vary for environmental resources at each location. This section provides a comparative analysis of environmental impacts by base.

2.3.1 F.E. Warren Air Force Base, Wyoming

At F.E. Warren AFB, two possible siting options (north and south sites) are being considered. The Proposed Action (north site option) would result in significant impacts for cultural resources. Long-duration impacts on cultural resources would be moderate because 11 NRHP-eligible sites and the Fort D.A. Russell/F.E. Warren National Register District would be affected. These impacts would be significant because of the national recognition afforded the district.

Long-duration cultural resource impacts at F.E. Warren AFB (south option) would be low because six cultural sites would be affected. These impacts would be significant because of the national recognition afforded the district.

Impacts on all other resources would not be significant.

The Alternative Action at F.E. Warren AFB (both north and south options) would not alter the LOI or significance rating for any resource.

The cumulative impacts of either the Proposed Action or the Alternative Action and Small ICBM program would result in significant impacts for five resources: socioeconomics, transportation, land use, cultural resources, and geology and soils. Short-duration socioeconomic impacts would be moderate and long-duration impacts would be high because inmigration would increase population in the Cheyenne area by 7.5 percent during construction (1995) and nearly 13 percent over baseline projections during operations (1999). These impacts would be significant because of the requirement for new housing and expanded school facilities, and the potential for revenue shortfalls in local jurisdictions.

Short- and long-duration transportation impacts would be high because the LOS rating along Randall Avenue would be reduced from B to D. These impacts would be significant because the LOS would drop to D, a substandard level. Short- and long-duration land use impacts would be low because one inhabited building may be relocated from the land to be acquired in fee for the Small ICBM program. These impacts would be significant because one inhabited building may require relocation. Long-duration cultural resource impacts would be high because of greater disturbance of historic sites. These impacts would be significant because of their national recognition. Long-duration geology and soil impacts would be moderate because of accelerated rates of erosion at the HML vehicle operations training area, which would be barren for the life of the program. These impacts would be significant because soil erosion would result in an appreciable net loss of topsoil.

Impacts for all other resources would not be significant.

2.3.2 Barksdale Air Force Base, Louisiana

The Proposed Action at Barksdale AFB would result in significant impacts for transportation and biological resources. Both short- and long-duration impacts on transportation would be low because the LOS rating along Barksdale Boulevard would not change, remaining at D. These impacts would be significant because program-induced traffic would aggravate existing congested conditions. Long-duration impacts on biological resources would be high because the program would affect large areas, cause associated disturbances in surrounding wetland habitats, affect sensitive wildlife populations, and result in the degradation of local and regional biological communities. These impacts would be significant because of the ecological importance of the habitat and the level of concern these potential impacts would elicit from natural resource management agencies.

Impacts for all other resources would not be significant.

The Alternative Action at Barksdale AFB would not alter the LOI or significance rating for any resource.

2.3.3 Dyess Air Force Base, Texas

The Proposed Action at Dyess AFB would not result in significant impacts for any resource.

The Alternative Action at Dyess AFB would not alter the significance rating for any resource.

2.3.4 Eaker Air Force Base, Arkansas

At Eaker AFB, two possible siting options (onbase and offbase sites) are being considered. The Proposed Action at Eaker AFB (onbase option) would result in significant impacts on cultural resources. Long-duration impacts on cultural resources would be high because construction would destroy large portions of two sites, including a major prehistoric

archaeological site, one of the most important of its kind in the region. These impacts would be significant because of the loss of its considerable research potential, reflected in its eligibility for the NRHP.

Impacts on all other onbase option resources would not be significant.

The Proposed Action at Eaker AFB (offbase option) would result in significant impacts on two resources: land use and cultural resources. Short- and long-duration impacts on land use would be low because it may be necessary to relocate one inhabited building from the proposed explosive safety zones or from land acquired. These impacts would be significant because one inhabited building may require relocation. Long-duration impacts on cultural resources would be low because two prehistoric sites of a type more common in the region would be disturbed. These impacts would be significant because of the sites' research potential.

Impacts on all other offbase option resources would not be significant.

The Alternative Action at Eaker AFB (both onbase and offbase options) would not alter the LOI or significance ratings for any resource.

2.3.5 Fairchild Air Force Base, Washington

The Proposed Action at Fairchild AFB would result in significant impacts on land use and biological resources. Short- and long-duration land use impacts would be moderate because of impacts on visual attributes, and the possible relocation of one inhabitable building. These impacts would be significant because of the necessity to relocate the inhabitable building. Long-duration impacts on biological resources would be moderate because wetland areas would experience permanent disturbance and several federal-candidate and state-recognized sensitive species would likely be affected. These impacts would be significant because of the ecological importance of the habitats and the level of concern these potential wetland impacts would elicit from natural resource management agencies.

Impacts for all other resources would not be significant.

The Alternative Action at Fairchild AFB would not alter the LOI or significance ratings for any resource.

2.3.6 Grand Forks Air Force Base, North Dakota

The Proposed and Alternative Actions at Grand Forks AFB would not result in significant impacts for any resource.

2.3.7 Little Rock Air Force Base, Arkansas

The Proposed and Alternative Actions at Little Rock AFB would not result in significant impacts for any resource.

2.3.8 Malmstrom Air Force Base, Montana

At Malmstrom AFB, two possible siting options (south and east sites) are being considered. The Proposed Action (both south and east options) would result in significant impacts on socioeconomics and transportation. Socioeconomic impacts (both south and east options) would be low because program-induced inmigration would cause population increases of 1.3 percent over baseline levels during construction (1992) and 1.1 percent over baseline during operations (1993). This level of program-induced population growth would result in low impacts on housing, education, public services, and public finances in

the Great Falls area for both the peak and succeeding years. These impacts would be significant because additional program-related population could aggravate existing overcrowded conditions in the Cascade County jail. Transportation impacts (both south and east options) would be moderate because the LOS rating for segments of 10th Avenue South would further degrade existing D and E ratings. These impacts would be significant because program-induced traffic would aggravate existing congested conditions.

Impacts for all other resources would not be significant.

The Alternative Action at Malmstrom AFB would not alter the LOI or significance ratings for any resource.

The cumulative impacts of either the Proposed or Alternative Actions, a second KC-135R squadron, and the proposed Small ICBM program would result in significant impacts on three resources: socioeconomics, transportation, and geology and soils. Both short- and long-duration socioeconomic impacts would be high because inmigration would increase population in the Great Falls area over 13 percent above baseline projections during the construction phase and 12.3 percent over baseline during operations. These impacts would be significant because of the need for expanded school facilities near the base, the aggravation of existing overcrowded conditions in the Cascade County jail, and revenue shortfalls in Cascade County. Both short- and long-duration transportation impacts would be high because the LOS rating for segments of 10th Avenue South would be reduced from D to E, and E to F. These impacts would be significant because the LOS would drop to E and F which are substandard levels. Long-duration geology and soils impacts would be moderate for soil erosion because of increased rates of loss resulting from the deployment of the three programs. These impacts would be significant because of the permanent disturbance of 350 acres associated with the HML vehicle operations training area which would be barren for the life of the program, resulting in an appreciable loss of topsoil.

2.3.9 Minot Air Force Base, North Dakota

The Proposed and Alternative Actions at Minot AFB would not result in significant impacts for any resource.

2.3.10 Whiteman Air Force Base, Missouri

The Proposed Action at Whiteman AFB would result in significant impacts on two resources: land use and biological resources. Short- and long-duration land use impacts would be low because it may be necessary to relocate two inhabited buildings from the proposed explosive safety zones or from land acquired. These impacts would be significant because inhabited buildings may require relocation. Long-duration biological resources would be moderate because important wetland and forest habitat would be lost and the wildlife inhabiting those areas would be affected. These impacts would be significant because of the ecological importance of the habitats affected and the level of concern these potential impacts would elicit from natural resource management agencies.

Impacts on all other resources would not be significant.

The Alternative Action at Whiteman AFB would not alter the LOI or significance ratings for any resource.

2.3.11 Wurtsmith Air Force Base, Michigan

The Proposed Action at Wurtsmith AFB would result in significant impacts on three resources: socioeconomics, biological resources, and water resources. Short-duration impacts on socioeconomics would be moderate because the program-related inmigration would cause population in the Oscoda area to increase by 7.6 percent over baseline forecasts in 1992 and by 7.2 percent in 1993. These impacts would be significant because of a potential shortage of temporary housing during the construction phase of the program.

Long-duration impacts on biological resources would be moderate because disturbances of the wetland areas onbase and offbase would be of concern, local drainage patterns would be altered, and the wildlife populations inhabiting those areas would be affected. These impacts would be significant because of the ecological importance of the habitats which would be affected and the concern these impacts would elicit from natural resource management agencies. Long-duration impacts on water resources would be low because the additional water needed to supply program requirements is expected to have only a minor effect on local groundwater drawdown. These impacts would be significant because program water needs would be drawn from wells vulnerable to groundwater contamination from adjacent areas of the local aquifer.

Impacts on all other resources would not be significant.

The Alternative Action at Wurtsmith AFB would not alter the LOI or significance ratings for any resource.

2.4 Safety Considerations

Public safety has been and will continue to be of utmost concern throughout the development and deployment of the Peacekeeper Rail Garrison system. Safety programs implemented during the original Peacekeeper development are being continued and those involving deployment are being revised and expanded to reflect the Rail Garrison mobile basing concept. The analysis of safety concerns associated with the proposed deployment of the Peacekeeper Rail Garrison system included an evaluation of the risks posed by rail, air, and truck transportation of the missile stages and warheads. The potential for fires, explosions, and radioactive material releases was evaluated. In addition, risk to the missile crews from exposure to radiation during day-to-day operations (the "mishap-free" risk) was analyzed along with the mishap-free risk to the general public which might exist during dispersal operations.

The analysis showed that while there is a very slight potential for mishaps with the deployment of the Peacekeeper Rail Garrison system, the system would be safe and would pose a negligible risk to human health and the environment. In the absence of a mishap, the materials in the Peacekeeper missile would not impose a health risk to those who would be exposed to them on a daily basis or to the general public.

All Peacekeeper Rail Garrison trains are expected to have a substantially better safety record than commercial rail traffic because the Peacekeeper locomotives and cars would be the most modern available, contain special safety features, be better maintained, and would be subject to less wear than commercial rolling stock. If there were a mishap involving a train carrying missiles, protection would be afforded the missile by the launch canister and the missile launch car structure. Further, the inherent stability of the solid propellants make the missile an unlikely source of explosion or fire. Operational Peacekeeper trains have the added potential of a mishap involving radioactive materials. In the exceedingly unlikely event of a fire or explosion, airborne dispersal of radioactive materials would increase the chance that some exposed persons could eventually develop cancer. Though the consequence is potentially very serious, radioactive material dispersal is so unlikely to occur that it is considered a negligible risk.

The proposed routine uses of the national rail network are for training trains, for occasional movement of missiles (without warheads) between garrison installations and the MOB (F.E. Warren AFB, Wyoming) for maintenance, and for transferring a small number of missiles to Vandenberg AFB, California for flight testing. Since the training trains would not carry missiles or warheads, there would be no additional hazard from the train cargo in a mishap. The train transport of missiles (without warheads) for maintenance and flight testing would involve few trips and constitute a very small risk.

Air transport would be the primary means of moving the reentry systems, with nuclear warheads, to the deployment installations. The reentry system, with nuclear warheads, would be transported to the deployment bases by nuclear-certified Air Force aircraft and crews. The probability of a mishap during air transport of the reentry systems is extremely small. In fact, the Air Force Special Cargo Squadron that handles these systems has transported nuclear materials for 25 years and has never experienced a mishap which created the possibility of damage to the reentry system.

In the unlikely event of a mishap, the Department of Defense (DOD) and the U.S. Environmental Protection Agency (EPA) would respond by deploying teams specially trained and equipped to deal with any contingency. The control of access to the site, fires, and the rescue and treatment of casualties would be the most immediate concerns, and DOD teams would assist responding local, state, and federal agencies with these efforts. Recovery and safe removal of any weapons would begin as soon as DOD or U.S. Department of Energy explosive ordnance disposal and emergency response personnel arrive at the site. If radioactive materials were dispersed, the public would be kept at a safe distance and all contaminated areas would be treated to comply with EPA cleanup standards.

United States nuclear weapons include safety and arming mechanisms that assure that there is virtually no possibility of an inadvertent nuclear detonation during transportation or handling of the reentry system, or when it is on alert. There has never been even a partial nuclear detonation of a United States nuclear weapon as a result of a mishap. The few past mishaps involving nuclear weapons have imposed forces on the weapons as great as those which could result from a Peacekeeper Rail Garrison mishap. The Peacekeeper weapons can withstand these forces -- and even greater ones -- without resulting in a nuclear detonation.

3.0 ENVIRONMENTAL ANALYSIS METHODS

This chapter describes the methods used to document the existing baseline environmental conditions at each proposed deployment location, as well as the methods used to identify and analyze potential impacts. For each resource category, a description of the resource, the Region of Influence (ROI) for that resource, data sources, analysis methods, level of impact (LOI) criteria, and significance criteria are presented.

The environmental resource categories are convenient groups of issue areas which cover the entire spectrum of environmental issues likely to be experienced as a result of the program. Each environmental resource consists of one or more elements which generally represent individual issues within the resource categories, though some elements, for example, public services, represent groups of issues, such as police, fire, and health services. The ROIs refer to the geographic areas where most of the resource- or element-level impacts are likely to occur. Data sources used in describing the existing and future baseline conditions include published and unpublished documents, maps, and field studies conducted specifically for the program.

The environmental analyses for each resource included a five-step process: (1) description of existing baseline conditions; (2) projection of baseline conditions to years of interest, where applicable, including the influence of other proposed projects; (3) identification and evaluation of program impacts; (4) determination of LOIs; and (5) determination of significance. Impact evaluation was conducted using state-of-the-art models and proven procedures used in previous environmental analysis including those developed specifically for Air Force programs. The LOIs signify a rating of the magnitude of an impact. The determination of LOI is based on both the absolute quantity of an affected resource and comparison of this quantity with the resource base. Using these measures, the LOI for each resource is categorized as negligible, low, moderate, or high. Finally, the significance of an impact is determined by evaluating its context and intensity as required under the Council on Environmental Quality (CEQ) regulations. To avoid repetition in each resource section, a general discussion of context and intensity for significance determination is provided here. Resource-specific considerations are given in Sections 3.2 through 3.11.

The CEQ definition of context indicates that "both short- and long-term effects are relevant." For this Environmental Impact Statement (EIS), both short- and long-duration impacts have been identified. Short-duration impacts are transitory effects of the proposed program that are of limited duration and are generally caused by construction activities or operation start-up. Long-duration impacts would occur or continue over an extended period of time, whether they start during the construction phase or operations phase. Most impacts from the operations phase are expected to be of long duration since program operations essentially represent a steady-state condition (i.e., impacts resulting from actions that occur repeatedly over a long period of time). However, long-duration impacts could also be caused by construction activities if a resource is destroyed or irreparably damaged, or if the recovery rate of the resource is very slow.

According to the CEQ regulations (Code of Federal Regulations 1981, 40 CFR §1508.27), intensity "refers to the severity of the impacts." Ten items are listed that "should be considered in evaluating intensity":

1. Impacts that may be both beneficial and adverse. A significant effect may exist even if the Federal agency believes that on balance the effect will be beneficial.

2. The degree to which the proposed action affects public health or safety.

3. Unique characteristics of the geographic area such as proximity to historic or cultural resources, park lands, prime farmlands, wetlands, wild and scenic rivers, or ecologically critical areas.

4. The degree to which the effects on the quality of the human environment are likely to be highly controversial.

5. The degree to which the possible effects on the human environment are highly uncertain or involve unique or unknown risks.

6. The degree to which the action may establish a precedent for future actions with significant effects or represents a decision in principle about a future consideration.

7. Whether the action is related to other actions with individually insignificant but cumulatively significant impacts. Significance exists if it is reasonable to anticipate a cumulatively significant impact on the environment. Significance cannot be avoided by terming an action temporary or by breaking it down into small component parts.

8. The degree to which the action may adversely affect districts, sites, highways, structures, or objects listed in or eligible for listing in the National Register of Historic Places or may cause loss or destruction of significant scientific, cultural, or historical resources.

9. The degree to which the action may adversely affect an endangered or threatened species or its habitat that has been determined to be critical under the Endangered Species Act of 1973.

10. Whether the action threatens a violation of Federal, State, or local law or requirements imposed for the protection of the environment.

Controversy, referred to in consideration 4, involves disagreement among recognized professionals over environmental impacts or assessment methods. Possible controversy over the purpose, need, or desirability of this program was not considered in evaluating the significance of impacts.

In evaluating the significance of impacts on individual resources or elements, the applicability of these ten items was considered first. In addition, other considerations judged appropriate for specific resources/elements were also evaluated. These are identified under individual resource discussions (Sections 3.2 through 3.11).

3.1 Methods for Assessing Nationwide Impacts

The Peacekeeper Rail Garrison program would involve several activities for which the ROIs would be more extensive than the areas surrounding the Main Operating Base (MOB) and candidate garrison bases. These activities would cause national-level impacts for two environmental resources: socioeconomics and transportation. Because research and development, production, deployment, and operations requirements of the system would affect many industries throughout the United States, national economic impacts are evaluated separately from impacts occurring at base locations.

Deployment and maintenance activities of the Peacekeeper Rail Garrison program would involve a rail network passing through 24 states, while training and operations could utilize rail lines throughout the country. The potential impacts on rail transportation are therefore evaluated on a national basis.

3.1.1 Methods for Assessing National Economic Impacts

The Peacekeeper Rail Garrison program would create jobs and industrial sales throughout the national economy. The magnitude of this economic impact was estimated, and its

significance was evaluated by assessing the potential for production-related bottlenecks or shortages.

Total program-related expenditures for research and development, production, military construction, and operation (in constant 1986 dollars) were projected for fiscal years (FYs) 1989 through 1993 based on the President's FY 1989 budget submittal. Program planning data regarding the composition of outlays for principal components of the Peacekeeper Rail Garrison system were then used to disaggregate these total expenditures to major industrial sectors.

The principal sectors likely to be affected by program spending are guided missiles and space vehicles, communication equipment, and railroad equipment. In addition, consumption expenditures would increase as a result of program-related jobs.

These spending projections by sector were entered as demand changes in a national input-output (I-O) economic model. The model was developed from detailed sectoral data published by the U.S. Department of Commerce, Bureau of Economic Analysis. The model produced estimates of the total (direct, indirect, and induced) multiplier effects on industrial sales due to these demands rippling through the economy. Using additional sectoral employment data prepared by the U.S. Department of Labor, Bureau of Labor Statistics, jobs and earnings impacts were estimated from the projections of industrial sales.

Projected program-related demands and output effects were compared to baseline forecasts of gross national product and industrial capacity utilization to assess the magnitude of program effects in relation to actual and potential output of the U.S. economy. The larger the growth in demand for output due to the Peacekeeper Rail Garrison program, the greater would be the potential for program-related shortages or bottlenecks affecting other economic activities. The significance of national economic impacts was judged by the degree to which the program-related demand for output would compete with or displace other economic activity.

3.1.2 Methods for Assessing Railroad Network Impacts

The methods used for evaluating the potential effects of program deployment on traffic flows on the national railroad system are described in this section. The potential effects on railroad safety are discussed in Chapter 5.0, Safety Considerations. The railroad system includes the facilities used for the movement of passenger and freight, track and terminal facilities, operational control facilities, and train traffic.

The railroads considered in the analysis include the main rail lines in the immediate vicinity of the candidate installations and the rail routes between the installations and F.E. Warren Air Force Base (AFB), the MOB, where the missile trains and their equipment would be maintained.

The sources of information on railroads were the state departments of highways, transportation, or commerce; public service commissions; or railroad commissions who publish the state's railroad system plan. Additional information was obtained from documents published by the Federal Railroad Administration and the Association of American Railroads, and from commercially available railroad maps.

Current traffic use of railroad lines was obtained in terms of average annual carloads of freight moved along rail line segments between 1983 and 1986. These numbers were converted into values for train trips passing through the rail line segment per year by applying a factor of 41 as the average number of carloads per train. This factor was derived from the total number of freight cars moved on Class I railroads in 1985, 57.2 percent of which were made by loaded cars. The average freight train in 1985 consisted of 71.8 cars (Association of American Railroads 1986). Any proposed rail line

improvements or abandonments as indicated in the state railroad plan were noted if they would affect future rail service in the area.

Potential program-related effects on railroad traffic were evaluated along the rail routes likely to be generally used by the Peacekeeper and training trains. These routes were identified based on the rail line which passes through the least populated areas, the rail line which has the smallest accident per volume rating, the rail line which has the smallest ratio of hazardous material accidents per hazardous material volume on each link, and the line which has the least network impedance (a measure of track quality, distance, and the unlikeliness of trains to interchange unnecessarily). The analysis included the initial delivery of the Peacekeeper trains to the various garrison installations, the occasional trips of parts of the train back to the MOB for major maintenance and repairs, the periodic movements of the training train to each of the garrison installations, and the dispersal of the Peacekeeper trains on the national rail network during times of national need.

For purposes of analyzing the Proposed Action, 2 Peacekeeper trains are assumed to be deployed at F.E. Warren AFB and up to 23 trains at other garrison installations. For the Alternative Action, 4 Peacekeeper trains are assumed to be deployed at F.E. Warren AFB and up to 46 trains at other garrison installations. Initial deployment of the Peacekeeper trains is assumed to take place over a 2-year period. Once a year at most, a train from each garrison installation would travel back to the MOB for major maintenance and repair. Each quarter, a training train would travel to each garrison installation to accomplish operations, security, and maintenance training. At most, the training train at each garrison would be dispersed five times for 24 hours to 72 hours, on the rail network around the garrison installation.

These additional train trips generated by the program were then compared to the current train traffic along the rail routes likely to be generally used by the Peacekeeper and training trains. These increases in train movements along the routes are small compared to the current train traffic and would only cause minimal interruptions to normal commercial trains. In addition, the Air Force would coordinate with the railroad dispatchers to request clearance onto the commercial rail network. Once on the network, the Peacekeeper and training trains would operate in the same manner as the existing commercial traffic. Therefore, no levels of impact and significance criteria were developed for evaluating impacts on railroads.

3.2 SOCIOECONOMICS

3.2.1 Resource Description

Six major elements are addressed in the socioeconomics resource: employment and income, population and demographics, housing, education, public services, and public finance. The results of these analyses are either translated into program impacts, used as inputs for other analyses, or used to describe the socioeconomic environment.

Employment and Income. The employment and income element describes the general level of economic activity for the region surrounding each candidate deployment installation. Civilian labor force, employment, unemployment, total income, and income per capita were the principal attributes used to describe economic conditions.

Population and Demographics. This element presents population trends and selected demographic characteristics of the region. Historical population levels, current population, projected population levels, and the military-civilian mix are the principal attributes discussed.

Housing. The housing element describes the total permanent year-round and temporary housing stock and available vacancies of major communities serving the Main Operating

Base and candidate garrison bases in the area. Permanent or year-round housing includes single-family, multifamily, and mobile home structures. Temporary or transient housing is defined to include primarily hotel and motel accommodations.

Education. The education element describes the characteristics of affected public and private school systems. Special attention is given to public elementary and secondary school districts. Student enrollment, staff levels, and facility capacities were the principal attributes studied.

Public Services. The public services element describes the overall service delivery systems of affected county and municipal jurisdictions, emphasizing major service functions. The total number of personnel employed by each jurisdiction relative to its population size, and the adequacy of existing equipment and facilities to meet current and projected demands were the principal factors evaluated.

Public Finance. The public finance element describes the fiscal condition of the affected counties, cities, and school districts. Annual operation expenditures, revenues, and reserve funding levels were the principal factors analyzed.

3.2.2 Region of Influence

Employment and Income. The ROI for the employment and income element is a multicounty market area, generally within 50 miles of the candidate deployment installation, that serves as a supply region for program-related labor requirements and construction materials. Not all counties within a 50-mile radius of the candidate deployment installations, however, were included in the ROI. These counties were those counties generally at the limit of the 50-mile radius which are characterized by their rural nature, low population, and employment levels, and general lack of support services for the type of activities associated with program deployment. The counties which do comprise the ROI are those from which at least 90 percent of local labor and material procurement could be available, and generally includes the principal commercial center in the area.

Population and Demographics. The ROI for this element includes those counties and major communities where most of the demographic changes attributable to the proposed program would be expected. In most cases, this would be the county in which the candidate deployment installation (Air Force base) is located with emphasis on the community(s) in the immediate vicinity of the base.

Housing. The ROI for this element includes those communities where most of the housing demand would be expected. In most cases, this would occur in communities nearest to the candidate deployment installation.

Education. The ROI for this element includes those school districts where most of the additional enrollment would be expected. In most cases, this would be the school districts adjacent to the base and the districts in the principal host community.

Public Services. The ROI for this element includes those counties and/or communities where most of the public service demands generated by program-related inmigration would be expected. In most cases, this would occur within the county in which the candidate deployment installation is located and the community(s) hosting most military personnel.

Public Finance. The ROI for this element includes those municipalities and school districts where increased public service demands would result in appreciable fiscal effects. In most cases, this would occur within the county in which the candidate deployment installation is located, and the city(s) hosting most military personnel.

3.2.3 Data Sources

Employment and Income. Publications of the U.S. Department of Commerce, Bureau of Economic Analysis were the sources for basic employment and income data. Civilian labor force and unemployment rates were obtained from state employment development and job service agencies.

Population and Demographics. Population estimates for the census years were obtained from publications of the U.S. Bureau of the Census. Additional information and population projections were provided by state and local planning agencies. The military component of the local population was obtained from reports from the respective bases.

Housing. Estimates of the 1980 total housing stock, vacancies, and prices for the various study areas were obtained from publications of the U.S. Bureau of the Census. These data were updated using U.S. Department of Housing and Urban Development data, Federal Home Loan Bank Housing Vacancy Surveys, and with the help of realtors, private agencies, base housing offices, and local government agencies. Temporary housing facilities data were obtained from local convention bureaus, private associations, and individual hotel and motel operators. Current housing listings from each base housing office were also obtained.

Education. Enrollment, facility information, and staffing levels were obtained from planning documents and annual reports of each school district. Enrollment projections made by individual districts were used where available.

Public Services. City and county government employment data were obtained from each jurisdiction's planning documents, budgets, and annual reports. The data were supplemented by discussions with appropriate city and county officials.

Public Finance. Fiscal data were obtained from the budget reports, annual financial statements, and audit reports of each jurisdiction.

3.2.4 Methods for Assessing Existing and Future Baseline Conditions

Employment and Income. Historical employment and income data for each ROI were compiled and compared with similar measures at the state and national levels. Unless otherwise specified, dollar values are expressed as constant 1986 dollar estimates. Employment and income data were presented for the census years 1980 and 1984 (the latest year available from the Department of Commerce Regional Economic Information System data tapes). Unemployment rates and civilian labor force information from the respective state employment development and job service agencies used the most recent available information (generally 1986). Forecasts of future baseline conditions were based on econometric models developed for each ROI. Population forecasts supplied by state and local planning agencies provided the principal exogenous variable.

Population and Demographics. National population census data for 1980 and 1985 (the latest year for which information was generally available) formed the basis for the analysis of current demographic conditions and recent trends. As available, data for 1986 and 1987 were included in the baseline discussions. The current size and demographic composition of the population were prepared on an annual basis. Future baseline projections were based on existing forecasts obtained from state and local planning agencies.

Housing. The existing baseline conditions for permanent year-round housing were compiled for 1980 and updated from the most recent housing survey reports where available. Where recent data were unavailable, information from realtors, private associations, and local government officials was used to update the census estimates. Housing demand projections were prepared using estimates of projected baseline population and

assumptions regarding estimated persons per household. Baseline supply data for temporary housing units were compiled from unpublished data. Housing office listings from each base were used to describe the local housing market.

Education. Existing baseline enrollments were compiled from published sources. Data were generally available through the current school year (1987-88). Enrollment projections were based on locally developed population forecasts and the ratio of school-age children to total population derived from the historical data.

Public Services. Descriptions of public services provided by the potentially affected jurisdictions were compiled from published sources and supplemented by information provided by local officials. Data were generally available through the current fiscal year (FY 1988). Public service employment levels were forecast based on estimated population growth and employment-to-population ratios derived from the historical data.

Public Finance. Historical revenues, expenditures, and changes in fund balances were compiled from published sources. Data from financial reports were generally available for the most recently completed fiscal year (FY 1987). Budget data were generally available through the current fiscal year (FY 1988). Projected revenues and expenditures were forecast based on the estimated growth in population and revenue/expenditure-to-population ratios derived from the historical data.

3.2.5 Methods for Assessing Socioeconomic Impacts

Employment and Income. Employment and income impacts were calculated for both direct program employment and procurement requirements as well as for indirect or secondary effects. All dollar values are presented as constant 1986 dollar estimates. Direct changes in construction employment were measured using the annual labor-hour requirements prepared by the U.S. Army Corps of Engineers and historically based assumptions regarding full-time equivalent work-hours per construction worker per year. Earnings were estimated by applying current craft-labor wage rates, derived from local building trade council publications, to annual construction work force estimates. Assembly and checkout (A&CO) worker earnings were based on annual salaries derived from similar work for the Peacekeeper in Minuteman Silos program at F.E. Warren Air Force Base (AFB), Wyoming; and, annual A&CO work force requirements at each base. Earnings of military personnel were estimated using a weighted average basic salary plus other payments (e.g., Basic Allowance for Quarters, Variable Housing Allowance, Basic Allowance for Subsistence and Flight Pay where applicable), and the estimated military operations work force requirements at each base.

Construction activities at the MOB (F.E. Warren AFB) are projected to begin in 1989. Although operations-related personnel would begin to arrive in July 1991, and reach a full complement by December 1991, personnel associated with site activation and A&CO would continue to be present through 1994. Thus, for purposes of evaluating the socioeconomic impacts associated with the long-term operation of the system, impacts in 1995 (the first year in which only operations-related personnel are present at the base) are used to characterize the effects associated with the operations phase of the program at F.E. Warren AFB. At other candidate deployment installations, construction, Site Activation Task Force, A&CO, and operations activities are described on a floating timeline (Section 1.4). When garrison locations are selected, the floating timeline will be converted to a calendar timeline in accordance with the selected sequence of deployment. Because socioeconomic impacts needed to be evaluated in terms of the level of change as measured against a specific baseline period, various start dates between 1990 and 1992 (the period in which garrison construction at each base would need to begin in order to achieve a planned Final Operational Capability by the end of 1993) were evaluated to determine if different start dates would have any impact on other planned or proposed missions at each base. The analyses identified no major differences from the use of different start dates at each of the candidate deployment installations. Thus, for

purposes of providing a parallel analysis of effects at each candidate installation and for comparison purposes, a start date of 1990 was used for each candidate installation. Based on this start date, the operations phase (defined as the first year in which only operations-related personnel are present at the installations) would be 1993.

Secondary changes in jobs and income were estimated using an economic (input-output) model specified structured for each ROI. The model, developed from published data, uses an approach developed by the Bureau of Economic Analysis. The model is structured to provide employment requirements for those sectors most likely to be affected by the program. Average wage rates for appropriate sectors were applied to respective changes in employment to obtain secondary income estimates. Labor force impacts (i.e., measures of the number of inmigrating workers, local hires, and weekly commuters) were estimated using factors derived from the Peacekeeper Monitoring Program at F.E. Warren AFB. The distribution of these labor force impacts on local areas was then estimated based on the location of worksites, potential residence locations, and commuting distances.

Population and Demographics. Annual population impacts were based on the number of program-related inmigrating personnel and assumptions regarding accompaniment rates and average household sizes for specific military and civilian worker categories. The inmigrating population was then allocated to the communities within the local area in the same pattern as the relocating labor force.

Housing. Annual program-related housing requirements were evaluated and compared to projected locally available vacancies. The impact analysis included four steps: (1) determination of inmigrant housing requirements and preference by housing type; (2) estimation of annual permanent and temporary housing requirements; (3) estimation of new housing starts by both the private sector and the Air Force in response to program demand; and (4) comparison of the program-related housing requirements to baseline housing stock and available vacancies. The Air Force is committed to using locally available housing to the greatest extent possible. If the private housing market is unable to supply housing, the additional housing required would be supplied through existing federal housing programs, or if other options are not feasible, through funding supplied by Military Construction Programs.

Education. Program-related enrollment increases were based on the number of inmigrants and ratios of school-age children to total population. Peacekeeper in Minuteman Silos monitoring data were used as a guide in determining the school-age children to total population ratios for military and secondary workers and dependents. The ratio of school-age children of inmigrant construction workers to inmigrant construction population was estimated separately since many of the construction workers do not relocate their families. The pupil-to-teacher ratio for elementary grades was used as the primary factor for assessing public school impacts.

Public Services. Impacts on public service delivery systems were measured by the estimated increase in public sector employment required as a result of increases in service demands associated with program-related population inmigration. Total local government employment by jurisdiction was used as a proxy measure of overall public service levels within each community since such services are predominantly labor-intensive activities. Estimates of increased need for additional facilities were based on the capacities of the existing infrastructure to absorb program-induced demand.

Public Finance. Operation and maintenance expenditure impacts for city and county government units were based on additional personnel needs caused by program-related population inmigration and estimates of the per employee costs for these personnel. School district operation and maintenance expenditures were based on current costs per student. Revenues from P.L. 81-874 programs were calculated based upon the number of program-related "A" pupils and "B" pupils. Expenditures for major capital and equipment

outlays as identified by other resource analyses were estimated on a case-by-case basis. Revenue impacts were estimated for the principal revenue sources of each jurisdiction. Property taxes were calculated by estimating the additional taxable valuation that would be generated by program activities and applying current mill-rate levies against the estimated increase in the tax base. Increases in sales tax revenue were estimated based on program-related increases in taxable retail sales and the applicable sales tax rate. Other revenue sources (e.g., charges for services, fines, fees, redistributed state tax collections, and miscellaneous revenues) were estimated on a case-by-case basis.

3.2.6 Levels of Impact Criteria

Program impacts, including cumulative effects from other proposed projects, were evaluated as either beneficial or adverse. For impacts that were evaluated as adverse, levels of impact (LOIs) were assigned as negligible, low, moderate, and high.

The criteria for determining the level of socioeconomic impacts involve measuring the demand for the various components of the resource (e.g., housing, public services, and local government expenditures) relative to baseline levels. This measure provides an indication of the magnitude of the program-induced change relative to projected baseline conditions.

Because the additional housing needs, school enrollments, public service personnel needs, and local government expenditures are driven by and are directly related to population growth, criteria for LOIs for the socioeconomics resource used the estimated increase in population relative to baseline levels to measure the LOIs. The assumption that population growth, when measured against baseline population levels, is representative of the magnitude of the program-induced change in other socioeconomic elements (housing demand, enrollment increases in the local schools, public service demands, and local government expenditure needs) is based on the generally linear relationship (within a reasonable range) between population and these other elements: a population increase of 4,000 in a community of 40,000 would represent a 10-percent increase in population and also represents, for the most part, a 10-percent increase in school enrollments, housing demand, and local government services and expenditures.

Annual increases of a community's population over ten percent were judged to cause a high impact based on a number of growth impact studies (President's Economic Adjustment Committee, 1981; Hammer, Siler, George Associates, 1982; U.S. Department of Energy, 1978). This magnitude of change tends to strain local service delivery systems in the short term and may change a community's existing structure and organization in the long term. Conversely, impacts would be negligible when population change is less than one percent. Population growth of this magnitude is normal in most communities and would not result in appreciable responses by either public or private enterprise or agencies. Low and moderate impact criteria are intervals between one percent and ten percent.

The LOIs for the socioeconomics resource are:

- Negligible Impact -- Increases in community population of less than one percent over projected baseline levels. This level of growth would not result in appreciable increases in housing demand, school enrollments, public service demands, or local government expenditures.

- Low Impact -- Increases in community population of one percent to five percent over projected baseline levels. The proportionate increases in housing demand, school enrollments, public service demands, and local government expenditures would be generally within normal growth patterns and require little response by affected communities.

- Moderate Impact -- Increases in community population of greater than five percent but less than ten percent over projected baseline levels. Increases of this size are generally greater than normal baseline growth. The proportionate increases in housing demand, school enrollments, public service demands, and local government expenditures would require substantial responses by affected communities.

- High Impact -- Increases in community population of ten percent or greater over projected baseline levels. Growth of this magnitude would tend to strain local housing markets and local public service delivery systems in the short term and change a community's existing structure and organization in the long term.

3.2.7 Significance Criteria

The significance of socioeconomic impacts was evaluated in accordance with the context and intensity criteria provided in the Council on Environmental Quality (CEQ) regulations (Section 3.0).

In addition to the CEQ criteria, other considerations judged appropriate for socioeconomic impacts are the following:

- The degree to which area residents would be adversely affected by decreased vacancy rates in local housing markets;

- The degree to which the proposed program would reduce public services levels or aggravate already existing adverse conditions in the affected communities; and

- The degree to which the proposed program would create excessive fiscal burdens on existing residents.

Applying these general criteria, socioeconomic impacts were judged to be significant when one or more of the following would occur:

- Changes in housing demand that cannot be filled by available vacancies or by timely development of affordable and suitable housing. A shortage of low- and moderate-income housing would cause substantial burdens on both civilian and military families.

- Increases in existing neighborhood elementary school enrollment would result in pupil-to-teacher ratios that are larger than the state standards, thereby threatening accreditation. Resolutions to these problems would require major additions of personnel or facilities for which sufficient funds are not expected to be available. For education, the funding criteria refers to the potential availability of funds for the mitigation of identified impacts. For accreditation, individual state standards for the number of students per classroom were used.

- Increases in population would reduce service levels of key functions below locally prevailing levels and would require additional personnel or facilities to return service levels to preprogram levels for which sufficient funds are not expected to be available.

- Revenue sources of local governments are unable to meet program-induced outlays or the financial resources of the jurisdictions are inadequate to meet potential shortfalls.

3.3 UTILITIES

3.3.1 Resource Description

The utilities resource consists of a broad range of physical systems potentially affected by the Peacekeeper Rail Garrison program. These systems include the services and facilities that supply potable water, wastewater treatment, solid and hazardous waste disposal, and energy.

Potable Water Treatment and Distribution. Potable water treatment and distribution involves those facilities that distribute water to meet municipal and industrial demands. Facilities include treatment, pumping and distribution systems, and storage tanks.

Wastewater. Wastewater treatment includes those facilities that collect, treat, and dispose of waterborne wastes generated by municipal and industrial users. Facilities included sewage collection systems and treatment plants or lagoons.

Solid and Hazardous Waste. Waste disposal involves those facilities and systems that provide collection and disposal of solid and hazardous waste from municipal and industrial activities. Landfills or other waste disposal facilities and hazardous waste storage facilities were included in the analysis.

Energy Utilities. Energy utilities include the consumption of electricity, natural gas (and other heating fuels), and liquid fuels as well as the facilities that are associated with the generation and transmission or distribution.

3.3.2 Region of Influence

The ROIs for the utilities resource are the geographic areas where community utility service may be directly or indirectly affected by the Peacekeeper Rail Garrison program. Communities and other locations anticipated to receive significant inmigration are the focus of the utilities analysis.

Service area boundaries for the water, wastewater, and solid waste disposal utilities in these communities define the ROI. The ROI for energy utilities is defined by the service area of those companies providing power and fuel to the identified communities and to Air Force facilities affected by the Peacekeeper Rail Garrison program.

3.3.3 Data Sources

Major data sources for each utility system included municipal, county, and industrial annual statistical reports, monthly performance reports, master plans, and other technical studies. Annual state reports on water quality provided information on the status of the water pollution control programs, including wastewater treatment plant upgrade studies. County and regional studies addressing the nature of solid waste generation and the status of existing facilities were used to develop the baseline analysis. Data sources for Air Force bases' utility systems included environmental impact statements and assessments and other technical reports.

3.3.4 Methods for Assessing Existing and Future Baseline Conditions

Potable Water Treatment and Distribution. Potable water treatment systems were assessed for adequacy to provide for new demands. The number of facilities, existing capacities, and excess capacity, as well as proposed expansions, were evaluated. When available, data for a 3-year period were collected to identify trends in the amount of water treated. If projections of future treatment requirements were available, they were incorporated into the baseline analysis. Per capita rates were used in the absence of projections to determine future treatment requirements.

Wastewater. Wastewater treatment systems were assessed for adequacy to provide for new demands. The number of facilities, existing capacities, and excess capacity, as well as proposed expansions, were evaluated. When available, data for a 3-year period were collected to identify trends in the amount of wastewater treated. If projections of future treatment requirements were available, they were incorporated into the baseline analysis. Per capita rates were used in the absence of projections to determine future treatment requirements.

Solid and Hazardous Waste. Landfills and collection systems involved in solid waste disposal were analyzed for their ability to collect and dispose of the wastes of the baseline population. The availability of landfill space and future plans for expansions or for the use of new sites or technologies were investigated.

Existing onbase hazardous waste generation and storage was identified. Onbase hazardous waste sites were identified through the use of the United States Air Force Installation Restoration Program documents. Other sites were identified based on discussions with state and local officials. These locations were provided to the water resources group so that the potential effect on surface and groundwater resources could be assessed.

Energy Utilities. Major utilities companies that provide electricity and natural gas, along with local suppliers of liquid fuels and other alternative energy sources, were examined to assess existing service systems, including service areas, number of customers, and planned expansions. Energy resources were evaluated in terms of the change in peak demand for electrical systems and the change in annum sales for natural gas systems. Energy use was identified in terms of the annual per capita consumption of electricity (in kilowatt-hours), natural gas (in thousand cubic feet), and liquid fuels (in gallons).

3.3.5 Methods for Assessing Utility Impacts

Methods for assessing utility impacts were the same for each of the four resource components. The analysis included certain assumed mitigations and offered specific mitigation measures where significant impacts were identified.

Utility requirements were based on direct and indirect program-related demands. Direct construction utility requirements at F.E. Warren AFB and at the other candidate bases were identified. Direct requirements at the bases during the operations phase were calculated using a per capita estimate for the additional personnel working onbase. Indirect utility requirements were estimated from population projections based on the socioeconomic analysis. Per capita utilization rates were multiplied by the projected population to obtain an estimate of the utility capacity needed. These rates were based on historical use patterns and any significant industrial use or other factors.

Changes in average daily demands were estimated by comparing demands at each location with and without the program. Both direct and indirect demands were totaled and taken as a percentage increase over the projected baseline demand. Total demand was compared against existing or programmed capacity to determine if shortfalls would occur as a result of the program. If the total demand for a utility appeared to effect the price of the service, then an analysis of the programs effect on the price was conducted.

3.3.6 Levels of Impact Criteria

Impacts on the utilities resource are related to the requirements for potable water and wastewater treatment capacity, solid waste disposal capacity, and energy supplies associated with increased service populations and population-induced land development. In addition, the direct requirements that support specific program-related construction and operations activities were evaluated. For each of the four components of the

utilities resource (potable water treatment and distribution, wastewater, solid waste, and energy utilities), program-induced changes were evaluated as a proportion of projected baseline utilities use for both the short and long duration.

Impacts would be negligible when the growth in utility demands are less than one percent. Growth of this nature occurs in most communities as the existing population increases its per capita consumption or generation of a resource. Annual increases in utility consumption that exceed ten percent generally would surpass growth projections for the system, and disrupt performance and delivery of service. This level of increase would require immediate attention and would be considered a high impact. Low and moderate impact criteria are intervals between these two extreme conditions. A LOI was assigned to the utilities resource after the relative merits of each component LOI was evaluated. The LOIs were defined generally for the utilities resource as follows:

- Negligible Impact -- A increase in service requirements attributable to the program-related utility demands of less than one percent over baseline demands.

- Low Impact -- An increase in service requirements associated with program-related utility demands of one percent to five percent over baseline demands.

- Moderate Impact -- An increase in service requirements associated with program-related utility demands that exceed five percent but are less than ten percent over baseline.

- High Impact -- An increase in service requirements associated with program-related utility demands that are ten percent or greater over baseline.

3.3.7 Significance Criteria

The significance of utilities impacts was evaluated in accordance with the context and intensity criteria provided in the CEQ regulations (Section 3.0).

In addition to the CEQ criteria, the following considerations were judged appropriate for the utilities resource:

- The degree to which a utility service would have to alter operating practices and personnel requirements;

- The degree to which the increased demands from the proposed program would require the development of additional capacity or new facilities;

- The degree to which the increased demands from the proposed program would reduce the reliability of utility service, or aggravate already existing adverse conditions in affected communities; and

- The degree to which the proposed program would aggravate existing deficiencies in the provision of utility services.

3.4 TRANSPORTATION

3.4.1 Resource Description

The transportation systems most likely to be affected by the proposed program are roads and railroads. Commercial airports (except Cheyenne Municipal Airport, Wyoming) and the public transportation systems are not expected to be affected by the proposed program. The methodology for evaluating impacts on the railroad system are discussed in Section 3.1. The focus of the analysis is on the road system between the candidate installations and the host communities.

The road networks considered in the analysis included all interstates, federal-aid designated primary U.S. or state-numbered highways, and principal city streets (usually the major urban arterials or federal-aid designated urban roads) where program-induced traffic is expected to be concentrated. The only commercial airport considered in the analysis was Cheyenne Municipal Airport, which would be utilized for the transportation of the reentry systems between F.E. Warren AFB and the candidate installations.

3.4.2 Region of Influence

The ROIs for transportation include all interstates and federal-aid designated primary U.S. or state-numbered highways within 50 miles of the candidate deployment installation that serves as a supply region for program-related labor requirements and construction materials. Because most of the labor force and materials requirements would come from communities nearest the candidate deployment installation, the analysis concentrated on the potential impacts on roads nearest the installation. Therefore, the ROIs for transportation only include interstates and federal-aid designated primary U.S. or state-numbered highways between the host community and the candidate deployment installation, and the principal city streets (also referred to as major urban arterials of federal-aid designated urban roads) within the communities serving each base.

3.4.3 Data Sources

The major sources of data were the respective agencies in each region including the state departments of highways and/or transportation; county highway departments or engineers; city road, engineering, planning, and/or public works departments of the host community; and the Federal Highway Administration. Most information was in the form of published or unpublished reports and maps showing the road network, geometric and physical characteristics, and volumes and characteristics of traffic. In addition, geometric characteristics and traffic information regarding onbase roads were obtained from each base or from published planning technical reports.

3.4.4 Methods for Assessing Existing and Future Baseline Conditions

Roads are described by their physical features, current traffic volume, and estimated level of service (LOS). The latest available average annual daily traffic counts were obtained to evaluate current use of road facilities. The LOS, which is specified by letter scores A (very good) to F (poor), provides a measure of the quality of service provided by a road segment or intersection and the likely level of acceptability of given traffic conditions to motorists. The LOS is a qualitative measure developed by the Transportation Research Board that incorporates the collective factors of speed, travel time, traffic interruptions, freedom to maneuver, safety, driving comfort and convenience, and operating costs provided by a road facility under a particular volume condition. Typical descriptions of operating conditions for each of the LOSs are given in Table 3.4.4-1 and shown in Figure 3.4.4-1.

Future conditions without the program may involve changes in either the transportation facilities or the traffic on the facilities. Information on likely facility improvements were obtained from the respective agencies and were included in the future (without program) baseline, to the extent feasible, if there is a reasonable expectation that they will be implemented. Future traffic volumes were either obtained from the respective transportation agencies (actual traffic projections or time series analysis), or estimated on the basis of population forecasts. Future traffic volumes on principal city streets in the host communities were estimated using projected population changes in the community. Population changes that include any effects of addition or completion of missions at the respective candidate installations were obtained from the socioeconomics analysis. Estimation of the LOS at critical road segments likely to be affected by the proposed program was performed for traffic conditions projected for 1990 and 1994.

Table 3.4.4-1

General Operating Conditions For Different Road Types by Level of Service

Level of Service	Operating Conditions		
	Freeways, Multilane Highways	Two-Lane Roads	Urban Streets
A	Traffic essentially free-flowing. Speeds about 60 mph[1]. Great freedom to maneuver. Minor disruptions easily absorbed.	Motorists can drive at desired speed, often about 60 mph[1]. Passing demand well below capacity; delays no more than 30%. Few platoons of 3 or more cars.	Free-flow operations at average travel speeds about 90% of the free-flow speed for the arterial class. Ability to maneuver within the traffic stream is high and stopped delays at signalized intersection is minimal, i.e., less than 5 seconds per vehicle.
B	Reasonably free-flowing, speeds about 57 mph. Maneuvering slightly restricted. High comfort. Incidents still easily absorbed.	Passing demand significant; delay about 45%. Speeds near 55 mph. Some platooning.	Reasonably unimpeded operations at average travel speeds about 70% of the free-flow speed for the arterial class. Ability to maneuver within the traffic stream is only slightly restricted and stopped delays at signalized intersection are in the range of 5.1 to 15 seconds per vehicle.
C	Stable flow, speeds in low 50-mph range. Lane changes require care and vigilance. Noticeable driver tension. Incidents cause degraded service, queuing.	Noticeable increases in numbers and sizes of platoons; delay about 60%. Speeds in low 50-mph range. Stable flow, but subject to congestion.	Stable operations, but ability to maneuver and changing lanes are more restrictive resulting in longer queues and lower average travel speeds of about 50% of the free-flow speed for the arterial class. Delays are in the range of the 15.1 to 25.0 seconds per vehicle.
D	Conditions border on unstable flow; small changes cause substantial deterioration in service. Speeds in low 40-mph range. Severe restrictions on maneuvering. Driver discomfort. Most disruptions cause LOS F.	Passing demand high, passing capacity near zero. Speeds may reach 50 mph. Platoons of 5-10 vehicles common. Delays may reach 75%. Approaches unstable flow.	Borders on a range in which small increases in flow may cause substantial increases in delays. Average travel speeds are about 40% of free-flow speed for the arterial class and stopped delays at intersections are in the range of 25.1 to 40 seconds per vehicle.
E	Conditions extremely unstable. No usable gaps; disruptions propagate upstream. Driver comfort, maneuverability extremely poor. Disruptions cause rapid transition to LOS F.	Passing virtually impossible; platooning intense; delays greater than 75%. Speeds below 50 mph; operation very unstable.	Characterized by significant delays at intersections ranging from 40.1 to 60 seconds per vehicle and average travel speeds of one-third or lower the free-flow speed for the arterial class. Many vehicles stop and the proportion of vehicles not stopping declines.
F	Forced or breakdown flow.	Heavily congested flow; volumes below capacity at low speed.	Arterial flow at extremely low speeds below one-third to one-quarter of the free-flow speed. Delays are in excess of 60 seconds per vehicle which is considered to be unacceptable to most drivers.

Note: [1]In the absence of strict enforcement. Assumes 55 miles per hour speed limit.

Source: Transportation Research Board 1985.



LEVEL OF SERVICE A



LEVEL OF SERVICE D



LEVEL OF SERVICE B



LEVEL OF SERVICE E



LEVEL OF SERVICE C



LEVEL OF SERVICE F

Source: Transportation Research Board 1985.

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FIGURE 3.4.4-1 OPERATIONAL CONDITIONS OF ROADS AT VARIOUS LEVELS OF SERVICE

3.4.5 Methods for Assessing Transportation Impacts

The effects of the proposed program on roads were derived from the potential increase in commuting induced by direct and indirect workers during the construction and operations phases. Impacts were evaluated in terms of peak-hour commuting LOS changes generated by program-related construction workers and operations personnel to assess the maximum of the proposed program on roads. The analysis involved an estimation of the number of workers and inmigrants that would use specific lengths of roads/highways, conversion of these program-induced commuters to peak-hour traffic volumes, and estimation of the resultant with-program LOS.

Program manpower estimates and their classes of activity (e.g., construction, assembly and checkout, and operations) were obtained from the program description. Program-related travel patterns were evaluated on the basis of proposed program work locations, work schedules, and vehicle occupancies. The most direct routes from the host communities (where program-related workers and personnel are expected to reside) to the worksites were determined, and the corresponding program-induced traffic was then assigned to the road/highway system. Traffic assignments were made only on primary rural highways, such as interstates and federal-aid designated primary U.S. or state-numbered highways between the host communities and the candidate installation, and the principal city streets (usually federal-aid designated urban roads) within the host communities. Person trips were converted to vehicle trips through application of ridership factors. For this analysis, all workers were assumed to commute by passenger car, with a ridership of 1.1 passengers per vehicle for up to 10 miles of commute, 1.35 passengers per vehicle for distances between 10 miles and 15 miles, and 1.55 passengers per vehicle for longer commuting distances. These factors were derived from information in the National Cooperative Highway Research Program Report 187, Quick Response Urban Travel Estimation Techniques and Transferable Parameters User's Guide (Transportation Research Board 1978) and are found to be reasonable values for these distance ranges.

The number of additional vehicle trips made by program-related employees that would occur during the peak hours was combined with baseline traffic projections to determine impacts on the road/highway system leading to the base. Commutes made by indirect employment workers and other inmigrants were estimated and distributed to the principal streets in the community based on existing traffic flow levels. The effect of generating queues and delays due to increased traffic at the entrance gates to the installation was determined based on gate capacities provided in the Military Traffic Management Command publication Traffic Engineering for Better Gates. Gate capacities are based on security levels: a high-security gate, where employees must stop and show their identification, could process at most 200 to 400 vehicles per hour per lane; a medium-security gate, where vehicles are not required to stop, could process at most 400 to 600 vehicles per hour per lane; and a low-security gate, found at installations that are open to the public, could handle about 600 to 800 vehicles per hour per lane. The resulting then-year traffic flow condition along roads leading to the base and at the gates was then compared to the without-program conditions to assess impacts of the program on transportation.

3.4.6 Levels of Impact Criteria

The effect of program-induced traffic on the quality of transportation service would have different levels of intensity. The measure of quality or LOI for roads would vary in relation to the ratio of the rate of flow to the capacity of the transportation facility.

For roads, the changes in the intensity of the quality of service is measured by changes in the traffic LOS. The LOI assignments are related to the changes in motorist safety and satisfaction associated with changes in the LOS rating or with appreciable increases in

volume at degraded service levels. For example, a change from LOS A to B results in comparatively little inconvenience, delay, or hazard. By contrast, a change from LOS E to F results in breakdown conditions: the level of annoyance is high, delays are severe, and the potential for collisions is sharply increased. An impact may be produced even without a change in LOS rating if the roadway section is already at a degraded LOS rating (LOS D, E, or F) and additional traffic will result in annoyance, slowing, and increased hazard. An increase in the amount of heavy vehicles in the traffic stream could also change the LOS rating. The operational characteristics along a freeway and multilane highway, two-lane road, and an urban arterial street under each LOS letter score is described in Table 3.4.4-1. The effects of increased queue lengths, delays, and service operations on urban streets are also expressed in LOS ratings.

The LOIs reflecting these considerations are characterized as follows:

- Negligible Impact -- No change would occur in LOS for categories A, B, or C. Although traffic volumes may increase, the motorist would perceive no essential difference in traffic operations.

- Low Impact -- The LOS would decline from A to B or B to C, or volume is added at LOS D. The motorist might perceive a slight change in traffic operations.

- Moderate Impact -- The LOS would decline from A to C, C to D, or D to E, or volume is added at LOS E. The motorist would perceive a noticeable decrease in the quality of service of traffic operations.

- High Impact -- The LOS would decline from A to D, A to E, A to F, B to D, B to E, B to F, C to E, C to F, D to F, or E to F, or volume is added at LOS F. The motorist would perceive a decided decrease in the quality of service of traffic operations, or existing LOS F conditions would be extended in duration and/or worsened.

3.4.7 Significance Criteria

The significance of transportation impacts was evaluated in accordance with the context and intensity of criteria provided in the CEQ regulations (Section 3.0).

In addition to the CEQ criteria, the following consideration is judged appropriate in evaluating significance for transportation.

- An impact on roads was considered significant if the LOS is affected at or reduced to LOS D or lower for more than one hour per day because of program-related traffic. The 1-hour criterion reflects a daily duration of impact beyond the usually accepted standard for road design and analysis. The LOS criterion also reflects motorists' exposure to conditions below minimum desirable design standards. Both factors imply associated impacts on road safety, and the potential demands for facility improvements with related capital expenditures.

3.5 LAND USE

3.5.1 Resource Description

The land use resource analysis includes a discussion of land uses, prime farmlands, compatibility with local land use plans and policies, and visual attributes. Land use analysis involves both direct and indirect impacts. Direct impacts would result from construction of program-related facilities on or in the vicinity of a base. These impacts

can affect both developed and undeveloped land, and result in changes in land use (including prime farmland) caused by acquisition of land for proposed program use including the rail connector spur and the explosive safety zone around the candidate base facilities. Some program facilities may be found incompatible with the existing land use plans and policies of the local jurisdictions. Indirect impacts would result from land use changes caused by program-induced population growth.

Visual attributes are defined as the physical characteristics or qualities of the environment that can be seen by observers of the landscape. A landscape is defined as a portion of land that the eye can comprehend in a single view, irrespective of its aesthetic value. The analysis involves the evaluation of changes in the aesthetic value of a landscape caused by program-related activities and the extent of acceptability of these changes to viewers.

3.5.2 Region of Influence

The land use ROIs include the affected portions of each base, the land surrounding the base, the communities hosting the inmigrant population, and land along the proposed connecting rail spur. The visual attributes ROIs are the foreground, middleground, and background areas in the vicinity of the proposed facilities as viewed from key observation points. Key observation points are highways with an average annual daily traffic of at least 1,000, residential communities (subdivisions), and recreation areas.

3.5.3 Data Sources

The locations of all candidate facilities, including restrictive easements and connector spur lines, were determined from siting maps prepared for the program. Data on offbase land use, land use plans and policies, and soils were obtained from city and county planning offices, Air Force base planning personnel, state forester offices, the U.S. Agricultural Stabilization and Conservation Service (ASCS), existing environmental studies, aerial and ground photographs, U.S. Geological Survey (USGS) maps, and field surveys.

In addition, ground photographs were taken from key observation points toward the proposed Train Alert Shelter (TAS) and Training Train Shelter (TTS) sites to assist in the preparation of simulated drawings when necessary.

3.5.4 Methods for Assessing Existing and Future Baseline Conditions

The analysis of program impacts on land use required an inventory of present and future land use baseline conditions in the vicinity of bases affected by direct fee acquisition for the garrison, connector rail spur, or relocated facilities, and by explosive safety zone easements where inhabited buildings or public transportation routes would require relocation. Land uses have been described based on interpretation of aerial photographs and existing maps such as those published by the USGS and the ASCS. Structures, utilities, roads, and easements are addressed as appropriate.

Because agriculture and silviculture are the predominant rural land uses in the ROIs, their generalized patterns were determined and analyzed by type of agricultural use (e.g., irrigated and nonirrigated pasture or rangeland, irrigated cropland, and nonirrigated cropland) or silvicultural use (harvesting of wood products). Prime and unique farmlands in the vicinity of the base were also identified. Prime farmlands include lands that have the best combination of physical and chemical characteristics for producing food, feed, fiber, forage, oilseed, and other agricultural crops with minimum inputs of fuel, fertilizer, pesticides, and labor, and without intolerable soil erosion, as determined by the Secretary of Agriculture (Farmland Protection Policy Act of 1981). Unique farmlands are defined as lands that are used for production of specific high-value food and fiber crops as determined by the Secretary of Agriculture. They have the special combination

of soil quality, location, growing season, and moisture supply needed to economically produce sustained high quality or high yields of specific crops when treated and managed according to acceptable farming methods. Examples of such crops include citrus, tree nuts, olives, cranberries, fruits, and vegetables. Urban land uses in the ROIs were inventoried by type (e.g., residential, commercial, industrial, public, or open space).

Projected future land use conditions assume a continuation of existing conditions. Land uses, except in specific locations undergoing conversion, are expected to remain relatively similar to the current mix of uses, and as such, the projected conditions analysis is qualitative.

Landscapes for each of the proposed program siting locations were identified. They contain descriptions of the landscape features (land, vegetation, and structures) found in each ROI and identification of key observation points of the TAS igloos, TTSs, and the Missile Assembly Building (at F.E. Warren AFB) to be constructed.

3.5.5 Methods for Assessing Land Use Impacts

Impacts were determined based on three factors: (1) the extent and kind of land which would be affected by the program facilities (including onbase housing where proposed) and the connector spur; (2) the number of inhabited buildings and other facilities (e.g., public roads and transmission lines) that would fall within restrictive easements; and (3) the anticipated visual acceptability of newly constructed facilities.

The amount of land designated for various land uses that would be acquired (and thereby changed) by the program was related to the amount presently available in the host county. Proposed program activities and facilities were compared to existing local land use, land use plans, and zoning in the immediate vicinity to determine the compatibility of the proposed military uses with those local plans and requirements. Further, the question of whether or not program-induced community growth would be inconsistent with adopted local plans and policies is discussed where such growth would occur.

The number of inhabited buildings and other facilities located within the explosive safety zone restrictive easements is important to the impact analysis because it would be necessary to relocate or vacate them. Inhabited buildings and other facilities include dwellings, commercial and industrial establishments, schools and other places of assembly, power plants, and certain electrical transmission lines.

The acceptability of visual intrusion of the TASs and TTSs on the landscape are important to aesthetic considerations because of their size. Each TAS would be 1,200 feet long, about 60 to 90 feet wide (at the base), and 30 feet high. They would lie parallel to each other, 200 feet apart, in groups of four (or 6 for the Alternative Action). All but 400 feet of the TASs would be covered with earth to create the igloo portion of the TAS, the remainder may be light steel or masonry construction. The TTSs would be 800 feet long, about 26 feet wide, and 30 feet high, and would not be covered with earth. The visual impacts of any TASs or TTSs to be located 0.5 mile or more from key observation points, or where the view would be blocked by intervening topography, vegetation, or structures, were considered negligible. At distances of over 0.5 mile, the 30-foot-high structures would rise less than 0.9 degree above the horizon and would not be noticeable to the casual observer.

3.5.6 Levels of Impact Criteria

Program impacts on land use, including cumulative effects of other known projects, were analyzed and the following four LOIs were assigned: negligible, low, moderate, and high.

The criteria for determining the LOI on agricultural land use were based on the extent of program-induced changes in several types of land uses and prime farmland as compared to the amount of each type of land use and the amount of prime farmland presently available in the host county (a commonly used geographic area for identifying agricultural economic strength). Permanent loss of ten percent of a given type of agricultural land use is considered a severe impact on the normal agricultural economy. Therefore, a loss of ten percent or more of a given type of agricultural land use (e.g., irrigated cropland or grazing land) or of prime farmland in a given county was assumed to be a high impact.

The criteria for determining the LOI on inhabited buildings and other facilities that would have to be relocated because of restrictive easements were based on the scope of the program. The need to relocate ten inhabited buildings was considered a high impact for a program the size of the Peacekeeper Rail Garrison program. Negligible, low, and moderate impacts were divided between zero and nine buildings.

The criteria for determining the LOI on visual attributes were based on factors that would measure the degree of visual intrusion on the landscape as viewed from key observation points. The factors used were the distance between the key observation points and the TASs and TTSs; the existence of topographic, vegetation, or structural features that would block views of program facilities from key observation points; and the degree of contrast within the landscape created by the facilities (TASs and TTSs would be the most conspicuous program facilities). The combination of these factors determine the viewer's acceptance or objection to the visual intrusions created by the program.

The LOI definitions for the land use resource are the following:

- Negligible Impact -- The loss of any land use type or prime farmland due to program acquisition would be less than one percent of the inventory of that use in the host county; no inhabited buildings would be located within the restrictive easements; and visual intrusions would not be noticeable to the casual observer.

- Low Impact -- The loss of any land use type or prime farmland due to program acquisition would be at least one percent but less than five percent of the inventory of that use in the host county; one to four inhabited buildings would be located within the restrictive easements; and/or visual intrusions would be noticeable but are not expected to be objectionable.

- Moderate Impact -- The loss of any land use type or prime farmland due to program acquisition would be at least 5 percent but less than 10 percent of the inventory of that use in the host county; five to nine inhabited buildings would be located within the restrictive easements; and/or visual intrusions are expected to be objectionable to less than 50 percent of the viewers.

- High Impact -- The loss of any land use type or prime farmland due to program acquisition would be 10 percent or more of the inventory of that use in the host county; ten or more inhabited buildings would be located within the restrictive easements; and/or visual intrusions are expected to be objectionable to more than 50 percent of the viewers.

3.5.7 Significance Criteria

The significance of impacts on land use was evaluated in accordance with the context and intensity criteria provided in the CEQ regulations (Section 3.0).

In addition to the CEQ criteria, the following considerations are also appropriate for the land use resource:

- The extent to which the action would restrict or prevent the use of inhabited buildings or other major facilities within the explosive safety zone restrictive easements;
- The degree of visual contrast between the program facilities and the existing landscape; and
- Where land acquisition is necessary for program facilities, the extent to which these facilities would be compatible with adopted local land use plans and zoning on adjoining private land.

3.6 Cultural Resources

3.6.1 Resource Description

Cultural resources include four elements: prehistoric, historic, Native American, and paleontological resources.

Prehistoric Resources. Prehistoric resources are physical properties resulting from human activities predating written records. They are generally identified as either isolated artifacts or sites; the latter is the basic analytical unit in archaeology. Sites contain concentrations of artifacts, features, and floral and faunal remains. Depending on their age, complexity, integrity, and relationship to one another, sites may be important and capable of yielding information about past populations and adaptive strategies. Although most sites have some research potential, it is generally the larger and more complex sites that have a variety of research applications and are of greatest concern during program planning.

Historic Resources. Historic resources consist of physical properties that postdate the existence of written records; in the United States, such properties usually relate to Euro-American occupations. Historic resources include architectural structures (e.g., buildings and bridges) and archaeological features such as foundations and trash pits. Such resources may have research potential in the same manner as prehistoric sites, but historic sites are more often considered important because of their association with important historical persons or events, or as examples of distinctive architectural styles. Ordinarily, sites less than 50 years old are not considered historic for analytical purposes, but exceptions can be made for younger properties if they are of exceptional importance (Code of Federal Regulations 1986c, 36 CFR §60.4).

Native American Resources. Native American resources are sites, areas, and materials important to Native Americans for religious or heritage reasons. Resources may include prehistoric sites and artifacts, contemporary sacred areas, traditional use areas (e.g., native plant habitat), and sources for materials used in the production of sacred objects and traditional implements. Of primary concern in the Environmental Impact Analysis Process are concepts of sacred space that create the potential for land use conflicts. Fundamental to Native American religions is the belief in the sacred character of physical places such as mountain peaks, springs, and burials. Additionally, traditional rituals often prescribe the use of particular native plants, animals, or minerals. Therefore, activities that may affect sacred areas, their accessibility, or the availability of materials used in traditional practices may be of concern.

Paleontological Resources. Paleontological resources are the physical remains, impressions, or traces of plants or animals from a former geological age. They include casts, molds, and trace fossils such as burrows and tracks. Fossil localities typically include surface outcrops, areas where subsurface deposits are exposed by ground disturbance, and

special environments favoring preservation, such as caves, peat bogs, and tar pits. Paleontological resources are important mainly for their potential to provide scientific information on paleoenvironments and the evolutionary history of plants and animals.

3.6.2 Region of Influence

One of the main considerations used to evaluate the importance of cultural resources is their cultural/historical context, as defined at the regional level. The ROI is designed as an approximation of the areas within which data useful for establishing cultural/historical context can be derived. Although their sizes vary from one region to another, the ROIs generally include several counties, incorporating recognized culture areas and/or physiographic provinces. They are intended to reflect the regions within which impact area resources can be compared with known sites to establish their relative importance. The ROIs also include the regional resource bases that would be affected by the loss of a resource in the program impact areas. The program impact areas comprise only a small portion of the ROIs.

3.6.3 Data Sources

Data for all resource elements were obtained at two levels: the ROIs and program impact areas. A general literature review was undertaken for all the ROIs; existing site records and detailed survey data were obtained for only a small area within the ROIs surrounding the onbase and offbase impact areas. Information used in the identification of cultural/historical contexts in the ROIs was obtained from a variety of published and unpublished reports. These documents were identified through consultation with the State Historic Preservation Offices, the U.S. Bureau of Reclamation, the U.S. Bureau of Land Management, the U.S. Forest Service, and a variety of professional researchers in the fields of anthropology, archaeology, geology, and history. Site-specific data on prehistoric, historic, and paleontological resources in the vicinity of program impact areas were obtained in two ways. A search of state site files was conducted to identify previously recorded sites near the base, and the National Register of Historic Places (NRHP) was consulted to identify any known eligible sites. Field surveys were subsequently carried out in those impact areas not previously studied. Native American resources were identified through direct consultation and field visits with religious specialists from the appropriate tribal groups.

3.6.4 Methods for Assessing Existing and Future Baseline Conditions

Baseline conditions for all resource elements were identified by combining resources previously identified in the vicinity of program impact areas with those identified during the site-specific field surveys. Regional geomorphic conditions were considered to assess the potential for encountering buried resources in the impact areas. The history of ground disturbance at the base and in offbase impact areas was detailed to the extent possible using existing records and field observations. Patterns of previous disturbance were used to further refine the definition of those impact areas where the preservation of intact subsurface deposits could be reasonably expected to occur.

3.6.5 Methods for Assessing Cultural Resource Impacts

The level of likely impacts was identified by comparing program impact areas with the distributions of all resources known or (in the case of potential buried sites) predicted to occur in the vicinity of the impact areas. The significance of impacts was determined by evaluating prehistoric, historic, and paleontological sites for their importance relative to other resources in the ROIs, as determined through consultation with area professionals and appropriate agency representatives. The assessment of impacts on Native American resources included the evaluation of the relative importance of different resource types, and the determination of specifically what actions or conditions would constitute disturbances to important resources. Both considerations were determined through

consultation with religious specialists. With the possible exception of some types of Native American resources (e.g., native plant habitat), impacts on cultural and paleontological resources are considered to be of long duration. The potential reversibility of an effect contributed to the identification of the level of impact (LOI).

3.6.6 Levels of Impact Criteria

The LOIs were determined by identifying the numbers and kinds of resources likely to be affected relative to their occurrence and importance in the region. Therefore, the setting or context of the impacts is regional. However, the amount or proportion of a given resource (i.e., site or locality) to be affected was also considered. The severity of impact was evaluated for its effects on NRHP eligibility, future research potential, or future suitability for religious or heritage uses. For cultural resources, the following LOIs were identified:

- Negligible Impact -- No important or sensitive resources are likely to be affected.
- Low Impact -- Important resources are likely to be affected, but they make up a small percentage of a resource type common in the region. Affected traditional use areas are widely available or could be restored.
- Moderate Impact -- Important resources are likely to be affected and they are of a type which is relatively uncommon in the region. Portions of affected resources may remain intact and some effects may be reversible.
- High Impact -- A large proportion of a given resource type within the region is likely to be destroyed, damaged, or altered. The resource represents a rare or unusual occurrence within the region.

A particular LOI may be driven by effects on any or all resource elements. The criteria used in determining the LOI for each resource element are described in the following sections.

Prehistoric and Historic Resources. Impact assessments focused mainly on those properties likely to be eligible for the NRHP. In addition to identifying the number and kinds of resources to be affected, the following issues were considered:

- Evaluation of the relative importance of a resource type in the regional context;
- The depositional integrity of a given resource; and
- The relative degree of protection afforded similar offbase resources in the region.

Native American Resources. The individual resource type, the proximity of impact areas to the resource, and the likely duration of impacts were considered in the analysis of Native American resources. Specific concerns include the following:

- The relative importance of the resource in the Native American physical universe and/or belief system;
- The distance at which activities in the vicinity of a sacred area constitute a disturbance;
- The extent to which affected resources may be restored; and

- The extent to which alternative sources for raw materials are available and/or suitable.

Paleontological Resources. In addition to identifying the numbers and kinds of resources likely to be affected, the following issues were considered in estimating LOI:

- The quality of fossil preservation in a given deposit; and
- The proportion of the resource to be affected.

3.6.7 Significance Criteria

In addition to the CEQ criteria listed in Section 3.0, the following considerations were judged appropriate for cultural resources:

- Whether the Proposed Action affects the research potential of a resource relative to regional research priorities; and
- Relative rarity of specific site types.

On the basis of these considerations, criteria were developed to assess impacts as significant or not significant.

Prehistoric and Historic Resources. Potential impacts on prehistoric or historic resources were considered significant if either of the following conditions apply:

- The proposed program could substantially add to existing disturbance of resources in the ROIs; or
- The proposed program may adversely affect NRHP-eligible resources or may cause loss or destruction of important scientific, cultural, or historic resources.

The NRHP eligibility (i.e., importance) of prehistoric and historic sites is evaluated according to criteria contained in U.S. Department of Interior regulations (Code of Federal Regulations 1986c, 36 CFR §60.4). Important resources are those that:

- Are associated with events that have made a significant contribution to the broad patterns of history; or
- Are associated with the lives of persons significant in history; or
- Embody the distinctive characteristics of a type, period, or method of construction, or that represent the work of a master, or that possess high artistic values, or that represent a significant and distinguishable entity whose components may lack individual distinction; or
- Have yielded, or may be likely to yield, information important in prehistory or history.

The evaluation of resources with regard to these criteria is accomplished through consultation with the State Historic Preservation Offices and Advisory Council on Historic Preservation in accordance with the National Historic Preservation Act.

Native American Resources. Impacts on Native American resources were considered significant if professional judgment indicated that either of the following conditions could occur as a result of the proposed program:

- A potential for affecting sites important for their position in the Native American physical universe or belief system; or

- The possibility of reduced access to traditional use areas or sacred sites.

Additionally, where a documented history of Native American concern for sacred sites was identified, this history was considered noteworthy, and was a contributor to the significance determination because of the increased likelihood that Native Americans may identify previously unknown sacred sites in the area.

Paleontological Resources. Impacts were considered significant if they affected deposits with high research potential. Important fossils could be expected to include:

- Those recovered in poorly studied regions or in unusual concentrations;

- Poorly known fossil forms;

- Assemblages containing a variety of fossil forms, particularly associations of vertebrates, invertebrates, and plants;

- Well-preserved terrestrial vertebrates; and

- Those in unusual depositional contexts.

3.7 BIOLOGICAL RESOURCES

3.7.1 Resource Description

As considered in this analysis, biological resources include the major components of the terrestrial and aquatic ecosystems potentially affected by the proposed program. For this study, available information was used to make site-specific and regional (i.e., ecosystem level) conclusions about the status of biological resources. Sections pertaining to biological habitats include all aspects of the general ecosystem in the study areas. Aquatic and terrestrial systems are treated together in the biological habitats discussion because they are closely interrelated, impacts from physical disturbances may affect both of these major systems, and these impacts can be best examined together in cause and effect relationships. Threatened and endangered species are treated separately because of legal requirements and the need for special consideration in the preservation of these species.

Biological Habitats. The discussion of biological habitats addresses all aspects of the general ecosystem within the ROIs. For terrestrial portions of the ecosystem, vegetation is described and treated as the foundation of the analysis for that portion of the system. Wildlife species are treated as an integral component of the vegetative habitats present in the ROIs. Aquatic systems are treated in a similar manner; however, the physical nature of the aquatic system (i.e., whether the aquatic habitat is a lake, stream, marsh, or some other habitat type) is described in greater detail because the biotic structure is often more strictly controlled by physical factors (e.g., substrate type, streamflow, and turbidity). All components of terrestrial, aquatic, and intergrade systems are treated at the ecosystem and population levels. Major emphasis is placed on some biological habitats that represent especially important components of the ecosystem, are protected by law, or are highly regarded by natural resource management agencies. Emphasis in discussions of these components is also given to other species and biological communities that would be affected by the program.

Threatened and Endangered Species. The threatened and endangered species section focuses on plant and animal species that are: (1) federally listed as threatened or endangered species; (2) are proposed for listing; and (3) are candidates for federal

listing. State-recognized species are also addressed. Threatened and endangered species that occur in the area of direct program disturbance that may be adversely affected by the program are emphasized in the discussion. Important characteristics of threatened and endangered species (e.g., wintering areas, nesting sites, and localities with high densities of species) are also described.

3.7.2 Region of Influence

The ROIs for biological resources are defined as the areas or locations where these resources can reasonably be expected to be directly or indirectly affected by program-related construction or operations activities. For biological resources, it is important to distinguish between areas and resources that may be subject to direct surface disturbance and other direct impacts from construction and operations activities, and areas where only indirect program impacts could occur as a result of increased recreation and program-induced development. The portions of the ROIs that would be subject to direct disturbance include those areas onbase and nearby where new facilities would be built, as well as adjacent areas that may also be affected by factors such as noise and runoff. Indirect impacts may occur where program-induced development is expected, or where program-induced recreational use would affect biological resources. The portions of the ROIs where indirect impacts may occur are the areas within a 1-hour driving time or approximately 60 miles from the major population center for each base. This area was selected because the program would result in only a small increase in population per base (approximately 800 people during operations). The resulting increase in recreational users would be negligible compared to existing levels of use at recreational resources beyond this area. The shape and extent of this area depends on the layout and type of roads in the area and the location of recreational facilities and biological resources of special sensitivity or interest.

3.7.3 Data Sources

Data sources employed in vegetation/habitat mapping included 1:7,200 and 1:24,000 color aerial photographs, 1:58,000 color infrared aerial photographs, U.S. Geological Survey (USGS) topographic maps, National Wetland Inventory maps, USGS land use/land cover maps, and other available maps and reports. Field surveys are scheduled for completion prior to publication of the Final Environmental Impact Statement (FEIS) to verify the photointerpreted maps and to support impact analyses. Federal and state natural resources management agencies (e.g., the U.S. Fish and Wildlife Service [USFWS], the U.S. Environmental Protection Agency, the U.S. Army Corps of Engineers [COE], and state fish and wildlife agencies), local experts, and base environmental personnel were consulted to obtain current information on the status of natural resources at each base. Literature surveys and searches of computerized natural resources data bases were also performed. These data sources were applied to the analysis of both biological habitats and threatened and endangered species.

3.7.4 Methods for Assessing Existing and Future Baseline Conditions

Biological Habitats. Major vegetation and aquatic habitats onbase and within 1 mile of the base were identified and mapped. Supporting data were incorporated in a data base management system. Wildlife, fisheries, and other biota were identified within the mapped habitats. Field surveys were used selectively to determine the status of key species in areas of direct surface disturbance and to fill particularly important data gaps. Primary attention was given to those plant and animal species whose local populations would be reduced by program-related activities and regional communities that would be disturbed by program impacts. Unique habitats were identified through interviews with natural resource management agencies and informed local experts, and through direct analysis of habitats in the potentially affected areas. These habitats' unique qualities, degree of legal protection (if any), and likelihood for improvement or degradation in the future (as a result of nonprogram-related activities) were analyzed. Projections of

future conditions for biological resources in the ROI relied heavily on information provided by natural resource management agencies and local planning groups.

Threatened and Endangered Species. Species evaluated include federally listed threatened and endangered species, proposed species, and federal-candidate species, which are defined in Table 3.7.4-1. Species given special protection or status by state agencies were also considered and are listed per base. Occurrences of threatened and endangered species were compiled from data supplied by the USFWS, state agencies, computerized natural resources data bases, local experts, and base environmental personnel. Comprehensive tabulations of these species were compiled for areas that may be affected by direct surface disturbance and potential indirect impacts near these areas. Species present in the remaining ROIs were not analyzed unless a specific source of program-related disturbance was identified.

Special attention was given to threatened and endangered species that are thought to occur within the direct disturbance area. Favorable habitats near known locations of sensitive species were inventoried to determine the presence of rare species. Permanent habitats and important habitats used on a seasonal or transitory basis were also evaluated.

Information regarding regional and site-specific distributions, abundance, population status and prognosis, habitat requirements, recovery plans, and importance to national populations were reviewed for each threatened and endangered species that may be affected by the proposed program. This information and assessments from natural resources managers were used to assess future conditions for these species.

3.7.5 Methods for Assessing Biological Resource Impacts

Site-level impacts were evaluated for all biological components and an overall assessment was made for the resource at each base. Site-level impacts on biological resources were evaluated for areas that may be directly or indirectly disturbed. Impacts on threatened and endangered species also have importance at the regional (i.e., ecosystem) level. The overall assessments place site-level impacts in perspective to the importance of accumulated impacts within the program study area.

Biological Habitats. Impacts on existing biological habitats were assessed relative to the habitat changes expected to result from the program. Overlays of facility disturbance zones were used to determine and locate the habitats potentially affected. The locations and amounts of potential offsite disturbance were also considered, including effects of erosion, siltation, dust, and excess water or water loss. All possible impacts on local watersheds were considered for aquatic habitats (e.g., the creation of barriers to upstream fish movement and downstream effects of sedimentation). Behavioral disturbance of wildlife (e.g., displacement) was considered, in addition to the amount and type of wildlife habitat lost. These impacts were quantified to a level appropriate to determine whether local populations of flora or fauna would be diminished, especially if any existing populations would have difficulty continuing their existence as a result of program impacts. The extent of potential impacts was further described to the degree that local and regional biological communities would be disturbed, including consideration of recovery time. The ability of assumed mitigations to reduce or eliminate impacts was also considered in deciding on the final impact ratings. These assumed mitigations include general practices such as soil stabilization and revegetation. Specific mitigations are summarized at the end of the impact assessment sections for each base, when appropriate.

This program would result in filling of wetland habitats on some bases. Section 404 of the Clean Water Act requires that a permit be obtained from the COE for placement of dredge and fill materials in wetlands of the United States. Section 404(r) (33 USC §1344(r)) exempts federal projects specifically authorized by Congress from

Table 3.7.4-1

Federal Threatened and Endangered Species Categories

Category	Definition
Endangered	Taxa[1] threatened with extinction throughout all or a significant portion of their range.
Threatened	Taxa likely to become endangered in the foreseeable future.
Proposed Endangered	Taxa proposed to be formally listed as endangered.
Proposed Threatened	Taxa proposed to be formally listed as threatened.
Category 1[2]	Taxa for which the USFWS currently has on file substantial information on biological vulnerability and threat(s) to support the appropriateness of proposing to list them as endangered or threatened species. Presently, data are being gathered concerning precise boundaries for critical habitat designations. Development and publication of proposed rules on these taxa are anticipated, but because of the large number of such taxa, it could take several years before they are published. Also included in Category 1 are plant taxa whose status in the recent past is known, but may already have become extinct. These plants may retain a high priority for addition to the list subject to the confirmation of extant populations.
Category 2[2]	Taxa for which information now in possession of the USFWS indicates that proposing to list them as endangered or threatened species is possibly appropriate, but for which substantial data on biological vulnerability and threat(s) are not currently known or on file to support the immediate preparation of rules. Also included in Category 2 are plant taxa that are possibly extinct and taxonomically questionable taxa that are believed extinct in the wild, but are extant in cultivation. It is likely that some of these will not warrant listing, while others will be found to be in greater danger of extinction than some taxa in Category 1.
Category 3A	Taxa for which the USFWS has persuasive evidence of extinction. If rediscovered, however, such taxa might acquire high priority for listing. At this time, the best available information indicates that the taxa included in this subcategory, or the habitats from which they were known, are in fact extinct or destroyed, respectively.

Table 3.7.4-1 Continued, Page 2 of 2

Category	Definition
Category 3B	Names that, on the basis of current taxonomic understanding, usually as represented in published revisions and monographs, do not represent taxa meeting the USFWS definition of "species." Such supposed taxa could be reevaluated in the future on the basis of subsequent research.
Category 3C	Taxa that have proven to be more abundant or widespread than was previously believed and/or those that are not subject to any identifiable threat. Should further research or changes in land use indicate significant decline in any of these taxa, they may be reevaluated for possible inclusion in Categories 1 or 2.

Notes: [1]Taxon pl. Taxa = a taxonomic entity (species, subspecies, or variety) or a group of such entities.
[2]The taxa in Categories 1 and 2 are candidates for possible addition to the List of Endangered and Threatened Species. The USFWS encourages their consideration in environmental planning, such as in environmental impact analysis under the National Environmental Policy Act; however, none of the substantive or procedural provisions of the Endangered Species Act apply to a species that is designated as a candidate for listing.

Source: Federal Register 1985.

obtaining a permit from the COE if information on the effects of such discharge, including consideration of 404(b)(1) guidelines (Code of Federal Regulations 1985, 40 CFR §230), is included in an environmental impact statement (EIS) pursuant to the National Environmental Policy Act, and the EIS has been submitted to Congress before the actual discharge of dredged or fill material from construction of the program and prior to either the authorization of the program or an appropriation of funds for such construction. In accordance with Section 404(r) requirements, a detailed evaluation of the potential for adverse impacts on aquatic ecosystems will be made for each base affected prior to publication of the FEIS. This report will include discussions on appropriate and practicable steps to minimize impacts, a factual determination on potential short-and long-term effects of the Proposed Action, secondary effects, and alternative siting analysis. In addition, mitigation plans will be prepared. This preliminary impact analysis considered these guidelines.

Threatened and Endangered Species. Specific program-related activities were analyzed to determine impacts on threatened and endangered species, and whether the species affected is federally listed, proposed, candidate, or state recognized. The types of impacts evaluated included direct mortality, displacement, loss of habitat or a habitat component, noise pollution, disturbance of daily/seasonal movements or activities, and stress. Potential impacts on sensitive species occurring elsewhere in the ROI were addressed to identify which program-induced impacts on these species would exceed those impacts resulting from continued population growth and increased recreational use without the program.

3.7.6 Levels of Impact Criteria

The level of impact (LOI) represents the biological magnitude of the expected disturbances (i.e., the effect on the condition of populations, habitats, and ecological systems). The expected overall impacts on biological resources were categorized as negligible, low, moderate, or high. The same LOIs and criteria for defining them were applied to short- and long-duration impacts. The criteria used for defining the LOIs are as follows:

- Negligible Impact -- No impact is expected, or the impact is expected to be so small as to be essentially unnoticeable by professional biologists.
- Low Impact -- The impact is noticeable, but no consequences are expected that would alter the condition of populations, biological communities, or the integrity of ecological systems.
- Moderate Impact -- The proposed program begins to adversely affect the condition of populations, biological communities, or the integrity of ecological systems. (For example, the proposed program begins to affect the reproductive success of a species.)
- High Impact -- The proposed program has a substantial adverse effect on the condition of populations, biological communities, or the integrity of ecological systems. (For example, the proposed program seriously affects the reproductive success of a species.)

3.7.7 Significance Criteria

The significance of impacts on biological resources was evaluated in accordance with the context and intensity criteria provided in the Council on Environmental Quality (CEQ) regulations (Section 3.0).

In addition to the CEQ criteria for biological resources impacts, the concepts of intensity and context include the potential of an impact to affect a wider array of ecologically

related biological resources than the directly affected resource, and the potential to affect the scientific, recreational, economic, or aesthetic value of the resource. These criteria are not necessarily dependent on the duration of an impact. Therefore, the same criteria apply to short- and long-duration impacts. The determination of significance of impacts on biological resources specifically included:

- The unique characteristics of biological resources, such as areas designated as parklands, wetlands, wild and scenic rivers, or ecologically critical areas;
- The general ecological, scientific, or economic value of a biological resource;
- The resulting level of concern the impacts would be expected to elicit from natural resource management agencies, scientific authorities, or other individuals or groups with expertise concerning the affected resource;
- The legal requirements for the affected resource (e.g., for threatened and endangered species and for wetland habitats);
- The extent to which the proposed program would add to present or future disturbances of resources in the ROI; and
- The potential of the affected resource to recover through natural population or habitat recovery or through artificial means such as revegetation and stream restoration.

3.8 WATER RESOURCES

3.8.1 Resource Description

Water would be required to construct and operate the Peacekeeper Rail Garrison system. Land disturbance which would occur during program construction was evaluated for its potential to alter the hydrology or degrade the quality of nearby surface or groundwater. Therefore, the water resources analysis considered three components: major water users, surface water hydrology and quality, and groundwater hydrology and quality.

Major Water Users. This component addresses the effects that program water requirements would have on existing major water users. The categories of major water users examined included military, municipal, self-supplied industrial, rural-domestic, and agricultural. Also examined was the adequacy of the water supply sources to meet the baseline and program-related water demands highlighting potential water shortages.

Surface Water Hydrology and Quality. This component addresses the effects of the proposed program on streamflows and the water quality of surface water bodies. State-designated water uses of streams and water quality standards violations were also addressed. Other issues included local drainage characteristics and water control works.

Groundwater Hydrology and Quality. This component addresses the effects of the proposed program on groundwater reserves, well yields, water table fluctuations, and water quality conditions and trends of the principal groundwater aquifers.

3.8.2 Region of Influence

The ROIs for water resources are defined as the local surface water drainages within and immediately around the candidate installations and their support communities where water quality may be affected by program-related construction. Where practical, the ROIs extend downstream to include the streams draining the general area. Beyond this point, program-related impacts would be minimal. The ROIs also include those

groundwater aquifers that would supply program-related water requirements. Finally, the ROIs include the areas serving competing major water users who might be affected by water diversions to support the program.

3.8.3 Data Sources

Hydrologic unit maps, 7.5-minute topographic quadrangles, and large-scale color aerial photographs were used to identify potentially affected surface water bodies. Water resources studies conducted by federal agencies such as the U.S. Geological Survey (USGS) and the COE, and by state water resource and water quality agencies, were reviewed. Several national water resource data bases were used to obtain site-specific data. This information was supplemented by interviews with agency personnel and with local water and wastewater officials.

3.8.4 Methods for Assessing Existing and Future Baseline Conditions

Sources of program-related water supply would vary widely among the candidate bases; therefore, the characterization of the water resources of some bases emphasizes surface water hydrology, while others accentuate groundwater hydrology and quality. Descriptions of major water users are presented uniformly for all bases.

Major Water Users. Total baseline water use within the ROIs was compiled using county-level statistical reports available from the USGS. Water use was characterized in greater detail for the 11 bases and their support communities. Local per capita factors (both for water use and sewage generation) were estimated in coordination with the utilities analysis. In the absence of projections by the local utility, these factors were applied to population projections generated by the socioeconomics analysis to determine future baseline requirements. Existing water supply sources were identified in interviews with local agencies, and their capability to meet future water demands are discussed. Emphasis was placed on identifying cases where projected water use might exceed locally developed sources of water supply. The institutional aspects of water use and existing water rights for the major water users were reviewed, including contractual agreements for water supply to the bases from support communities.

Surface Water Hydrology and Quality. Data and statistical programs available on the STORET and WATSTORE national data bases were used to characterize surface water flows, water quality, and flood information of the ROI streams. Surface water basins were delineated using USGS topographic quadrangles and maps of stormwater drainage systems. The 100-year floodplains were also plotted using flood insurance maps available from the Federal Emergency Management Agency. The state-designated uses for water bodies in the ROIs were reviewed along with their appropriate water quality standards. Major wastewater discharges to these water bodies were identified in interviews with state agencies. Emphasis was placed in determining water quality problems and violations of water quality standards. To the extent found in the literature or from interviews, water quality trends are discussed.

Groundwater Hydrology and Quality. The principal aquifers from which most of the groundwater in the ROIs is withdrawn were identified from USGS records and interviews with state agencies. Special groundwater management areas and future groundwater resource trends or developments were also identified in these interviews. General data on groundwater pumpage, depth to groundwater, and historical declines in groundwater levels were reviewed. Emphasis was placed on identifying aquifers experiencing depletion or having groundwater quality problems which might limit future groundwater availability.

3.8.5 Methods for Assessing Water Impacts

Estimation of program-related water use is fundamental in assessing impacts on the water resources base and existing major water users. Total program-related water use was evaluated for each year of the construction phase and for a typical year of full program operations (represented by 1993 unless otherwise noted). Direct water requirements such as construction- and operations-related water use were estimated based on historical data obtained from other military projects. Indirect domestic water use by inmigrants in the ROIs was estimated by applying area-specific, per capita water use factors to program-induced inmigrant projections developed by the socioeconomics analysis.

Major Water Users. Potential supply sources of program-related water requirements were identified. Program-related water requirements were compared to the future baseline use of the affected entities to determine the relative increase in water use. The annual water entitlement or supply capacity of the affected entities was compared to the peak annual, baseline-plus-program water use (typically 1992) and to water use in the first year of full program operation (typically 1993). The capability of the water supply sources to meet program-related demands was evaluated to assess the likelihood of interference with existing major users and to identify potential water shortages.

Surface Water Hydrology and Quality. For those bases and support communities with surface water supply sources, annual increases in stream diversions to meet program requirements were compared to the stream's average annual flow and a qualitative assessment of the resulting hydrologic effects was made. Increases in wastewater discharges to streams as a result of the program were obtained from the utilities analysis. Using available information on the adequacy of the wastewater treatment facilities and baseline water quality data of the affected streams, a qualitative assessment was made concerning the potential for water quality degradation resulting from increased wastewater discharges, where appropriate.

Maps of program facility locations were overlain on maps showing floodplains and surface water basins. Alterations in local drainages were identified. Those facilities lying within the 100-year floodplain were identified and potential flood effects were qualitatively evaluated. The amount of disturbed area within each subbasin was estimated. Program-induced erosion within each stream basin was calculated in association with the geology and soils analysis using the Universal Soil Loss Equation. The resulting sedimentation to local streams was calculated using a standard sediment delivery ratio function available in the literature. The potential for water quality impacts was analyzed, taking into account the water quality classification of the stream and the potential effect of the sedimentation on existing stream uses.

Groundwater Hydrology and Quality. Where groundwater provides a substantial portion of the existing water supply, program-related groundwater requirements were compared to baseline groundwater pumpage within each ROI and the relative increase was calculated on an annual basis. The potential for water quality degradation or depletion of a given aquifer was evaluated considering this increased pumpage as well as baseline trends. Areas where program-related pumpage might seriously affect the groundwater system were identified in cooperation with state agencies.

3.8.6 Levels of Impact Criteria

The following criteria provided the basis for a determination of both short- and long-duration impacts for surface and groundwater resources and major water users. The LOI definitions are expressed in qualitative terms.

- Negligible Impact -- Program-related water use would be minimal and would not be noticeable to existing major water users. No detectable changes to the hydrology or quality of the existing water resources base would occur.

- Low Impact -- Program-related water use would be small relative to baseline water use. This would not interfere with other major water users. Alternatively, small hydrologic changes or minor degradation of water quality would result.

- Moderate Impact -- Program-related water use would be substantial relative to baseline water use and/or would occasionally interfere with other major water users. Alternatively, appreciable hydrologic changes or degradation of water quality would result.

- High Impact -- Program-related water use would be large relative to baseline water use and/or would frequently interfere with other major water users. Alternatively, pronounced hydrologic changes would occur and/or serious or irreversible degradation of water quality would result.

3.8.7 Significance Criteria

In addition to the CEQ criteria, the following considerations were judged appropriate in evaluating significance for water resources:

- Whether the proposed program would result in the development of more costly sources of water and a potential rise in the cost of obtaining water to other major water users.

- The degree to which the proposed program would either result in or intensify water shortages.

- The degree to which shifts in the categories of major water users would occur (including the elimination of one or more major water users), changing the economic or social patterns of an area.

- The degree to which stream water quality degradation resulting from the proposed program would impair state-designated uses, or further degrade the quality of a stream which currently fails to meet state water quality standards, reducing the value of the stream for aquatic habitat maintenance or other downstream use.

- The degree to which the dewatering of one or more perennial streams or the potential decline in groundwater level results in a substantial depletion of the resource base.

- The degree to which the proposed program causes changes in the hydrologic characteristics of a stream that would result in substantial increases in downstream flood hazard.

- The degree to which the proposed program is likely to result in a reduction or cessation of the flow of one or more major springs. (Such springs are unique geographic features and their loss represents a substantial depletion of groundwater resources.)

- The degree to which the proposed program threatens degradation of groundwater quality to the point that the aquifer can no longer be economically pumped for established or likely future uses.

3.9 GEOLOGY AND SOILS

3.9.1 Resource Description

Geology and soils resources deal with the physical properties of the earth and its natural resources. The narrower scope considered in this EIS for adequately describing environmental effects of the proposed program includes energy and mineral resources, soil resources, and geologic hazards. The proposed program activities may require altering the existing terms of energy and mineral leases or extraction facilities in the garrison areas due to operational considerations. Program-related construction activities could affect the rates of soil erosion. This effect is important because of the potential loss of soil and possible secondary affects on water quality and biological habitat. The proposed program is not anticipated to influence the occurrence of geologic hazards. Consequently, this component is considered more relevant as a safety issue because of the potential for geologic hazards to affect elements of the proposed program.

Energy and Mineral Resources. Energy resources include geologic environments or regions where the generation or potential occurrence of energy resource materials such as oil, gas, coal, uranium, oil shale, and geothermal waters have been identified. Mineral resources include all forms of metallic and nonmetallic mineral deposits.

Soil Resources. Soil types in potential program construction areas were evaluated to determine if program-related construction activities would accelerate soil erosion rates resulting from increases in ground disturbance. Soil erosion includes wind, sheet, rill, and gully erosion.

Geologic Hazards. This component is divided into two categories that cover the potential effects from (1) seismic hazards and (2) landslides and terrain failure. Seismic hazards include strong ground shaking motions and surface fault rupture, which may result in damage to installation facilities. Landslides and terrain failure include all forms of slope instability related to slides, slumps, soil creep, and rock falls.

3.9.2 Region of Influence

The ROIs for energy and mineral resources, soil resources, and geologic hazards include the installations and associated program-related areas in the immediate vicinity. The land within a 1-mile radius of the installations and a 1,000-foot-wide corridor along the connecting rail spurs was characterized for purposes of establishing the local baseline context. In addition, regional ROIs were established for geologic hazards for the purpose of developing a regional framework for seismicity at each candidate installation.

3.9.3 Data Sources

Data sources used to prepare this EIS included published and unpublished reports and maps, data bases available through federal and state agencies, and consultations with local scientists. Major sources of data were previous geologic and soil investigations conducted at the installations in support of other programs, and preliminary siting activities for the Peacekeeper Rail Garrison program. Previous Department of Defense contractors' materials, such as Installation Restoration Program reports, were reviewed to determine if applicable data had already been collected.

3.9.4 Methods for Assessing Existing and Future Baseline Conditions

Energy and Mineral Resources. Baseline conditions for energy and mineral resources were obtained from public records concerning leasing activity and production data for each installation. Regional and local geologic interpretations from existing maps and publications on the energy potential of an area were also incorporated into this process. Areas identified as potential targets for resource exploration and/or production include

Known Geologic Structures, Known Geothermal Resource Areas, locations with existing extraction facilities, areas with known mineral accumulations, and lands currently held by oil and gas leases.

Soil Resources. Soil resource conditions were evaluated using criteria defined by the U.S. Soil Conservation Service (SCS). The susceptibility of a soil type to erode was based on the erodibility index which is related to physical and chemical properties of a soil type. Wind erosion susceptibility was categorized based on the Wind Erodibility Group designation assigned to each soil by the SCS. Sheet erosion susceptibility was categorized based on the K-factor designation assigned to each soil by the SCS. Soil erosion susceptibility at the proposed affected areas was determined by constructing soil susceptibility maps which were overlaid with program facility maps. Future soil erosion conditions are not expected to differ from baseline conditions because the susceptibility of a soil to erode was based on the erodibility characteristics inherent to the soil particles regardless of outside factors (e.g., climate and construction).

Geologic Hazards. Geologic maps and publications were used to identify the tectonic province and seismic zone of the candidate installations. Regional and local maps and reports were also incorporated into the data base to characterize local fault zones. Data on the maximum credible earthquake and property of horizontal acceleration of rock were also compiled to evaluate the potential effect of a major seismic event at each installation. The liquefaction potential was also investigated by collecting and analyzing data on sediment and soil types and depth to local groundwater. Landslides and terrain failure were characterized by incorporating aerial photograph interpretation with topographic elements (e.g., steepness of slopes) and geologic and soils characteristics of the candidate installations. Materials susceptible to landslides or terrain failure were characterized and identified for site-specific areas of the program using the same techniques.

Future conditions for the geology and soils resource were assumed to be a continuation of existing geologic environments into the foreseeable future. This is because rates of natural geologic processes would not appreciably change over the short period of time associated with the proposed program when compared to the geologic time scale.

3.9.5 Methods for Assessing Geology and Soil Impacts

Impacts were characterized for energy/mineral and soil resources. Energy and mineral exploration would be restricted if leases occur in the proposed garrison site. Leaseholders would receive just compensation for energy or mineral resource interests that must be modified or terminated in accordance with the requirements under mineral exploration and extraction on Air Force lands. Just compensation would be based on an independent geologic appraisal of the lease or production. Mineral resource production of aggregate materials (sand and gravel) is not considered an issue based on previous environmental studies for other programs conducted at several installations.

For evaluating rates of soil erosion, the proposed garrison site and other disturbed areas were considered barren of vegetation only during the construction phase of the program. Disturbed ground was assumed to be mulched with 1 ton per acre of straw or equivalent materials as a temporary measure to control the rate of soil erosion during construction. A soil stabilizer would be maintained until new growth is established in areas disturbed by the program. This preventive measure could be utilized for the purpose of reducing impacts on soils, biological habitats, and the water quality of local streams.

Impacts were not assigned for geologic hazards because seismic activity was not anticipated to be affected by the proposed program. Support facilities and structures would be designed and constructed to withstand the MCE predicted for the region. The occurrence of landslides or terrain failure is not anticipated to occur because of design

and construction practices. The potential affects of seismic activity on the proposed program are addressed as a geologic safety issue in Chapter 5.0, Safety Considerations.

Energy and Mineral Resources. Program impacts on energy and mineral resources are related to present and future lease activities and how the proposed program may affect development due to limitations imposed by the program. Energy and mineral resource areas were identified by the presence of existing extraction facilities or leases, with consideration given to the local geologic setting. Impacts were based on the location of energy/mineral leases and the presence or absence of extraction facilities.

Soil Resources. Soil erosion rates associated with program construction and disturbed zones were calculated using empirical formulae that assess wind (Wind Erosion Equation) and sheet (Universal Soil Loss Equation) erosion. The data were calculated for average slope lengths of 200 feet for both wind and sheet erosion to account for variations in the landscape. A length of 1,000 feet was also used to calculate wind erosion rates for the garrison in order to treat the proposed site as a large exposed field. This was necessary to evaluate those soils whose length parallel to the prevailing wind direction exceeded 1,000 feet. Soil erosion of disturbed ground associated with construction of the rail spur was calculated for a zone restricted to 50 feet on either side of the spur. Soil erosion impacts were determined by comparing the sum of the erosion calculations to the maximum tolerable soil loss of a soil type as defined by the SCS.

3.9.6 Levels of Impact Criteria

The LOI is the determination of the magnitude of an impact. The LOI is determined by comparing LOI criteria to any program-induced change in the availability of energy and mineral resources or baseline rates of soil erosion. Since quantification of all aspects of geology and soils was not possible, professional judgment was also applied in determining the LOIs.

- Negligible Impact - Soil erosion would not exceed the baseline rate. Access to energy/mineral resources would not be restricted.

- Low Impact - Soil erosion rates would exceed the baseline rate but would be less than the maximum tolerable soil loss. Onbase energy/mineral leases encompassing proposed facility sites may have to be extinguished.

- Moderate Impact - Soil erosion rates would approximately equal the maximum tolerable soil loss. Offbase energy/mineral leases encompassing proposed facility sites may have to be extinguished. Onbase energy/mineral extraction in the vicinity of the proposed facility sites may be restricted for the life of the program.

- High Impact - Soil erosion rates would exceed the maximum tolerable soil loss. Offbase energy/mineral extraction in the vicinity of proposed facility sites may be restricted for the life of the program.

3.9.7 Significance Criteria

In addition to the CEQ criteria provided in Section 3.0, the following considerations are judged appropriate for the geology and soils resource:

- Whether the proposed program would deny access to critical energy resources or strategic and critical mineral commodities;

- Whether long-duration program-induced erosion would occur at rates greater than the soils natural regenerative capability due to an appreciable net loss of topsoil. Soil productivity would be reduced or possibly eliminated. The

present ecosystem would be incapable of reestablishing itself under the altered soil environment; and

- Whether program-related construction could result in detrimental effects that continue beyond the life of the program and would require extensive or continuous remedial action.

3.10 AIR QUALITY

3.10.1 Resource Description

For this program, air quality in a given location is described by the concentration of various pollutants in the atmosphere, which are expressed in units of concentration, generally parts per million or micrograms per cubic meter ($\mu g/m^3$). Federal and/or state ambient air quality standards have been established for each of the criteria pollutants. These pollutants are ozone, carbon monoxide (CO), nitrogen dioxide (NO_2), sulfur dioxide (SO_2), particulate matter equal to or smaller than 10 micrometers in diameter (PM_{10}), lead, sulfates, and hydrogen sulfide. These standards represent the allowable atmospheric concentrations at which the public health and welfare are protected, and include a reasonable margin of safety. The federal standards, which were established by the U.S. Environmental Protection Agency (EPA) and termed National Ambient Air Quality Standards (NAAQS), are defined as the maximum acceptable concentrations that may be reached, but not exceeded more than once per year.

3.10.2 Region of Influence

The ROIs include numerous areas where air quality may be affected directly by program-related construction activities or indirectly by program-induced transportation traffic. In general, the ROIs include the Air Force bases and the counties in which the bases are located. In addition, the ROIs include any federal- and state-mandated Prevention of Significant Deterioration (PSD) Class I areas that are within a 50-mile radius from the bases. In general, Class I is designed for "pristine" areas where almost any deterioration would be significant. Congress established several types of mandatory PSD Class I areas. These mandatory areas include international parks, wilderness areas larger than 5,000 acres, national memorial parks larger than 5,000 acres, and existing national parks larger than 6,000 acres. All other areas of the country classified as attainment are Class II. Class II limits allow for moderate, well-controlled growth and Class III limits allow pollutant levels to increase considerably.

3.10.3 Data Sources

Information and data relevant to the air quality descriptions presented in this document were obtained from federal agencies (e.g., EPA, National Technical Information Service, National Oceanic and Atmospheric Administration, National Climatic Data Center, and National Park Service), and state air quality control offices (for states containing potentially affected areas), local air pollution control agencies, military environmental offices (located at the bases presently under consideration as candidate installations), and reports published by universities and research study groups.

3.10.4 Methods for Assessing Existing and Future Baseline Conditions

In most cases, baseline values for existing urban air quality were obtained through a detailed review of published data (measured onsite ambient air quality data). For nonurban areas, where onsite ambient air quality data were not available, monitoring data from a representative station were used to estimate the regional background air quality. When no ambient data were available, average background numbers as determined by the EPA were used.

Future air quality baseline conditions were determined from a review of planned regional industrial and commercial development and projected traffic increases. Emission inventory and air quality data were extracted from available environmental documents pertinent to planned projects. This information was used to qualitatively estimate the future air quality in the region.

3.10.5 Methods for Assessing Air Quality Impacts

The major emissions of the Peacekeeper Rail Garrison program would result principally from the generation of fugitive dust (PM_{10}). Construction activities (e.g., land clearing, blasting, ground excavation, and cut-and-fill operations) and vehicle movements are the most significant sources of fugitive dust, defined as PM_{10}, that becomes airborne because of natural causes and/or human activities. In spite of uncertainties, such as source activity and silt and moisture content of materials, estimates were made for fugitive emissions resulting from construction activity. Fugitive dust emissions resulting from construction activity are proportional to the area of land being worked and the level of construction activity. An emission factor of 1.2 tons per acre of construction per month of activity (EPA-AP42, 1985a) was used to calculate uncontrolled fugitive dust emissions. These emissions were reduced 50 percent by assuming watering of construction areas. Emissions resulting from heavy diesel-powered equipment were estimated using EPA Document AP-42 and the numbers and types of construction equipment assumed to be onsite. The heavy truck emissions were estimated using the emission factors provided by the EPA (1985a).

Air quality impacts resulting from pollutant emissions from program-related activities were determined through the use of a simple proportional model. This model assumes that the pollutant concentrations in an area of interest are linearly related to the emissions in the area. The model provides a vehicle for relating pollutant emissions to background pollutant concentrations.

The first step in the application of the model was to estimate the amount of fugitive dust and gaseous pollutants (CO, SO_2, NO_2, and hydrocarbons) emitted from program construction and operations activities. Construction activities included the operation of heavy diesel-powered construction equipment, trucks, and other motor vehicles. Operations activities included training train operations, vehicular traffic increases, routine maintenance (e.g., standby power testing, locomotive diesel engine testing, and backup diesel generator testing), and aircraft operations related to the transportation of the reentry vehicle. Emission factors obtained from the EPA document AP-42 were used for developing these estimates.

Using county emission inventories obtained from the EPA and the results obtained in the first step, the second-step calculation derives the percentage increases in county particulate and gaseous pollutant emissions resulting from program emissions.

Because the percentage increase for each of the individual gaseous pollutant emissions from construction and operations activities was minimal, it was not presented. However, the percentage increases in fugitive dust emissions resulting from construction activities were somewhat greater than the gaseous emissions and, consequently, were used to calculate increases in background particulate concentrations.

Using the existing background particulate concentrations obtained from a representative particulate monitoring station (PM_{10} where available, otherwise total suspended particulates) and the percentage increase in particulate emissions (obtained in the second step), the third step was to calculate the increase in background particulate concentrations.

The fourth step was to determine the total background particulate concentration by adding the result of step three to the existing background concentration.

The final step in determining air quality impacts for fugitive dust emissions was to compare the concentration increases and the resulting total background concentrations with the incremental particulate concentration increases and the ambient PM_{10} standards specified in the level of impact criteria.

3.10.6 Levels of Impact Criteria

The magnitude of program effects on air quality was classified as having negligible, low, moderate, or high LOIs depending on the general health effects of fugitive dust generated by program facilities and activities. These were determined by known or projected ground-level concentrations and their relationship to applicable ambient air quality standards. In addition, EPA minimum threshold increments from new or modified major sources in nonattainment areas were used to better define the LOIs. The analysis includes a breakdown of LOIs by both areal extent and duration, as appropriate.

The LOIs for air quality are the following:

- Negligible Impact -- Predicted incremental concentrations of fugitive dust would not equal or exceed one $\mu g/m^3$ averaged annually or five $\mu g/m^3$ over a 24-hour period. These increments and background concentrations would be minimal when compared to the national or state air quality standards.

- Low Impact -- Predicted incremental concentrations of fugitive dust would exceed 1 $\mu g/m^3$ averaged annually or 5 $\mu g/m^3$ over a 24-hour period, but the increment together with background concentrations of fugitive dust would not exceed 35 $\mu g/m^3$ averaged annually or 100 $\mu g/m^3$ over a 24-hour period.

- Moderate Impact -- Predicted incremental concentrations of fugitive dust would exceed one $\mu g/m^3$ averaged annually or five $\mu g/m^3$ over a 24-hour period. The increment combined with background concentrations of fugitive dust would not exceed the ambient air quality standards of 50 $\mu g/m^3$ of PM_{10} (only those particulate sizes with an aerometric diameter of ten micrometers or less) averaged annually or 150 $\mu g/m^3$ PM_{10} over a 24-hour period.

- High Impact -- Predicted incremental concentrations of fugitive dust would exceed the PM_{10} primary NAAQS (50 $\mu g/m^3$ averaged annually or 150 $\mu g/m^3$ over a 24-hr period) when combined with background concentrations of PM_{10}. General health effects would occur. Susceptible people would experience mild aggravation to the upper respiratory system.

3.10.7 Significance Criteria

In addition to the CEQ criteria listed in Section 3.0, the following additional consideration is judged appropriate for the air quality analysis:

- Impacts are considered significant if estimated emissions from the construction activity would increase ambient pollutant levels from below to above federal, state, or local air pollution standards, would exceed allowable increments under PSD regulations, would be inconsistent with measures contained in local air quality attainment plans, or would add to existing or projected violations of federal, state, or local standards.

3.11 NOISE

3.11.1 Resource Description

Noise impacts can be defined as unwanted sound generated from the proposed program that interferes or interacts with the human or natural environment. Noise is described in terms of sound levels, which are measured in decibels (dB) or decibels adjusted to an A-weighted scale (dBA) to correspond with the range of human hearing. Ambient noise is defined here as all noise generated in an area, including background and incidental sources which are usually expressed in terms of the equivalent sound level (L_{eq}) or day-night noise level (L_{dn}). In an outdoor environment, L_{eq} is used, which expresses the average overall noise for a specific period. The L_{dn} is a measure of noise for a 24-hour period, in which the measured noise levels between 10:00 P.M. and 7:00 A.M. are weighted by an additional ten dB because of the increased receptor sensitivity during these designated sleeping hours. All of these noise level parameters are expressed in dBA scale and were used to characterize the baseline noise environment.

3.11.2 Region of Influence

The ROIs for noise are broadly defined as those areas where noise-level increases may occur as a result of program-related activities. Sensitive noise receptors identified as residential areas, schools, hospitals, parks, and churches that would be affected by increased noise levels, were the focus of attention within the ROIs.

3.11.3 Data Sources

Noise observations, noise data, and general discussions appear in miscellaneous documents. These are primarily special studies involving highway traffic, airport traffic, or special military projects/studies. Noise data, when available, were acquired from contacts with military base environmental offices or from environmental impact statements/reports published at the federal and state levels for certain transportation projects.

3.11.4 Methods for Assessing Existing and Future Baseline Conditions

The major noise sources in the vicinity of most of the Air Force bases under consideration were vehicular traffic on local roads and highways, and onbase aircraft operations. Land use patterns onbase and offbase, and the location of sensitive receptors with respect to the proposed construction areas, were determined from a review of base and regional maps, and through site visits. Sensitive receptors (e.g., residential areas, schools, hospitals, and recreation areas) were identified. In addition, the most recent Air Base Air Installation Compatible Use Zone report was used to derive the noise levels related to aircraft operations. Documents from the EPA were used to determine background noise levels at the rural sites. Projection of future baseline noise levels was not considered necessary for impact analysis.

3.11.5 Methods for Assessing Noise Impacts

Based on typical noise levels from construction equipment (Table 3.11.5-1) and the distribution of construction equipment at construction sites, noise levels resulting from construction activity were estimated through the use of simple point-source and line-source noise level prediction equations (Canter, 1977). Noise resulting from program operational activities, such as vehicular, air, and railroad traffic was also analyzed. Noise impacts associated with the construction and operational activities of the proposed program were evaluated and compared with the incremental noise increases specified in the LOI criteria. Noise impact analyses used single event noise levels to define construction noise impacts while L_{dn} values were used to define aircraft and vehicular traffic noise impacts.

Table 3.11.5-1

Typical Noise-Range Levels of Principal Construction Equipment

	Noise Levels in dBA at 100 Feet[1]
Structure Construction	
Crane	69-81
Welding generator	65-76
Concrete mixer	68-72
Concrete pump	75-78
Concrete vibrator	76[2]
Air compressor	68-81
Pneumatic tools	75-92
Bulldozer	80[2]
Cement and dump trucks	77-88
Front loader	66-78
Dump truck	77-88
Paver	80-82
Grading and Compacting	
Grader	74-87
Roller	67-69
Paving	
Paver	80-82
Truck	77-88
Tamper	68-71
Excavation and Earthmoving	
Backhoe	66-87
Front loader	66-78
Dump truck	72-88
Jackhammer	76-92
Scraper	74-87
Clearing	
Front loader	66-78
Dump truck	77-88
Jackhammer	76-92
Crane with headache ball	69-81
Landscaping and Cleanup	
Backhoe	66-87
Dump truck	77-88
Front loader	66-78
Paver	80-82

Notes: [1]Typical noise levels of principal construction equipment were adjusted from 50 to 100 feet.
[2]Represented by one value only in the EPA document.

Source: U.S. Environmental Protection Agency 1971.

3.11.6 Levels of Impact Criteria

Noise effects resulting from program-related increases in vehicular or construction activity (individually or in combination) were classified as having a negligible, low, moderate, or high impact depending on the magnitude and/or duration of that effect on the existing ambient noise environment, relative to the local population and/or land use. The impact levels are based upon the fact that noise level changes of three dBA or less are perceived as negligible by most people, while an increase of ten dBA is perceived as a doubling in sound (Bolt, Beranek and Newman, Inc. 1973).

The LOIs for noise are the following:

- Negligible Impact -- Predicted noise impacts would not exceed ambient noise levels by more than 2.9 dBA. The increase is not normally noticeable.

- Low Impact -- Predicted noise impacts would exceed ambient noise levels by 3 dBA to 4.9 dBA. The increase is barely noticeable.

- Moderate Impact -- Predicted noise impacts would exceed ambient noise levels by 5 dBA to 9.9 dBA. The increase is clearly noticeable.

- High Impact -- Predicted noise impacts would exceed ambient noise levels by ten dBA or more.

3.11.7 Significance Criteria

In addition to the CEQ criteria listed in Section 3.0, an increase in noise would be considered significant if the following condition occurs:

- An increase in noise levels related to construction activities of greater than 10 dBA at sensitive receptors. This 10-dBA increase would create potential interference and annoyance. Noise increases in quiet areas (background less than 50 dBA) may be perceived as greater than the same increases in noisier areas.

4.0 AFFECTED ENVIRONMENTS AND ENVIRONMENTAL CONSEQUENCES

This chapter describes the potentially affected environments and environmental consequences of the Peacekeeper Rail Garrison program. The chapter is divided into 12 sections. Section 4.1 describes the nationwide impacts of the program on the national economy and on the national railroad network. Sections 4.2 through 4.12 describe the program, affected environment, and environmental consequences at each of the 11 candidate deployment installations, including the Main Operating Base. At each base, ten environmental resources categories, as described in Chapter 3.0, Environmental Analysis Methods, are analyzed.

The introductory sections of each base-specific analysis identify the facilities required at each location, their proposed sites, and the resources required for system construction, assembly and checkout, and operation. Construction at F.E. Warren Air Force Base (AFB), the Main Operating Base, must begin in 1989 to meet current program needs. Construction starts in 1990 have been assumed for all other bases to permit unbiased comparison of the relative environmental consequences of their selection. Sensitivity studies show that the environmental consequences are substantially the same for construction start dates between 1990 and 1992.

Because the proposed Peacekeeper Rail Garrison program would not become fully operational before 1994 and would continue into the early part of the next century, it was necessary to develop projections of future conditions against which program impacts could be compared. Therefore, both existing and future baseline conditions are discussed in this chapter. Future baseline conditions include new military missions that will become operational at several of the bases; these include deployment of the first KC-135R air refueling squadron at Malmstrom AFB, Montana; the Central Radar System Over-the-Horizon Backscatter radar system at Grand Forks AFB, North Dakota; and the B-2 bomber wing at Whiteman AFB, Missouri.

The description of existing and future baseline conditions for a given resource is immediately followed by the impacts of the Proposed and Alternative Actions on that resource. In evaluating the impacts, certain assumptions were made. These assumptions have been incorporated into the environmental impact analysis and are described here to avoid duplication under each base description. In addition, commonly practiced construction methods were assumed. Mitigation measures that could be taken by the Air Force or by state and/or local agencies to reduce or eliminate impacts are described individually for each base at the end of the environmental consequences discussion. These measures would depend on impact location and decisions by the agencies most directly affected, including in many cases state and local government agencies.

Assumptions. The following assumptions were made for the program at each candidate location:

- Inmigrating military personnel and their dependents will live onbase if existing or program-related housing is available. When onbase housing is not available, military households will live in surrounding communities following the pattern of existing Air Force households. In the absence of available housing in surrounding communities, the Air Force would provide the required housing either onbase through the Military Construction Program, or offbase through the use of federal programs which encourage private entrepreneurs to construct additional housing in the affected communities.

- The Air Force Spill Prevention and Response Plan at each base will be updated, if necessary, to accommodate the proposed Peacekeeper Rail Garrison program. In addition, the Hazardous Waste Management Plan at each base will be upgraded, if necessary, to provide for classification, handling, storage, and transport of hazardous wastes associated with the proposed program.

- The Air Force will compensate landowners at fair market value for any land interest acquired as well as any structures that must be relocated as a result of this program.

- Landowners who are required to be relocated as a result of this program will be paid relocation benefits in accordance with Public Law 91-646.

- In the deployment and operations of the Peacekeeper Rail Garrison program, the Air Force will comply with all applicable federal environmental laws and regulations. In addition, the Air Force will comply with legally applicable environmental restrictions of state and local laws and regulations. The Air Force intends to follow state water laws in securing any new water supplies for the proposed program. To the extent practicable, the Air Force will also follow state and local construction standards.

- Except as specifically indicated, all program-related water requirements will be obtained from the existing water supply systems of each base and its support community(s).

- The areas between the garrison perimeter fences (a 30-ft swath) plus two additional 45-foot clear zones immediately inside and outside of the fences will be kept clear of vegetation and will be graveled. Soil stabilization measures will be employed within the balance of the garrison area not permanently disturbed by new facilities to avoid or control soil erosion.

- The Air Force will use the "best management practices" during construction regarding erosion control, dust control, slope stabilization, protection of public water supplies, and maintenance of stream water quality.

- All active agricultural production within the explosive safety zones will continue within the terms of the easements.

- All agricultural, oil/gas, and mining leases within the garrison areas will be rescinded and compensation provided as required by law.

- No construction equipment will be operated at night.

- In accordance with Department of Defense Instruction No. 4165.45, the Air Force will provide housing under the following guidelines:

  - Where the local housing market has the capacity to provide suitable rental housing for military families, military-owned, leased, or sponsored housing will not be programmed, except for those personnel who must reside on the installation for reasons of military necessity.

  - Where the local housing market is limited or nonexistent, or where housing is available but the location, quality, or cost creates an undue hazard or hardship for military families, . . . military-owned, leased, or sponsored housing may be provided to meet valid requirements.

  - All reasonable precautions will be taken to avoid harmful impact on local housing markets. In this regard, military housing will not normally be programmed or built if total assets, both onbase and in the community, exceed 90 percent of the effective requirement for installations . . . .

- Ground disturbed as a result of construction activity will be stabilized upon completion of construction. Temporarily disturbed areas will be revegetated with appropriate species and noxious weed invasion controlled.

- Proper construction techniques will be used to reduce the potential for landslides and mass movements occurring beyond the construction phase of the program. Grading plans will be developed to limit lengths of disturbed slopes to the extent possible.

- Dust-suppression methods such as watering and/or palliatives will be used during construction.

- Construction equipment will operate with noise-suppression baffles and mufflers.

4.1 NATIONWIDE IMPACTS

4.1.1 Economic Impacts

The Peacekeeper Rail Garrison program is expected to cost between $10 billion and $15 billion (in 1986 dollars) including expenditures for research and development, production, construction, and operations over the system's lifetime. Program expenditures from fiscal year (FY) 1989 through FY 1993 are projected to total about $7.6 billion (in 1986 dollars). This total would consist of nearly $2.0 billion in research and development outlays, $4.3 billion for production, $0.7 billion for military construction, and $0.6 billion in initial operating costs. Peak annual expenditures during this period would occur in FY 1991, amounting to $2.8 billion. Ongoing annual outlays for operation and support of the program beyond 1993 are projected at about $0.2 billion.

Table 4.1.1-1 presents projected program expenditures from FY 1989 through FY 1993, both in total and for the sectors in which demands would be greatest. The table also summarizes key economic indicators of program impact in terms of total (direct, indirect, and induced) jobs and earnings.

Demands for guided missiles and space vehicles represent the largest demand component of the program, estimated at $3.7 billion from FY 1989 through FY 1993. Communication equipment purchases also would be substantial, at $1.4 billion during these same years. Railroad equipment purchases are projected to total more than $0.5 billion for the program.

Earnings of direct, indirect, and induced workers would increase from approximately $0.8 billion in FY 1989 to about $3.1 billion in FY 1991 due to the program. The number of jobs created by the program is forecast to rise from nearly 40,000 in FY 1989 to nearly 148,000 in FY 1991, and then to decline sharply to 13,000 by FY 1993 and just under 12,000 in FY 1994 and beyond. At the employment peak in FY 1991, about 59,000 jobs would be created in manufacturing, with the remainder (89,000 jobs) distributed among other sectors of the economy.

Peak FY 1991 expenditures on the program would represent 0.06 percent of the 1991 forecast of U.S. gross national product published by Data Resources, Inc. (U.S. Long-Term Review, Spring 1988). Manufacturing capacity utilization has in recent years averaged between 80 percent and 81 percent, and utilization rates are forecast by Data Resources, Inc., to fluctuate between 82 percent and 84 percent from 1989 to 1993.

Program-related economic expansion can be accommodated under these conditions without creating labor and material shortages. Certain key subsectors, such as missile components, rocket fuels, and locomotive production, may experience increased backlogs. Since U.S. government purchases would represent substantial portions of output in these sectors, to minimize delays it may be necessary for government agencies to set schedule priorities among alternative programs.

4.1.2 Impacts on National Railroad Network

The potential effects of program deployment on commercial railroad traffic is discussed in this section. The potential effects on railroad safety are considered in Chapter 5.0, Safety Considerations.

During the construction phase, impacts on railroads would occur as a result of rail track extensions and spur reconstruction. Most of the bases would require new spurs and would be connected to the existing spur along with new wyes at the main line connection. Some of the new construction would require an at-grade crossing, bridge, or multiple-box culverts to cross streams or bayous. Because most of the construction would occur off the main rail line, minimal interference from normal commercial train traffic would occur. Construction of the wye on the main line could be completed without causing delays to normal commercial train traffic.

Table 4.1.1-1

Peacekeeper Rail Garrison Expenditures, Sector Demands, and Impacts on Earnings and Employment

Indicator/Sector	1989	1990	1991	1992	1993	TOTAL
			(Million 86$)			
Expenditures						
Research and Development	717.73	690.02	528.05	7.44	0.00	1,943.25
Production	0.00	1,097.15	1,914.98	1,304.87	0.00	4,317.00
Military Construction	40.43	311.41	240.63	105.60	20.75	718.83
Operation	0.00	22.49	134.96	224.93	224.93	607.31
TOTAL:	758.16	2,121.07	2,818.62	1,642.84	245.68	7,586.39
Key Sector Demands						
Missiles/Space Vehicles	413.20	1,033.40	1,433.64	800.82	45.32	3,726.38
Communication Equipment	155.43	388.74	539.29	301.24	17.05	1,401.75
Railroad Equipment	57.44	143.67	199.31	111.33	6.30	518.05
Earnings	837.48	2,345.13	3,097.89	1,785.29	241.70	8,307.49
			(Thousand Man-Years)			
Employment (Direct, Indirect, Induced)	39.60	112.17	147.73	85.74	12.69	397.93

The assembly and checkout of the Peacekeeper trains would be performed at the Main Operating Base (MOB) facilities at F.E. Warren Air Force Base (AFB). The Peacekeeper trains (without the reentry system) would be moved from the MOB at F.E. Warren AFB to the Garrison Maintenance Facility using any of the rail routes shown in Figure 4.1.2-1. The reentry systems would be transported separately using C-141 aircraft to the garrison installations. The reentry systems would be installed on the missiles in the Garrison Maintenance Facility on each garrison installation.

For purposes of analyzing the Proposed Action, 2 Peacekeeper trains are assumed to be based at F.E. Warren AFB and up to 23 trains deployed at up to ten other candidate garrison installations. Initial delivery of these trains would add an average of 11 to 12 train trips each year on the commercial rail network. These additional 11 to 12 Peacekeeper train trips would have minimal effects on the normal operations of the commercial trains.

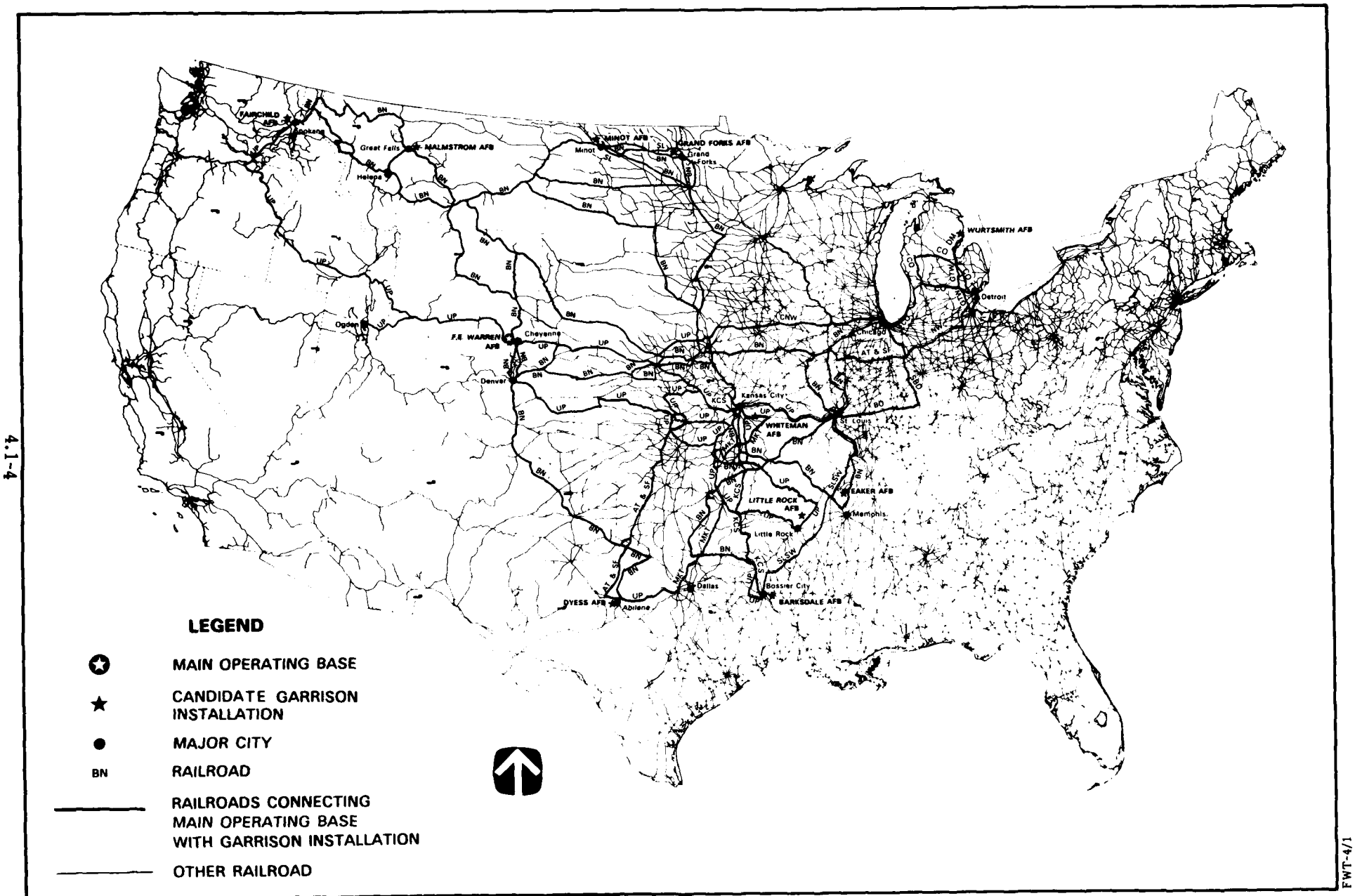
Major maintenance and repair on parts of the Peacekeeper train would be performed at the MOB. Any of the possible rail routes identified for each of the ten candidate garrisons could be used by the train in traveling between the garrison and F.E. Warren AFB. With the assumption that one train per garrison installation would return to the MOB each year, a maximum of 20 train trips a year (or 1 round trip from each of the 10 candidate garrison installations) would be added to any of these alternative rail lines. The rail lines in the vicinity of F.E. Warren AFB, the MOB, can easily handle 20 additional train trips per year.

Each quarter, a training train may travel to each of the garrison installations to accomplish operations, security, and maintenance training. Although the training train could visit other garrisons, it was assumed that it would return to the MOB before proceeding to other installations to assess the maximum impact on the national rail network. This would generate an additional 8 train trips each year between the garrison installation and the MOB, or an additional 80 train trips (assuming a maximum of 10 garrison installations) each year on the national rail network. At the garrison installation, the training train would be dispersed five times to train crews from 24 hours to 72 hours. This would add 20 train trips near each garrison or a maximum of 200 nationwide.

Nationwide, more than 19 million cars were moved on the rail network in 1985, generating 5,000 to 7,000 train trips per day. Training and maintenance activities of the program would increase train traffic on the national rail network by 300 train trips each year. This increase is very small compared to the number of train trips that the commercial rail network currently services. The Air Force would coordinate with the local dispatcher and the railroad operations department regarding movements of the trains. If the Peacekeeper train is dispersed on the national rail network, train traffic would be increased by 25 train trips per day for the duration of the dispersal activity. Compared to the 5,000 to 7,000 daily train trips on the nation's rail network, the additional trips are considered insignificant.

For the Alternative Action, 100 Peacekeeper missiles on 50 trains would be deployed, with 4 trains assumed to be based at F.E. Warren AFB and 46 trains at up to ten candidate deployment installations. Initial deployment of these trains would add 23 Peacekeeper train trips each year for two years on the national rail network. The additional 23 train trips would have minimal effects on train traffic.

Since the frequency of maintenance and repair trips to the MOB and that of training train trips are assumed per garrison installation and not by number of Peacekeeper trains, the additional train traffic generated by the Alternative Action would be about 300 trips. If all 50 Peacekeeper trains are dispersed on the commercial rail network simultaneously, the additional 50 train trips per day for the duration of dispersal activity would have an insignificant effect on the nation's rail network which handles 5,000 to 7,000 train trips per day.



FWT-4/1

FIGURE 4.1.2-1 NATIONAL RAILROAD NETWORK AND POTENTIAL ROUTES FOR INITIAL PEACEKEEPER RAIL GARRISON DEPLOYMENT, MAINTENANCE, AND TRAINING

4.2 F.E. WARREN AIR FORCE BASE, WYOMING

F.E. Warren Air Force Base (AFB), with an area of approximately 5,870 acres, is located in Laramie County in southeastern Wyoming. The host organization of this Strategic Air Command base is the 90th Strategic Missile Wing, supporting 150 Minuteman III and 50 Peacekeeper missiles. The missile launch facilities are dispersed over an approximate 12,600-square-mile area covering portions of Wyoming, Nebraska, and Colorado.

F.E. Warren AFB employed 4,022 military personnel (634 officers and 3,388 enlisted), 803 appropriated fund civilian personnel, and 2,276 other civilian personnel (including 1,940 contractor personnel) at the end of fiscal year 1987. Approximately 40 percent of the military personnel live on F.E. Warren AFB and 60 percent live in communities near the base.

The City of Cheyenne, located east of the base, is the host community for F.E. Warren AFB. Most of the personnel living offbase reside in Cheyenne or in areas adjacent to the city. Cheyenne, located in a predominantly agricultural and ranching region, had an estimated 1985 population of 48,876. Laramie County had an estimated 1985 population of 71,870. The region's economy is dominated by the agriculture, trade, government, and service sectors. Located at the intersection of two major interstate highways, Cheyenne also serves as a regional transportation center.

The following sections provide a description of activities associated with the deployment of the Peacekeeper Rail Garrison program at F.E. Warren AFB for the Proposed Action (4 Train Alert Shelters [TAS]) and the Alternative Action (6 TASs). In addition, the proposed deployment of 150 Small Intercontinental Ballistic Missiles (ICBMs) in the vicinity of F.E. Warren AFB is discussed.

Proposed Action. For the Proposed Action at F.E. Warren AFB, the Air Force would construct garrison facilities and provide personnel necessary for the deployment and operation of up to four Peacekeeper missile trains. As described in Chapter 1.0, Program Overview, F.E. Warren AFB would also be the Main Operating Base (MOB) for the Peacekeeper Rail Garrison program. Approximately $119.6 million (in 1986 dollars) of construction would occur onbase for the Proposed Action. Construction activities for the purpose of analysis are assumed to begin in 1989 with initial operations beginning in 1991. Direct employment requirements would be 252 in 1989, peak at 624 in 1992, and stabilize at 442 in 1995 during the full operations phase. Peak construction employment of 408 would occur in 1990. Annual direct employment requirements for the Proposed Action are presented in Table 4.2-1 for site activation, construction, assembly and checkout, and operations activities.

The MOB facilities at F.E. Warren AFB would include a Missile Assembly Building (MAB), Trainer and Instruction Facility, Missile Rail Trainer, Rail Car Processing Facility, and Central Preparation Kitchen. The MAB would be constructed near the western boundary of the base and restrictive easements on 109 acres would be required to accommodate the explosive safety zone for the MAB (Figure 4.2-1 and Table 4.2-2). Construction of the MOB facilities would permanently disturb approximately 12 acres and temporarily disturb 22 acres (Table 4.2-3). The existing explosive ordnance disposal (EOD) range would require relocation. Relocation of the EOD range would disturb approximately one acre permanently.

For the Proposed Action, two subalternatives would be considered. For the purpose of clarity, these are referred to as the north site option and the south site option. The garrison for the north site option would be located in the northern portion of the base (Figure 4.2-1). Seven buildings (including the 4 TASs), roads, utilities, parking, and approximately 1.4 miles of track would be constructed within the garrison. Construction of the garrison would disturb approximately 53 acres permanently and 93 acres

Table 4.2-1

Annual Direct Employment (Military and Civilian) for the Peacekeeper Rail Garrison and Small ICBM Programs in the F.E. Warren AFB Area by Calendar Year for 1989-2000 (Full-Time Equivalent Jobs)

	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	Year 2000[1]
PEACEKEEPER RAIL GARRISON												
Proposed Action												
Site Activation	75	168	149	144	144	48	0	0	0	0	0	0
Construction	177	408	94	0	0	0	0	0	0	0	0	0
Assembly & Checkout	0	8	56	38	27	4	0	0	0	0	0	0
Operations	0	0	130	442	442	442	442	442	442	442	442	442
TOTAL:	252	584	429	624	613	494	442	442	442	442	442	442
Alternative Action												
Site Activation	75	168	149	144	144	48	0	0	0	0	0	0
Construction	195	422	94	0	0	0	0	0	0	0	0	0
Assembly & Checkout	0	12	84	57	0	0	0	0	0	0	0	0
Operations	0	0	144	486	486	486	486	486	486	486	486	486
TOTAL:	270	602	471	687	630	534	486	486	486	486	486	486
SMALL ICBM												
Site Activation	0	0	0	17	17	47	58	79	79	73	73	0
Construction	0	0	0	247	1,073	1,589	945	778	500	2	0	0
Assembly & Checkout	0	0	0	0	0	0	229	141	211	233	176	0
Operations	0	0	0	0	0	188	825	1,223	1,455	1,830	2,324	2,324
TOTAL:	0	0	0	264	1,090	1,824	2,057	2,221	2,245	2,138	2,573	2,324

Note: [1]Employment beyond the year 2000 would continue at these levels for the life of the respective programs.

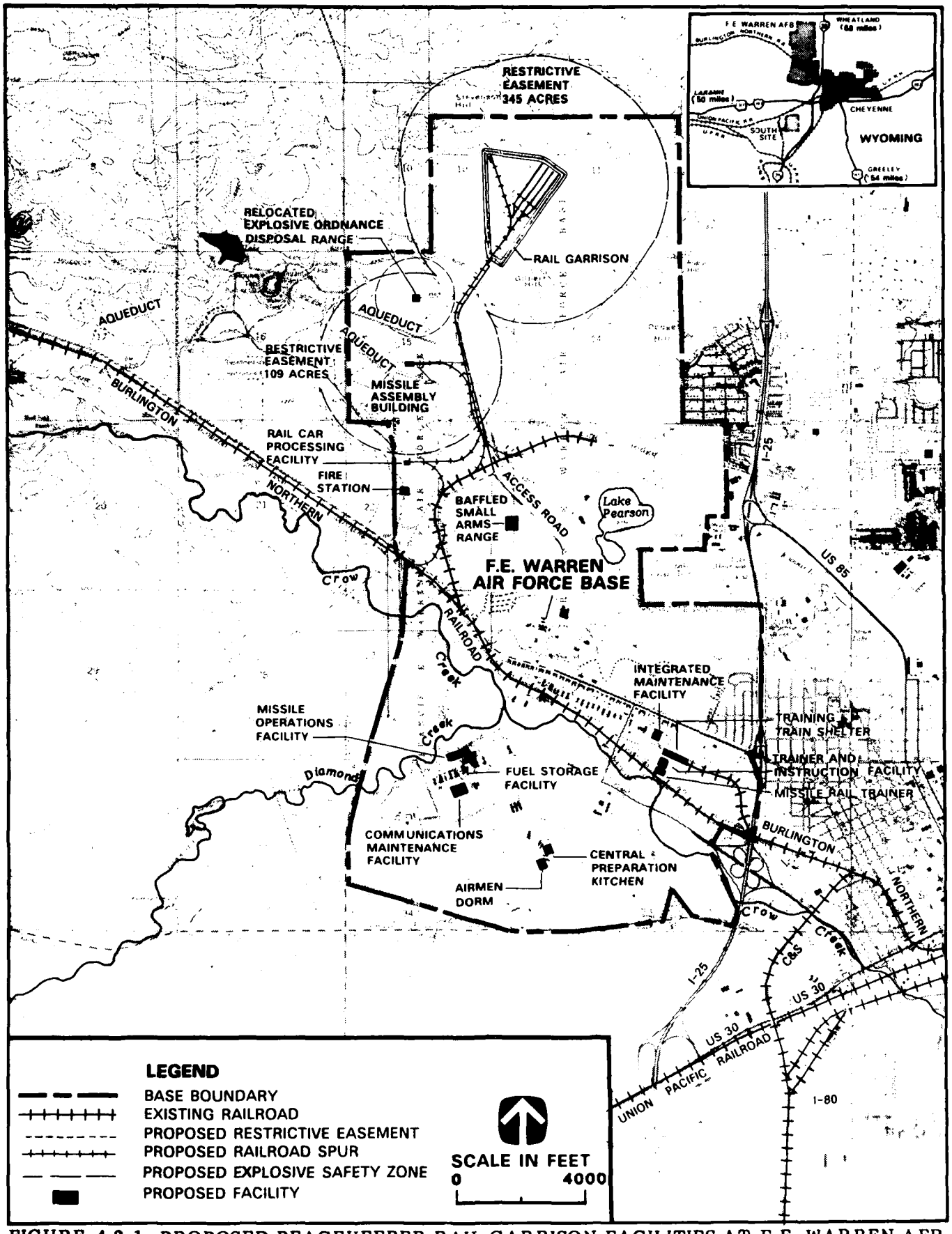


FIGURE 4.2-1 PROPOSED PEACEKEEPER RAIL GARRISON FACILITIES AT F.E. WARREN AFB, WYOMING (NORTH SITE OPTION)

Table 4.2-2

Offbase Land Acquisition and Easement Requirements
Peacekeeper Rail Garrison Program
F.E. Warren AFB, Wyoming (North Site Option)
(acres)

	Proposed Action	Alternative Action
Land Acquisition		
Garrison Area	0	0
Rail Spur	0	0
Housing Area	0	0
Relocated Facility	0	0
TOTAL:	0	0
Restrictive Easements		
Missile Assembly Building	109	109
Garrison Area	345	430
TOTAL:	454	539

Table 4.2-3

Summary of Area Disturbed by the Peacekeeper Rail Garrison Program
F.E. Warren AFB, Wyoming (North Site Option)
(Proposed and Alternative Actions)

Facility Group	Area Disturbed (acres)		
	Permanent	Temporary	Total
Proposed Action			
Main Operating Base Support Facilities	11.9	22.5	34.4
Garrison Facilities	52.8	93.2	146.0
Rail Spur	17.5	19.9	37.4
Support Facilities	19.2	71.1	90.3
Relocated Facility	1.0	0.0	1.0
TOTAL:	102.4	206.7	309.1
Alternative Action			
Main Operating Base Support Facilities	11.9	22.5	34.4
Garrison Facilities	62.4	124.6	187.0
Rail Spur	16.4	19.1	35.5
Support Facilities	19.2	71.1	90.3
Relocated Facility	1.0	0.0	1.0
TOTAL:	110.9	237.3	348.2

temporarily (Table 4.2-3). The north site option would require the acquisition of restrictive easements on 345 acres adjacent to the northern boundary of the base to accommodate the explosive safety zone for the garrison (Figure 4.2-1 and Table 4.2-2).

The rail spurs for the north site option connecting the garrison, MAB, and Rail Car Processing Facility to the existing onbase spur and then to the Burlington Northern (BN) main line (which transects the southern portion of the base) would require the construction of 3.2 miles of new track (Figure 4.2-1). A single turnout from the existing onbase spur to the main line to allow trains leaving the garrison to travel west on the main line would also be constructed. In addition, approximately 1.5 miles of the existing onbase spur would require upgrading. Approximately 17 acres would be disturbed permanently and 20 acres temporarily outside the garrison for the connector spurs (Table 4.2-3).

The north site option would require the construction of technical and personnel support facilities with a total floor space of approximately 69,100 square feet (sq ft). To provide access to the Training Train Shelter, approximately 0.1 mile of new track will be added to an existing 0.5 mile rail spur from the main line (Figure 4.2-1). The existing track would require upgrading. Construction of the support facilities, utilities, roads, and parking would permanently disturb approximately 19 acres and temporarily disturb 71 acres (Table 4.2-3).

The garrison for the south site option would be located approximately two miles south of F.E. Warren AFB (Figure 4.2-2). Seven buildings (including the 4 TASs), roads, utilities, parking, and approximately 1.4 miles of track would be constructed within the garrison. To accommodate the garrison, acquisition of 639 acres of private land would be required (Table 4.2-4). Construction of the garrison would disturb approximately 53 acres permanently and 91 acres temporarily (Table 4.2-5). The south site option would require the acquisition of restrictive easements on 718 acres adjacent to the land acquisition area to accommodate the explosive safety zone for the garrison (Figure 4.2-2; Table 4.2-4).

The rail spur connecting the garrison to the Union Pacific main line west of the proposed south site would require the construction of 1.1 miles of new track (including a wye at the main line) outside the garrison to the main line. Approximately 13 acres would be acquired for the connector spur (Table 4.2-4). Approximately six acres would be disturbed permanently and five acres temporarily outside the garrison for the connector spur and wye (Table 4.2-5).

Technical and personnel support facilities requirements for the south site option would be similar to those for the north site option. However, because of the distance from F.E. Warren AFB to the south site, several additional facilities including a satellite fire station and remote command post would be required. In addition, an access road would be constructed from the garrison to an existing county road north of the site to provide access to the base. Construction of the support facilities, utilities, roads, and parking would permanently disturb approximately 21 acres and temporarily disturb 77 acres (Table 4.2-5).

The relocation of the EOD range (to accommodate the explosive safety zone of the MAB) would also be required for the south site option.

Alternative Action. For the Alternative Action, the Air Force would construct garrison facilities and provide personnel for the deployment and operation of up to six Peacekeeper missile trains. Approximately $133.2 million (in 1986 dollars) of construction would occur at F.E. Warren AFB for the Alternative Action. Construction and operations activities are assumed to occur in the same time frame as the Proposed Action. Annual direct employment requirements for the Alternative Action are presented in Table 4.2-1.

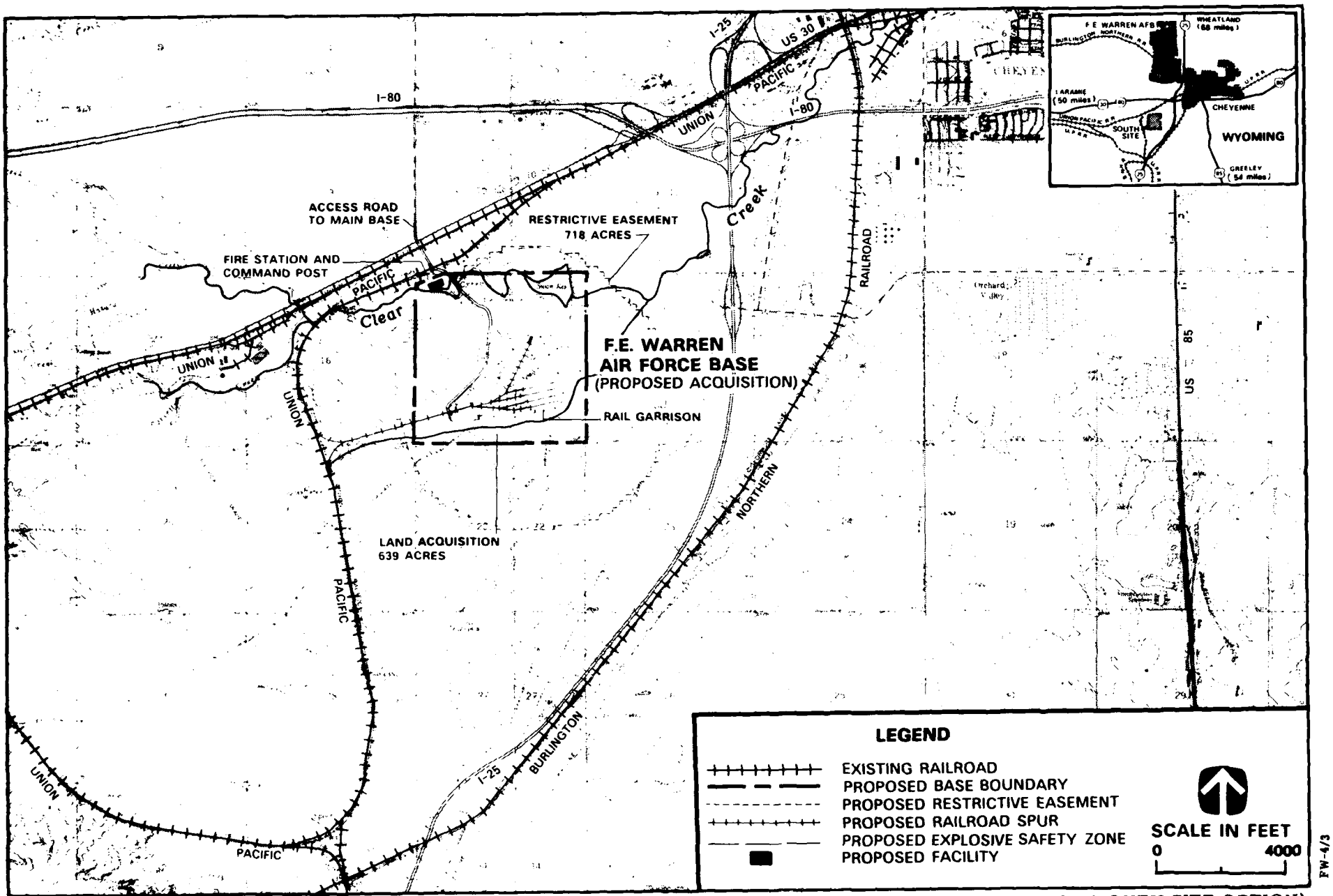


FIGURE 4.2-2 PROPOSED PEACEKEEPER RAIL GARRISON FACILITIES AT F.E. WARREN AFB, WYOMING (SOUTH SITE OPTION)

Table 4.2-4

Offbase Land Acquisition and Easement Requirements
Peacekeeper Rail Garrison Program
F.E. Warren AFB, Wyoming (South Site Option)
(acres)

	Proposed Action	Alternative Action
Land Acquisition		
Garrison Area	639	639
Rail Spur	13	13
Housing Area	0	0
Relocated Facility	0	0
TOTAL:	652	652
Restrictive Easements	718	782

Table 4.2-5

Summary of Area Disturbed by the Peacekeeper Rail Garrison Program
F.E. Warren AFB, Wyoming, South Site Option
(Proposed and Alternative Actions)

Facility Group	Area Disturbed (acres)		
	Permanent	Temporary	Total
Proposed Action			
Main Operating Base Support Facilities	11.9	22.5	34.4
Garrison Facilities	52.8	91.2	144.0
Rail Spur	6.0	4.7	10.7
Support Facilities	20.7	76.9	97.6
Relocated Facility	1.0	0.0	1.0
TOTAL:	92.4	195.3	287.7
Alternative Action			
Main Operating Base Support Facilities	11.9	22.5	34.4
Garrison Facilities	62.7	116.3	179.0
Rail Spur	5.5	4.2	9.7
Support Facilities	20.7	76.9	97.6
Relocated Facility	1.0	0.0	1.0
TOTAL:	101.8	219.9	321.7

The MOB facility requirements for the Alternative Action would be similar to the Proposed Action. The garrison for both the north site and south site options would contain six TASs (instead of 4) and would be constructed in approximately the same location as the Proposed Action (Figures 4.2-3 and 4.2-4). Nine buildings (including the 6 TASs), roads, utilities, parking, and approximately two miles of track would be constructed within the garrison for each option. Technical and personnel support facility requirements for each option would be similar to the Proposed Action.

For the north site option, construction of the six-TAS garrison would disturb approximately 10 additional acres permanently (62.4 acres total) and 31 acres temporarily (124.6 acres total) (Table 4.2-3). The north site option would require the acquisition of restrictive easements on an additional 85 acres (total of 430 acres) to accommodate the explosive safety zone for the garrison (Table 4.2-2). The rail spurs connecting the garrison, MAB, and Rail Car Processing Facility to the BN main line for the north site option would be similar to the Proposed Action. Construction of 3 miles of new track and upgrading of 1.5 miles would be required.

For the south site option, construction of the six-TAS garrison would disturb approximately 10 additional acres permanently (62.7 acres total) and 25 acres temporarily (116.3 acres total) (Table 4.2-5). The south site option would not require the acquisition of any additional land beyond that required for the Proposed Action, but would require the acquisition of an additional 64 acres (total of 782 acres) to accommodate the explosive safety zone (Table 4.2-4). The rail spur connecting the garrison to the main line for the south site option would require the construction of one mile of new track outside the garrison to the Union Pacific main line (including a wye).

Other Air Force Programs. One additional program, the Small ICBM program, is proposed for deployment at F.E. Warren AFB.

The Small ICBM program would provide for the deployment of 150 Hard Mobile Launchers at up to 75 of the Minuteman missile launch facilities. The MOB would be F.E. Warren AFB. Facilities containing approximately 1.02 million sq ft of floor space would be constructed over a 6-year period at the base to support Small ICBM operations. Various roads, utilities, and other support construction would also be required.

The Small ICBM program would create a total of 1,824 direct jobs and 1,543 secondary jobs in 1994, the peak construction year (Table 4.2-1). The greatest total employment effect (due to concurrent construction and operations activities) would occur in 1997 when 2,245 direct jobs and 1,063 secondary jobs would be required. Sustained operations employment is projected to be 3,387 jobs (2,324 direct and 1,063 secondary) starting in the year 2000. During the construction years (1992-1997), the Air Force would spend over $700 million (1986 dollars) in the region. After Full Operational Capability is achieved (post-1999), program-related Air Force spending in the region would approach $63 million (in 1986 dollars) per year throughout the life of the program.

Summary of Program Impacts. At F.E. Warren AFB, two possible siting options (north and south sites) are being considered. The Proposed Action (north site option) would result in significant impacts for cultural resources. Long-duration impacts on cultural resources would be moderate because 11 National Register of Historic Places-eligible sites and the Fort D.A. Russell/F.E. Warren National Register District would be affected. These impacts would be significant because of the national recognition afforded the district.

Long-duration cultural resource impacts at F.E. Warren AFB (south option) would be low because six cultural sites would be affected. These impacts would be significant because of the national recognition afforded the district.

Impacts on all other resources would not be significant.

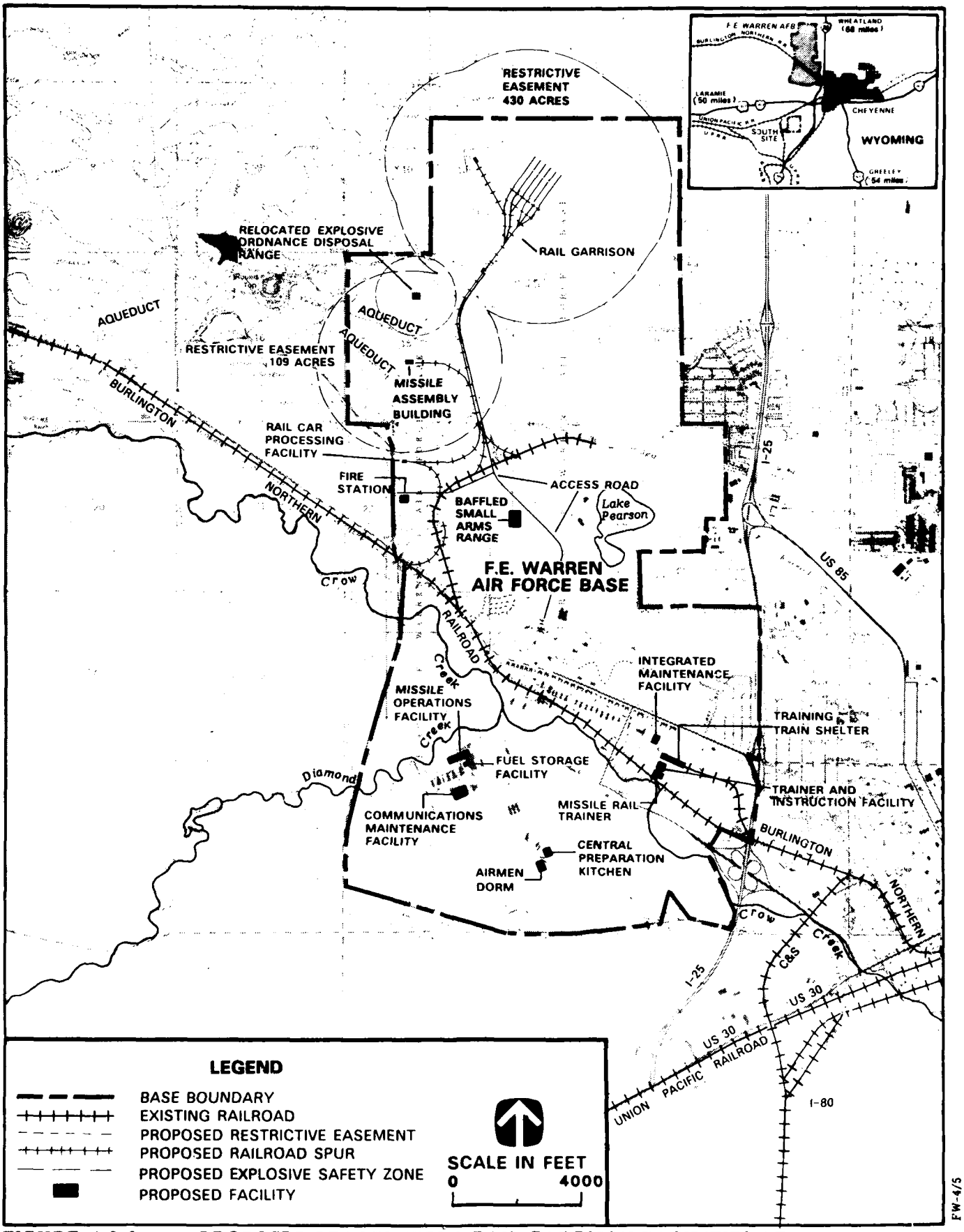


FIGURE 4.2-3 PROPOSED PEACEKEEPER RAIL GARRISON FACILITIES AT F.E. WARREN AFB, WYOMING (NORTH SITE OPTION) (ALTERNATIVE ACTION)

The Alternative Action at F.E. Warren AFB (both north and south options) would not alter the level of impact or significance rating for any resource.

The cumulative impacts of either the Proposed Action or the Alternative Action and Small ICBM program would result in significant impacts for five resources: socioeconomics, transportation, land use, cultural resources, and geology and soils. Short-duration socioeconomic impacts associated with the deployment of the Peacekeeper Rail Garrison and the Small ICBM programs would be moderate and long-duration impacts would be high. Population inmigration in 1995 would be 4,155, representing 7.5 percent of the baseline population of the F.E. Warren AFB area. Long-duration population inmigration would be 7,149 in 1999, representing 12.6 percent of the baseline population of the base area. These impacts would be significant because of the need for new housing, expanded school facilities in the area, and revenue shortfalls in local jurisdictions.

Short- and long-duration transportation impacts would be high because the level of service rating along Randall Avenue would be reduced from B to D. These impacts would be significant because the level of service would drop to D, a substandard level. Short- and long-duration land use impacts would be low because one inhabited building may be relocated from the land to be acquired in fee for the Small ICBM program. These impacts would be significant because one inhabited building may require relocation. Long-duration cultural resource impacts would be high because of greater disturbance of historic sites. These impacts would be significant because of their national recognition. Long-duration geology and soil impacts would be moderate because of accelerated rates of erosion at the Hard Mobile Launcher vehicle operations training area, which would be barren for the life of the program. These impacts would be significant because soil erosion would result in an appreciable net loss of topsoil.

Impacts for all other resources would not be significant.

Both short- and long-duration beneficial socioeconomic effects would be generated by the Proposed and Alternative Actions, as well as by the concurrent deployment of the two programs, including increases in employment and income, and greater utilization of temporary and permanent housing.

4.2.1 SOCIOECONOMICS

4.2.1.1 Region of Influence

The F.E. Warren AFB Region of Influence (ROI) for the employment and income element includes Laramie and Albany counties in Wyoming and Weld and Larimer counties in Colorado. The ROI for housing is the City of Cheyenne and for the remaining elements is Laramie County and the City of Cheyenne, the host community for F.E. Warren AFB.

4.2.1.2 Existing and Future Baseline Conditions

Employment and Income. Employment in the ROI increased 9.5 percent from 179,968 in 1980 to 197,067 in 1984. Government, trade, and services sector employment accounted for 61 percent of the total employment in 1980 and 64 percent in 1984. The services sector led in employment gains, followed by finance, insurance, and real estate, and retail trade. Only the farm and transportation and utilities sectors lost employment from 1980 to 1984. In 1984, the unemployment rate in the ROI was 5.3 percent.

Employment in Laramie County increased by only 942 jobs, from 41,564 in 1980 to 42,506 in 1984. The government sector accounted for all of these gains. In 1984, the government, retail trade, and services sectors were the three major employers in the county and combined they accounted for 71 percent of the total employment.

Total employment in the ROI is projected at 216,268 in 1990, at 239,990 in 1995, and at 264,284 in the year 2000. The corresponding unemployment rates are projected at 6.6 percent, 6.1 percent, and 5.6 percent, respectively.

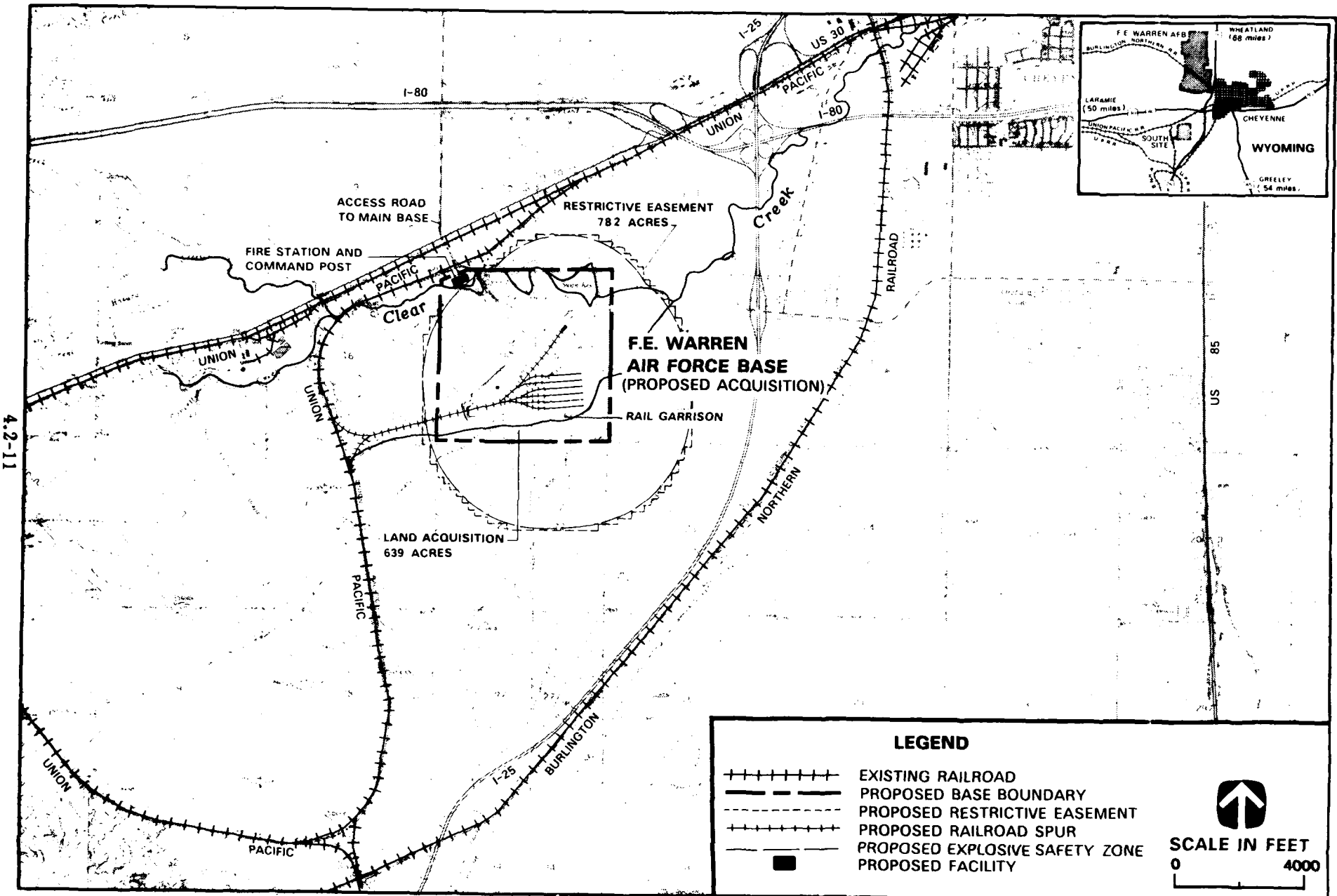


FIGURE 4.2-4 PROPOSED PEACEKEEPER RAIL GARRISON FACILITIES AT F.E. WARREN AFB, WYOMING (SOUTH SITE OPTION) (ALTERNATIVE ACTION)

Total earnings (in current dollars) in the ROI increased from $2.33 billion in 1980 to $3.14 billion in 1984. Discounting for inflation, however, this increase in total earnings represented only 7.7-percent growth over the 1980 to 1984 period. Laramie County's total earnings, in real terms, declined 2.3 percent over the same period. Per capita personal income in the ROI increased from $8,992 in 1980 to $11,861 in 1984; and in Laramie County from $11,011 in 1980 to $13,469 in 1984.

Total earnings (in 1986 dollars) are projected to increase to $3.6 billion by 1990, $4 billion by 1995, and $4.4 billion by the year 2000. The corresponding per capita personal annual incomes are projected at $11,994, $11,993, and $12,018 over the same years. The projected per capita personal income in Laramie County is $14,348 in 1990, $14,346 in 1995, and $14,379 in the year 2000.

Population and Demographics. The population of Laramie County in 1985 was estimated at 71,870, a 4.7-percent increase over the 1980 population of 68,649. The county population is projected to increase to 72,542 by 1990, 75,251 by 1995, and to 77,777 by the year 2000. Cheyenne had an estimated population of 48,876 in 1985, an increase of 1,593 over the 1980 population of 47,283. Cheyenne's population is projected to reach 50,054 by 1990, 51,923 by 1995, and 53,666 by the year 2000. Military personnel and their dependents accounted for approximately 17 percent of the population in the Cheyenne area (city population [estimated 49,528] plus base residents [3,220]) in 1987.

Housing. The total number of permanent year-round housing units in Cheyenne was approximately 19,600 in 1980. Available vacancies were 852 units or 4.3 percent of this total. By 1987, the stock of permanent year-round units was estimated to have grown to 21,400 units. It is estimated that the available vacancy rate increased to 6.4 percent or about 1,370 units by 1987. Total vacancies were estimated to be 1,919 units or 9.0 percent of the total in 1987. In August 1987, the housing referral office had listings for 1,020 units for sale and 108 for rent. Temporary facilities include about 2,000 hotel/motel rooms and 9 campgrounds with over 400 spaces. During the summer months, over 300 hotel/motel rooms and 50 camping spaces are vacant.

F.E. Warren AFB has a total of 1,096 military family housing units including 475 substandard Wherry units. Of the 475 Wherry units, 265 are scheduled for disposal in fiscal year (FY) 1988, having been replaced by the new turnkey project of 265 units now called Carlin Heights. This will leave 831 usable units which will be fully occupied. The remaining 210 substandard Wherry units may be replaced depending upon the availability of funding. Unaccompanied enlisted personnel housing facilities have the capacity to house 1,180 personnel and are fully occupied.

By 1990, the stock of permanent year-round housing units in Cheyenne is expected to remain at about the 21,400 level. Vacancies will have declined to 1,875 units or 8.8 percent of the total supply. Available vacancies are expected to number 1,326 units or 6.2 percent of the total supply. In 1995, the permanent housing stock will have reached 23,224 units, 1,613 (6.9%) of which will be vacant. Available vacancies will be 1,010 units, or 4.3 percent of the total supply. The supply of permanent units is expected to reach 25,796 by the year 2000. In this year, total vacancies will number 1,791 (6.9%) and available vacancies will number 1,121 (4.3%) units. No increase in temporary facilities is projected.

Education. Laramie County School District No. 1, serving Cheyenne and surrounding rural areas in Laramie County, had a total enrollment of 13,112 for the 1987-88 school year. The district operates 25 elementary schools, 3 junior high schools, 2 senior high schools, and 1 alternative high school. The district has 953 certified employees and 634 noncertified employees. Approximately 17 percent of this district's enrollment are dependents of federal employees. Current pupil-to-teacher ratios are 22.8-to-1 at the elementary level; this ratio is below the weighted average state standard of 25-to-1. Enrollments are projected to increase to 13,275 by 1990 and 13,770 by 1995, and staffing is expected to increase to maintain existing pupil-to-teacher ratios.

Public Services. The City of Cheyenne had 457 employees in 1987, a decrease of 17 from the previous year. The Cheyenne Fire Department had approximately 88 firemen stationed at five fire stations. The Cheyenne Police Department has approximately 79 patrol officers. Laramie County employs 285 people in 14 departments. The City of Cheyenne and Laramie County employ 8.7 and 4.0 personnel per 1,000 population, respectively. The City of Cheyenne's staffing levels would need to increase from 457 to 463 by 1990 and to 480 by 1995, or the number of personnel per 1,000 population would fall to 8.6 and 8.3, respectively. Similarly, the county's staffing would have to increase from 285 to 290 by 1990 and to 301 by 1995, or the number of personnel per 1,000 population would drop to 3.9 and 3.8, respectively.

Public Finance. Services provided by the City of Cheyenne are funded principally through the general and special revenue funds. In FY 1987, expenditures from these funds were $20.3 million, with public safety (law enforcement and fire protection services), public works expenditures (highway and street maintenance), and sanitation services accounting for a majority of these outlays. Revenues in FY 1987 totaled $22 million. Intergovernmental revenue in the form of redistributed state sales taxes, mineral royalties and severance taxes, property taxes, franchise taxes, and a local 1-percent sales tax account for the majority of revenues. The year-end fund balance of $6.5 million represented approximately 32 percent of total expenditures in FY 1987. Over the 1990 to 1995 period, revenues and expenditures are projected to be in the $20.7-million to $21.4-million range. By FY 2000, revenues and expenditures are projected to be approximately $22.1 million.

In FY 1987, the city issued $6.7 million in general obligation bonds and retired $1.5 million, resulting in outstanding general obligation bond indebtedness of $42.8 million at the end of the year. Net bonded indebtedness (outstanding indebtedness less monies available in debt service accounts and debt payable from enterprise revenues) represented approximately 28 percent of the city's assessed valuation of $144.9 million, or $870 per capita.

Laramie County School District No. 1 general fund revenues and expenditures were $56.3 million and $54.9 million, respectively, in FY 1987. Under P.L. 81-874 guidelines, the district is classified as a "regular" district. Revenues from this source amounted to approximately $1.6 million in FY 1987. Year-end fund balances were estimated to be $12.4 million, representing 23 percent of expenditures in that year. Over the 1990 to 1995 period, revenues and expenditures are projected to be $58.4 million to $60.6 million. By FY 2000, revenues and expenditures are projected to be approximately $62.9 million.

Revenues and expenditures of the general and special revenue funds of Laramie County were approximately $11.3 million and $11.8 million, respectively, in FY 1987. Intergovernmental revenue in the form of redistributed sales and use taxes, property taxes, and a local optional 1-percent sales tax account for the majority of revenues. In addition, a capital facilities sales tax to be used for construction of a new jail facility is budgeted to raise approximately $6.5 million during FY 1987. Reserve funding levels were about $3.8 million, representing approximately 32 percent of operating expenses in that year. Over the 1990 to 1995 period, revenues and expenditures are projected to be in the $13.1-million to $13.5-million range. By FY 2000, revenues and expenditures are projected to be approximately $13.9 million.

4.2.1.3 Impacts of the Proposed Action

For the Proposed Action, a brief summary of the program-related effects on key socioeconomic indicators is presented in Table 4.2.1-1. For Socioeconomics, the impact analysis is the same whether the north or south option is selected.

Employment and Income. The Proposed Action (4 Train Alert Shelters [TASs]) would create new jobs in the ROI beginning in 1989. Depending on the timing of construction activity, these program-related jobs would range from 478 to 995 during the 1989 to 1994

Table 4.2.1-1

Selected Socioeconomic Indicators, Peacekeeper Rail Garrison Program
F.E. Warren AFB, Wyoming, 1989-1995
Proposed Action

	1989	1990	1991	1992	1993	1994	1995[1]
Region of Influence							
Employment (Jobs)							
Total Program-Related Jobs	478	995	626	857	843	690	624
Direct Jobs	252	584	429	624	613	494	442
Civilian	233	549	270	191	180	90	53
Military	19	35	159	433	433	404	389
Secondary Jobs	226	411	197	233	230	196	182
Local Hires	365	735	320	293	285	223	197
Program-Related Spending (000s 86$)	$9,932	$18,965	$10,178	$12,501	$12,291	$10,144	$9,213
Personal Income (000s 86$)							
Direct	$ 6,191	$14,359	$10,177	$12,967	$12,649	$ 9,435	$ 8,044
Secondary	5,399	9,502	4,395	5,106	5,030	4,341	4,040
Total Personal Income	$11,590	$23,861	$14,572	$18,073	$17,679	$13,776	$12,084
Cheyenne[2]							
Population							
Baseline Population	53,136	53,274	53,668	54,055	54,432	54,795	55,143
Program-Related Change	275	629	767	1,443	1,429	1,199	1,093
Change as % of Baseline	0.5	1.2	1.4	2.7	2.6	2.2	2.0
Housing Demand							
Temporary Units	18	41	17	18	18	16	15
Permanent Units	86	197	246	423	416	331	292
Total Units	104	238	263	441	434	347	307
School District Enrollment							
Elementary	21	49	66	127	126	106	96
Secondary	18	40	60	104	103	86	78
Total Enrollment	39	89	126	231	229	192	174

Notes: [1]Program-related effects would continue at these levels throughout the life of the program.
[2]Population and school district enrollment include F.E. Warren AFB.

period. During the operations phase starting in 1995, the program-related jobs would stabilize at 624. During the peak construction year (1990), of the 995 total new jobs, 584 would be direct jobs (549 civilian and 35 military) and 411 would be secondary jobs. Local hires would number 735. All direct and most secondary jobs would occur in Laramie County. Of the 624 total program-related jobs during the operations phase, 442 would be direct jobs (53 civilian and 389 military) and 182 would be secondary jobs. The number of local hires would be 197. In 1990, total program-related jobs would peak at 0.5 percent of the total baseline employment in the ROI, and thereafter, range from 0.3 percent to 0.4 percent.

The with-program unemployment rate would be slightly lower than the without-program unemployment rate in 1989 and 1990 only; the rates would be almost identical in all other years.

During the construction phase, the Proposed Action would generate personal income (in 1986 dollars) of $11.6 million in 1989 and $23.9 million in 1990. The personal income would stabilize at approximately $12.1 million during the operations phase. Laramie County's share of that personal income would range from $7.9 million in 1989 to $17.3 million in 1990, and to $10.3 million in 1995 and thereafter. The program-related spending would range from $10 million to $19 million during the construction phase and stabilize at approximately $9.2 million annually during the operations phase.

Population and Demographics. Although the Proposed Action would affect population in both the ROI and Laramie County, major impacts would occur only in Laramie County (especially the City of Cheyenne). As a result of the Proposed Action, population increases in the ROI would range from 0.1 percent to 0.3 percent of the baseline population; whereas, in Laramie County, the increases would be in the 0.4- percent to 2-percent range. Of the total inmigrants in the ROI (295 in 1989 to 1,475 in 1992), Laramie County's share would vary from 274 to 1,443. The number of weekly commuters would be less than 30 in any given year. Of the 1,093 inmigrants to Laramie County during the operations phase (1995 onward), 119 would live onbase and 974 in the City of Cheyenne.

The inmigration would increase the Cheyenne area baseline population (city population of 50,835 and onbase population of 3,220) by 2.7 percent in the peak year (1992) and 2.0 percent in 1995 (city population of 51,923 and onbase population of 3,220). The inmigrants moving into the City of Cheyenne would be 2.6 percent of the city's population in 1992 and 1.9 percent in 1995. Military personnel and their dependents would account for 18 percent of the Cheyenne area population in 1995.

Housing. Most program-related workers and their families would be housed in privately owned permanent units and temporary facilities within the City of Cheyenne. The remaining workers, 120 unaccompanied noncommissioned officers [NCOs] and airmen, would live onbase in newly constructed unaccompanied enlisted personnel housing facilities.

The offbase program-related demand for housing is expected to begin in 1989. In this year, approximately 85 permanent units (5.7% of available vacancies) and 20 temporary facilities (less than 6% of available vacancies) would be required in Cheyenne. The peak demand for temporary facilities would occur in 1990. This short-duration demand would be for 40 facilities (11% of available vacancies) in that year and would fall to the long-duration demand of 15 facilities (approximately 4.3% of available vacancies) by 1994. The peak demand for permanent units would be experienced in 1992. The short-duration demand would be for 425 units (out of 962 available or 44.2%) and would decline to the long-duration demand of 290 units (out of 1,030 available or 28.2%) beginning in 1995. The short-duration vacancy rate would fall from 4.3 percent to 2.4 percent, while the long-duration vacancy rate would fall from 4.3 percent to 3.1 percent as a result of the Proposed Action.

The program-related demand for temporary facilities can easily be met by existing hotels, motels, and campgrounds in Cheyenne; therefore, a beneficial effect would occur. The short-duration demand for permanent units would cut the existing vacancy rate almost in half and would be beneficial to landlords and property owners. However, this could temporarily tighten the local housing market for low and moderately priced units. The increased long-duration demand would be beneficial because it would help remove excess vacancies from the local market.

Education. School enrollment in Laramie County School District No. 1 is expected to increase by approximately 230 students in 1992, and decline to 175 additional students from 1995 and thereafter. These students would be dispersed throughout the district; therefore, instances of localized overcrowding are not expected to occur. The addition of these students to Laramie County School District No. 1 is expected to increase elementary level pupil-to-teacher ratios from 22.8-to-1 to 23.1-to-1 during the operations phase. This ratio would still be below the weighted average state standard of 25-to-1. The increases in class size are not expected to have a measurable effect on educational service levels in the area. Current facilities should be adequate, though some additional teachers may be required.

Public Services. Program-related increases in population would lead to increases in demands for public services provided by the City of Cheyenne of 2.7 percent over baseline levels in the peak year (1992). Operations-phase population levels, beginning in 1995, would result in increased service demands of two percent for the city. The increased service demands would be experienced by a majority of the departments now providing service to area residents. To maintain the current service level of 8.7 personnel per 1,000 population, the city would need 10 additional personnel by 1995, increasing city employment from a baseline level of 480 to 490. Most of the additional staffing would be needed in the Police, Fire, and Public Works departments. If no additional personnel were hired, the number of personnel per 1,000 population would drop from 8.7 to 8.5. This reduction in the numbers of personnel per 1,000 population would not result in an appreciable deterioration from the community's current level of public services provision.

Program-related increases in population would lead to increases in demands for public services provided by Laramie County of 2 percent over baseline levels in the peak year (1992) and 1.5 percent in 1995. In order to maintain existing service levels, the county would need to hire four additional personnel by 1995, increasing employment from a baseline level of 301 to 305. Without additional staffing, the number of county personnel per 1,000 population would drop from 4.0 to 3.9. This level of population increase would not affect the county's ability to deliver public services at current levels to area residents.

Public Finance. Program-related increases in expenditures for the City of Cheyenne and Laramie County would be limited to outlays for additional personnel as required. Expenditure increases ranging up to $100,000 to $280,000 in the county and city, respectively, in the peak year (1992) and $80,000 to $220,000, respectively, in the operations phase are estimated. The increases would be two percent to three percent over projected baseline expenditures. With reserve funding levels of approximately $6.5 million in the city and $3.8 million in the county, and additional revenues from sales taxes and miscellaneous charges, fines, and fees, existing revenue sources should be able to meet these expected outlays.

Based on an average per pupil cost of $4,400, program-related school district expenditure increases would range up to $1 million in the peak year (1992) and $800,000 during the operations phase. These increases would be about two percent over projected baseline expenditures in these years. Because the additional students would be classified as regular "B" students, payments from P.L. 81-874 programs would be minimal (less than $10,000 during the operations phase). Temporary revenue shortfalls (up to $400,000

in FY 1992) could occur as state foundation program monies lag behind the additional enrollment. Reserve funding levels of approximately $10.2 million in the district would be adequate to cover potential shortfalls.

Summary of Impacts. For the Proposed Action at F.E. Warren AFB, short- and long-duration socioeconomic impacts would be low because inmigration would cause population in the Cheyenne area to increase by 2.7 percent over baseline forecasts during the peak construction year (1992) and by 2.0 percent during program operations (beginning in 1995). This level of program-induced population growth would result in low impacts on housing, education, public services, and public finance within the Cheyenne area for both the peak and succeeding years. Impacts would not be significant because the increase in demand for housing would be met by available vacancies, existing educational facilities would absorb program-related enrollment increases, no new public service facilities would need to be constructed, and existing revenue sources of the jurisdictions would be adequate to meet program-related expenditures.

Both short- and long-duration beneficial socioeconomic effects would be generated by the Proposed Action, including an increase in employment and income in the ROI and greater utilization of temporary and permanent housing vacancies within the Cheyenne area.

4.2.1.4 Impacts of the Alternative Action

For the Alternative Action, a brief summary of the program-related effects on some key socioeconomic indicators is presented in Table 4.2.1-2. For socioeconomics, the impact analysis is the same whether the north or south option is selected.

Employment and Income. Impacts of the Alternative Action on employment and income in the ROI would be higher than the Proposed Action. During the construction phase, the Alternative Action would create new jobs ranging from 511 in 1989 to 1,029 in 1990; 33 to 34 more jobs than the Proposed Action. Of the 1,029 new jobs during the peak construction year (1990), 602 would be direct jobs (567 civilian and 35 military) and 427 would be secondary jobs. The number of local hires would be 762, which is 27 more jobs than those created by the Proposed Action. During the operations phase, total new jobs created by the Alternative Action would number 686; which is 62 more jobs than those created by the Proposed Action. Of these 686 new jobs, 486 would be direct jobs (58 civilian and 428 military) and 200 would be secondary jobs. Local hires would number 217, 20 more jobs than those created by the Proposed Action.

During the construction phase, the Alternative Action would generate personal income (in 1986 dollars) ranging from $12.4 million in 1989 to $24.7 million in 1990 in the ROI; $0.77 million to $0.83 million more than generated by the Proposed Action. Laramie County's share of that personal income would range from $8.4 million in 1989 to $17.8 million in 1990. During operations, the Alternative Action would generate $13.3 million personal income for the ROI and $11.3 million of that personal income would go to Laramie County. In the ROI, the program-related spending would range from $10.6 million in 1989 to $19.7 million in 1990 and then stabilize at $10.1 million annually during the operations phase.

Population and Demographics. The Alternative Action would increase population from 309 in 1989 to 1,611 in 1992 in the ROI, which is 14 to 136 more persons than the Proposed Action. During the operations phase, total inmigrants to the ROI would number 1,213; 111 more than the Proposed Action. During the construction phase, Laramie County's share of the inmigration would range from 286 in 1989 to 1,576 in 1992. Of the 1,213 total inmigrants during operations, 1,202 would move to Laramie County. As a result, the county's baseline population would increase 1.6 percent during the operations phase.

Table 4.2.1-2

Selected Socioeconomic Indicators, Peacekeeper Rail Garrison Program
F.E. Warren AFB, Wyoming 1989-1995
Alternative Action

	1989	1990	1991	1992	1993	1994	1995[1]
Region of Influence							
Employment (Jobs)							
Total Program-Related Jobs	511	1,029	682	944	923	755	686
Direct Jobs	270	602	471	687	671	540	486
Civilian	251	567	300	215	199	97	58
Military	19	35	171	472	472	443	428
Secondary Jobs	241	427	211	257	252	215	200
Local Hires	392	762	346	326	315	244	217
Program-Related Spending (000s 86$)	$10,588	$19,686	$10,999	$13,782	$13,477	$11,100	$10,131
Personal Income (000s 86$)							
Direct	$ 6,619	$14,807	$11,243	$14,315	$13,853	$10,292	$ 8,843
Secondary	5,741	9,883	4,691	5,626	5,520	4,757	4,443
Total Personal Income	$12,360	$24,690	$15,934	$19,941	$19,373	$15,049	$13,286
Cheyenne[2]							
Population							
Baseline Population	53,136	53,274	53,668	54,055	54,432	54,795	55,143
Program-Related Change	287	643	837	1,576	1,556	1,311	1,203
Change as % of Baseline	0.5	1.2	1.6	2.9	2.9	2.4	2.2
Housing Demand							
Temporary Units	20	42	18	20	20	17	16
Permanent Units	89	202	271	462	453	361	321
Total Units	109	244	289	482	473	378	337
School District Enrollment							
Elementary	23	50	72	139	137	116	106
Secondary	18	41	59	113	112	94	86
Total Enrollment	41	91	131	252	249	210	192

Notes: [1]Program-related effects would continue at these levels throughout the life of the program.
[2]Population and school district enrollment include F.E. Warren AFB.

Of the 1,202 inmigrants to Laramie County during operations, 130 would live onbase and the remaining 1,072 would live in the City of Cheyenne. The proportional share of military personnel and their dependents of the Cheyenne area population would be 18 percent in 1995.

The program-related inmigration would increase the Cheyenne area population by 2.9 percent during the peak inmigration year (1992) and by 2.2 percent beginning in 1995.

Housing. The Alternative Action would not change the expected program-related occupancy patterns within Cheyenne. An additional 11 unaccompanied NCO's and airmen would live in newly constructed onbase unaccompanied enlisted personnel housing facilities. The initial demand for housing in Cheyenne would increase by five permanent units in 1989. The additional workers would not change demand for temporary facilities appreciably. An additional 30 permanent units would be required in 1992, reducing available vacancies by a total of 46.8 percent. The operational demand for permanent units would increase by 30 units and would reduce available vacancies by a total of 31.4 percent. The short-duration available vacancy rate would fall from 4.3 percent to 2.3 percent and the long-duration available vacancy rate would fall from 4.3 percent to 3.0 percent with the Alternative Action. Because these additional housing demands would not be large enough to cause shortages, they would have a beneficial effect.

The program-related demand for temporary facilities can easily be met by existing hotels, motels, and campgrounds in Cheyenne; therefore, a beneficial effect would occur. The higher short-duration demand for permanent units would cut the existing vacancy rate almost in half and would be beneficial to landlords and property owners. However, this would temporarily tighten the local housing market and may adversely affect lower income households. The higher long-duration demand for permanent units would be beneficial to landlords but might also result in decreased availability of low and moderately priced housing.

Education. During the construction phase, the Alternative Action would bring in an additional 20 students above levels identified for the Proposed Action. During the operations phase, an additional 15 students above levels associated with the Proposed Action would enroll in Laramie County schools. Pupil-to-teacher ratios would remain about the same as those identified for the Proposed Action. Current facilities should be adequate to accommodate these students; however, additional staffing may be required.

Public Services. The slightly higher population inmigration levels associated with this alternative would result in slightly higher demands for public services provided by the City of Cheyenne and Laramie County. This increase would not result in a measurable increase in city or county personnel levels over what is projected for the Proposed Action. The number of personnel per 1,000 population and resulting service levels would remain essentially the same as those identified for the Proposed Action, for both the city and the county.

Public Finance. Because staffing requirements would remain essentially unchanged with this alternative, expenditure increases would remain at levels estimated for the Proposed Action. The slightly higher population and income would result in slightly higher revenues from sources such as fines, fees, and charges for services, but these amounts would be small relative to the jurisdictions' existing revenue sources.

Summary of Impacts. For the Alternative Action at F.E. Warren AFB, short- and long-duration socioeconomic impacts would be low because inmigration would cause population in the Cheyenne area to increase by 2.9 percent over baseline forecasts during the peak construction year (1992) and by 2.2 percent during program operations (beginning in 1995). This level of program-induced population growth would result in low impacts on housing, education, public services, and public finance within the Cheyenne area for both the peak and succeeding years. Impacts would not be significant because the increase in

demand for housing would be met by available vacancies, existing educational facilities would absorb program-related enrollment increases, no new public service facilities would need to be constructed, and existing revenue sources of the jurisdictions would be adequate to meet program-related expenditures.

Both short- and long-duration beneficial socioeconomic effects would be generated by the Proposed Action, including an increase in employment and income in the ROI and greater utilization of temporary and permanent housing vacancies within the Cheyenne area.

4.2.1.5 Cumulative Impacts

A brief summary of the program-related effects on key socioeconomic indicators for the concurrent deployment of the Peacekeeper Rail Garrison and Small Intercontinental Ballistic Missile (ICBM) programs is presented in Table 4.2.1-3.

The cumulative impacts include impacts of the Peacekeeper Rail Garrison and Small ICBM programs on employment and income, population and demographics, housing, education, public services, and public finance.

Employment and Income. In addition to the Proposed Action, deployment of the Small ICBM at F.E. Warren AFB would create new jobs ranging in number from 509 in 1992 to 3,622 in 1999. Civilian jobs would peak at 1,619 in 1994 and decline to 23 in the year 2000. Military jobs would stabilize at approximately 2,300 after 1998. Secondary jobs would peak at 1,629 in 1993 and local hires at 2,561 in 1994. The Small ICBM program-related jobs would be 1.5 percent or less of the total baseline jobs in the ROI in any given year. With the Small ICBM program, the unemployment rate of the ROI would be lower from 1992 to 1997 than without the program and slightly higher during the operations phase because of the relative increase in the labor supply from military dependents.

Deployment of the Small ICBM would generate personal income (in 1986 dollars) in the ROI ranging from $12.7 million in 1992 to $78.6 million in 1994, and $70.9 million in 1999. Laramie County's share of that personal income would range from $8.4 million in 1992 to $54.0 million in 1994, and $60.8 million in 1999. The Small ICBM program-related spending would range from $11.9 million in 1992 to $70.8 million in 1994, and to $53.4 million in 1999.

Therefore, cumulative impacts of both the Peacekeeper Rail Garrison and the Small ICBM programs on employment and income would be appreciably higher than those of the individual components. Total new jobs would range from 478 in 1989 to 1,367 in 1992, and to 4,250 in 1999. Total employment during operations would be 3,924 beginning in the year 2000. The number of direct civilian jobs and local hires would peak at 1,709 and 2,784, respectively, in 1994. From 1989 to 1995, direct civilian jobs would outnumber military jobs and from 1996 and thereafter military jobs would take the lead.

The unemployment rate with the two programs would be lower than without the programs from 1989 to 1997 and then the situation would be reversed. As the number of military personnel increases, the number of military dependents seeking jobs in the local market would also increase.

The cumulative impact of the two programs on personal income (in 1986 dollars) would range from $11.6 million in 1989 to $92.2 million in 1994, and $80.6 million in 1999 in the ROI. Laramie County's share of that personal income would vary from $7.9 million in 1989, to $65.8 million in 1994, and to $70.3 million in 1999. The program-related spending associated with both programs would increase from $9.9 million in 1989 to $80.9 million in 1994, and then decline to $59.2 million in 1999 in the ROI.

Table 4.2.1-3

Total Employment and Population Inmigration
Peacekeeper Rail Garrison and Small ICBM Programs
F.E. Warren AFB, Wyoming
1989-2000

	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	Year 2000
Total Employment	478	995	626	1,367	3,562	3,969	3,882	3,940	3,871	3,621	4,246	3,924
Peacekeeper Rail Garrison	478	995	626	857	843	690	624	624	624	624	624	624
Small ICBM	0	0	0	510	2,719	3,279	3,258	3,316	3,247	2,997	3,622	3,300
Population Inmigration	295	678	801	1,695	2,289	2,951	4,260	5,037	5,496	6,061	7,190	6,785
Peacekeeper Rail Garrison	295	678	801	1,475	1,460	1,215	1,103	1,102	1,102	1,102	1,102	1,102
Small ICBM	0	0	0	220	829	1,736	3,157	3,935	4,394	4,959	6,088	5,683

Population and Demographics. The number of inmigrants associated with the Small ICBM program would range from 220 in 1992 to 6,088 in 1999. Laramie County's share of that inmigration would range from 203 in 1992 to 6,055 in 1999. With the arrival of additional operations personnel and completion of construction, Laramie County's share of the total inmigration would increase because it is the Main Operating Base (MOB) county. Therefore, total inmigration would reach 7.8 percent of the total baseline population of the county in 1999. Of the total 6,056 inmigrants to the county in 1999, 790 would live onbase and 5,266 in the City of Cheyenne. The peak number of weekly commuters would be 111 in 1994 and decline gradually to zero in the year 2000.

The cumulative impacts of the Peacekeeper Rail Garrison and the Small ICBM programs on population and demographics would be higher than those of the Small ICBM program. However, cumulative impacts would begin three years earlier in 1989. In the ROI, the range of inmigrants would vary from 295 in 1989 to 7,190 in 1999. During operations beginning in the year 2000, total inmigration would be 6,785. Laramie County's share of that population would range from 92 percent in 1990 to 100 percent in 1999. As a result, inmigration would account for 9.3 percent of the county population in 1999. Of the 7,149 inmigrants in 1999, 909 would live onbase and 6,240 in the City of Cheyenne.

Housing. For the Small ICBM, the Air Force has not programmed for family housing units to be constructed on F.E. Warren AFB or in the proximity of the base. However, current projections of housing vacancies and potential new construction in Cheyenne suggest that about 700 units would have to be provided by the Air Force through one of its housing programs. Since these conditions may change, the Air Force will continue to monitor the housing market in the Cheyenne area and will increase or decrease the extent of its participation as necessary to prevent housing impacts in the community. Most program-related workers and their families would be housed in privately owned permanent units and temporary facilities within the City of Cheyenne. The remaining workers (797 NCOs and airmen), would live onbase in newly constructed unaccompanied enlisted personnel housing facilities.

With the Small ICBM program, the demand for temporary facilities would increase by 25 (for a total of 45 room/sites) in 1992, 150 (for a total of 165) in the peak demand year (1994), and by 75 (for a total of 90) in the long duration. The peak demand would be met by using about 47 percent of the 350 spaces available in 1994. The demand for permanent units would also increase. Beginning in 1992, 55 additional permanent units would be required to house the additional workers and their families for a total of 480. The short-duration peak demand year would change from 1992 with the Proposed Action to 1999 with the Small ICBM program. In that year, an additional 1,600 units would be required for a total of 1,890. The long-duration impacts would stabilize by the year 2000 with 1,445 additional units needed for a total of 1,735. This demand for housing in 1992 would decrease the available vacancy rate from 4.3 percent to 2.2 percent. In 1999 and the year 2000, all available vacancies would be occupied.

If all Air Force personnel were required to seek suitable and affordable housing in the community in the absence of any Air Force housing program, some serious consequences would result. With a majority of military personnel in the lower enlisted grades having an average monthly housing allowance of about $350, the available supply of low- and moderate-priced housing would quickly be occupied, resulting in a shortage of over 500 units. Since monthly housing expenditures at this modest level are not sufficient for the development, financing, and construction of new two-, three-, and four-bedroom housing units, the housing shortfall would be offset through the use of unsuitable and potentially substandard housing. The competition for low- and moderate-income housing between military and civilian residents in the Cheyenne area would cause hardships for both groups because of increased housing costs and substandard housing conditions. In some cases, Air Force families may displace existing residents, placing an even greater burden on low-income households. The combined effects of insufficient affordable housing, higher housing costs, and potential displacement of low-income families would

result in a high and significant housing impact. To avoid these significant impacts, the Air Force will provide adequate housing for its personnel to offset potential shortages.

The program-related demand for temporary facilities can be met by existing hotels, motels, and campgrounds in Cheyenne; therefore, a beneficial effect would occur. The higher short- and long-duration demand for permanent units would utilize most vacancies and new construction in the Cheyenne area. This would greatly benefit property owners, landlords, and developers, but could lead, without an Air Force housing program, to the use of substandard units by households with lower incomes including many lower ranking military personnel with larger families.

Education. The cumulative effects of the concurrent deployment of the Peacekeeper Rail Garrison and Small ICBM programs would add 910 students to schools in the area during the operations phase. These students would be dispersed throughout the community. Combined with the additional enrollment due to the Proposed Action, total long-term enrollment additions to the school district would number 1,085. These additional students would cause pupil-to-teacher ratios at the elementary level to rise from 22.8-to-1 to 24.6-to-1. This overall level would still be below the weighted average state standard of 25-to-1. These additional students would place a burden on the district's ability to provide for the educational needs of the community. Increased staffing would be needed to accommodate this influx, and there may be overcrowding at some facilities.

Public Services. The concurrent deployment of the Peacekeeper Rail Garrison and Small ICBM programs would lead to increases in demands for public services provided by the City of Cheyenne of 12.6 percent over baseline levels in 1999. The increased service demands would be experienced by a majority of the departments now providing service to area residents. To maintain current service levels, as measured by the city's rate of 8.7 personnel per 1,000 population, the city would need 62 additional personnel by 1999. A large portion of the additional staffing would be needed in the Police, Fire, and Public Works departments. If no additional personnel were hired, the number of personnel per 1,000 population would drop from 8.7 to 7.7. This reduction in the number of personnel per 1,000 population could result in an appreciable deterioration from the community's current level of public service provision.

The cumulative effects of the population levels associated with the two missile systems would lead to increases in demands for public services provided by Laramie County of 9.3 percent over baseline levels in 1999. To maintain existing service levels, the county would need to hire 29 additional employees by 1999. The Sheriff's Department and Public Works Department would be expected to need a large share of these personnel. Without additional staffing, the number of county personnel per 1,000 population would drop from 4.0 to 3.7. This reduction in the number of personnel per 1,000 population might affect the county's ability to deliver public services at current levels to area residents.

Public Finance. Small ICBM program-induced expenditures in the City of Cheyenne are estimated to increase gradually over the FY 1992 to 1999 period, reach approximately $1.5 million in FY 1999, and stabilize at approximately $1.4 million in FY 2000 and thereafter. These increases would represent approximately six percent to seven percent over projected baseline expenditure levels in these years. The cumulative effect of both the Peacekeeper Rail Garrison and Small ICBM programs would be $1.9 million in FY 1999 and $1.8 million in FY 2000, and would represent eight percent to nine percent of projected baseline expenditures in these years. Small ICBM program-induced revenues are estimated to increase to $1.2 million by FY 1999 and $1.1 million during the operations phase of the program. The cumulative effect of both programs would represent revenue increases of $1.6 million and $1.5 million in FY 1999 and FY 2000, respectively. Expenditure increases associated with both programs would be greater than revenues over the operations phase of the program. During the construction phase, however, because of the relatively larger proportion of civilian workers and higher procurement

levels, program-induced revenues are slightly higher than expenditures over the FY 1989 to 1994 period. In FY 1994 (the year in which the difference is the greatest), revenue and expenditure increases are estimated to be $840,000 and $710,000, respectively.

Small ICBM program-induced expenditures in Laramie County are estimated to peak at approximately $850,000 in FY 1999 and stabilize at $800,000 in FY 2000 and thereafter. These increases would represent approximately six percent over projected baseline levels in these years. The cumulative effect of both the Peacekeeper Rail Garrison and Small ICBM programs would be $980,000 in FY 1999 and $940,000 in FY 2000, and would represent approximately a 7-percent increase over projected baseline levels in these years. Small ICBM program-induced revenues are estimated to increase to $800,000 in FY 1999 and $730,000 during the operations phase. The cumulative effect of both programs would represent revenue increases of $920,000 in FY 1999 and $850,000 in FY 2000. Similar to the City of Cheyenne, program-induced expenditures are projected to be larger than revenues during the operations phase, while during the construction phase, revenues would be slightly greater than expenditures.

Small ICBM program-induced expenditures of Laramie County School District No. 1 are estimated to be approximately $4.3 million in FY 1999 and $4.0 million in FY 2000 and thereafter. These increases would be approximately a 6-percent to 7-percent increase over projected baseline levels in these years. The cumulative effect of both programs would represent expenditure increases of $5 million and $4.8 million in FY 1999 and FY 2000, respectively, representing approximately a 7-percent to 8-percent increase over projected baseline levels in these years. Because of lagging revenues from property taxes and state foundation program monies and the importance of these revenues in the revenue structure of the district, deployment of both programs would result in shortfalls ranging up to $1 million in FY 1995 during the buildup phase. As enrollment stabilizes over the operations phase, program-induced revenues would equal expenditure requirements.

Summary of Impacts. Short-duration socioeconomic impacts associated with the deployment of the Peacekeeper Rail Garrison and the Small ICBM programs would be moderate and long-duration impacts would be high. Population inmigration in 1995 would be 4,155, representing 7.5 percent of the baseline population of the F.E. Warren AFB area. Long-duration population inmigration would be 7,149 in 1999, representing 12.6 percent of the baseline population of the base area. These impacts would be significant because of the need for new housing, expanded school facilities in the area, and revenue shortfalls in local jurisdictions.

Both short- and long-duration beneficial socioeconomic effects generated by the Proposed Action would include an increase in employment and income in the ROI.

With the Alternative Action, population inmigration would be about 110 more during operations than the Proposed Action. Deployment of the Alternative Action and the Small ICBM would cause a total of about 7,300 persons to inmigrate in 1999 (peak year) and about 6,895 persons to inmigrate during operations. These increases of 1.5 percent in 1999 and 1.6 percent during operations would be reflected in each socioeconomic element. However, they would not be sufficient to change the level of impact or significance rating presented for the Proposed Action and Small ICBM program.

The significant impact on the supply of permanent housing units in Cheyenne because of the cumulative effects of the Peacekeeper Rail Garrison and Small ICBM programs could be mitigated in three possible ways: (1) provide military family housing units onbase through Military Construction Program funding, (2) provide military family housing either onbase or offbase through Section 2667, 801, or 802 funding, and (3) increase housing allowances paid to military personnel, particularly junior enlisted personnel.

Mitigation Measures. Mitigation measures that could be undertaken to reduce or eliminate potential significant cumulative impacts of the Peacekeeper Rail Garrison and other programs at F.E. Warren AFB are listed below. All or some of these measures may be implemented. For each measure, the agencies that may be involved in implementation are identified.

- Where appropriate, award multiple small contracts to enable local firms with limited bonding capacities the opportunity to bid. Contract awards to local firms would reduce population inmigration during the construction phase and subsequently lower demand for temporary housing units (U.S. Army Corps of Engineers.

- Provide information to local job service agencies about the availability of jobs (by type) and the skills needed for them. This information could help reduce the number of job seekers inmigrating into the area and reduce demand for local housing (U.S. Air Force contractors).

- Maximize participation in P.L. 81-874 entitlement programs by encouraging parents who live or work on federal facilities to respond to school district requests for information. This federal program provides aid to local school districts which have had substantial increases in school enrollments as a result of new or expanded federal activities (U.S. Air Force).

4.2.2 UTILITIES

4.2.2.1 Region of Influence

The utilities ROI for F.E. Warren AFB includes the host community of Cheyenne and the base.

4.2.2.2 Existing and Future Baseline Conditions

Potable Water Treatment and Distribution. The City of Cheyenne provides potable water for its residents, the South Cheyenne Water and Sewer District, and F.E. Warren AFB. The raw water is derived from surface and groundwater sources. The capacity of the city's potable water treatment facilities is 26 million gallons per day (MGD). The city can supplement the surface water supply with up to seven MGD of water for periods of peak demand from wells that require only chlorination. The 1987 average daily potable water demand was 14.9 MGD. The city's potable water storage of 22 million gallons is adequate to handle increased summer demands. The average daily potable water demand for 1994 and the year 2000 is projected to be 17.6 MGD and 19.6 MGD, respectively.

The base's average daily potable water demand for 1987 was 1.02 MGD. The base water demands in the foreseeable future without the program are expected to remain constant.

Wastewater. Wastewater treatment is provided by the City of Cheyenne and includes service to South Cheyenne Water and Sewer District and F.E. Warren AFB. In 1987, wastewater flows were 8.02 MGD. Currently, treatment capacity is 8.5 MGD. With the completion of the expansion program for the Crow Creek plant, total system capacity will be 11 MGD by mid-1990. The estimated average daily wastewater flow for 1994 is 8.6 MGD and 9.6 MGD for the year 2000.

Wastewater flows from F.E. Warren AFB were 1.26 MGD in 1987. These flows are greater than potable water consumption and are due to the infiltration of groundwater and runoff into old onbase sewers. This condition results in a 15-inch onbase sewer surcharging the city's 12-inch collector sewer. As units of old Wherry housing are removed and replaced with housing at another location, the base anticipates that a portion of the infiltration problem will be eliminated and the surcharging of the offbase 12-inch sewer will be reduced.

Solid and Hazardous Waste. Solid waste for the City of Cheyenne, South Cheyenne, and F.E. Warren AFB is collected by public and private contractors and disposed of at the city's landfill. Approximately 200 tons per day (T/day) is disposed of in the landfill. The city's landfill is operating under consent decree and is expected to be operational until 1992. The city has initiated a search for a new landfill site and is considering a variety of waste disposal options including the use of an incinerator.

Onbase hazardous wastes are managed by F.E. Warren AFB; the Defense Reutilization and Marketing Office (DRMO) is responsible for providing for the proper handling of the wastes and arranging for transport to treatment and disposal facilities. The base stores the wastes in a temporary storage facility located near the DRMO. The wastes include sodium chromate, contaminated soil (lead), oils, paints, thinners, solvents, and other regulated materials.

Energy Utilities. Cheyenne Light, Fuel, and Power (CLFP) distributes electric power to the City of Cheyenne and a portion of F.E. Warren AFB. In 1987, the company had a peak demand of 103 megawatts (MW). The company purchases the bulk of its system's power from Pacific Power and Light Company and has a small amount of generating capacity within Laramie County. With interties to other electric utilities belonging to the Western Systems Coordinating Council, CLFP is able to purchase the necessary electrical power supplies under long-term contracts.

F.E. Warren AFB obtains power from the Western Area Power Administration (WAPA) and Rocky Mountain Generation Cooperative. In FY 1987, the base purchased a total of 36,576,000 kilowatt-hours for use at the cantonment area. The WAPA provided 55 percent, Rocky Mountain supplied 38 percent, and CLFP provided the remaining 7 percent.

The CLFP provides natural gas service to F.E. Warren AFB and the City of Cheyenne. In 1987, the company delivered 12,996 million cubic feet (MMcf) of natural gas to the region, with supplies from the Colorado Interstate Gas Company. Average annual residential customer use was 110 thousand cubic feet. A coal-fired hot water plant heats most of the existing buildings at F.E. Warren AFB. A small portion of the buildings are heated by natural gas. Onbase consumption was 344,771 thousand cubic feet in 1987.

Base petroleum products are procured through open bidding and secured under long-term contracts; delivery is by tanker truck. Diesel fuel use was 251,900 gallons in FY 1987. Onbase storage capacity is 22,200 gallons. Because F.E. Warren AFB does not have airfield operations, there is limited use of other petroleum products.

4.2.2.3 Impacts of the Proposed Action

For the utilities resource, the impact analysis is the same whether the north or south site option is selected.

Potable Water Treatment and Distribution. Program-related requirements of 0.34 MGD (including onbase demands) would increase average daily demands in the City of Cheyenne by two percent from a baseline level of 17 MGD to a peak of 17.3 MGD in 1992. The city's treatment facilities, with a 26-MGD capacity, would be operating at 66 percent and storage would be adequate to meet summer demands. Daily requirements at F.E. Warren AFB would increase from a baseline level of 1.02 MGD to 1.07 MGD. Program-related demands would be 0.05 MGD or five percent in the same year. Average daily demands of 1.07 MGD would be met through the existing interconnection with the city. If the south site option is selected, an interconnection to the city's 30-inch water main would have to be extended a distance of 2.5 miles or a well installed to meet the demands at the garrison.

Wastewater. Average daily flows for the City of Cheyenne would increase from a baseline level of 8.38 MGD to a peak of 8.5 MGD in 1992. Program-related flows from the base and the city would represent a 0.13-MGD or 1.6-percent program-related increase. The existing treatment plants, with an 11-MGD capacity, would be operating at 77 percent and would be able to adequately treat the increased flows. Wastewater flows at F.E. Warren AFB would increase by 0.04 MGD or 2.8 percent in 1992. With the removal of the Wherry housing units and the subsequent decreased infiltration, surcharging of the city's sewer would decrease.

Solid and Hazardous Waste. Solid waste generation from the City of Cheyenne and F.E. Warren AFB would increase by 4.6 T/day or 2.5 percent in 1992. Solid waste generation onbase would increase by 0.4 T/day or 2.4 percent in the peak year (1992). With the city and private haulers already adequately disposing of 200 T/day, the program-related increase would require no additional equipment or personnel. The existing landfill has a projected lifespan of four years and a new landfill site would be required to handle baseline and program-related flows after 1992. Program-related solid waste would reduce the 4-year lifespan by approximately two weeks. Program-related hazardous waste generation onbase would be incorporated into the existing management system, stored onbase, and then transported to treatment and disposal facilities.

Energy Utilities. Program-related electricity demands for the City of Cheyenne would peak in 1992 with an increase of 0.8 MW. This demand would increase the projected peak demand of 103 MW for the CLFP system by less than one percent. The system has adequate power supplies to meet this increase. Electrical requirements at F.E. Warren AFB would equal 4.0 MW. Adequate capacity will be available from the existing substation to meet the demands. Rocky Mountain Cooperative and WAPA have adequate reserves to meet this demand. Natural gas consumption would increase by 49 MMcf or less than one percent. The CLFP has an adequate infrastructure and reserves to meet the new demand. Natural gas use onbase would increase from a projected demand of 345 MMcf to 352 MMcf or by 1.9 percent. The CLFP has adequate capacity to supply the base. Liquid fuel consumption onbase would increase the need for diesel fuel supplies. These supplies would continue to be filled by the Defense Fuels Supply Center through contracts with local and regional suppliers.

Summary of Impacts. Utility requirements associated with the Peacekeeper Rail Garrison program would increase demands on the City of Cheyenne systems by less than three percent in the peak year (1992). During the operations phase, the increases would be slightly reduced but would remain above one percent. Both peak year and operations requirements on energy utilities would be less than one percent. Because the peak year requirements would not be substantially greater than the impacts associated with the operations requirements, all utility impacts would be of long duration. These impacts would be low because the increased demands on utility service in the City of Cheyenne would be between one percent and five percent. Impacts would not be significant because the potable water, wastewater, and energy systems have adequate capacity to meet the new demands without increasing or expanding existing facilities and the city is developing a new landfill site by 1992 to handle baseline solid waste disposal.

4.2.2.4 Impacts of the Alternative Action

For the utilities resource, the impact analysis is the same whether the north or south option is selected.

Potable Water Treatment and Distribution. With the additional construction associated with six Train Alert Shelters (TASs) and the operations personnel to support the program, potable water requirements would be 0.37 MGD, which is 0.03 MGD greater than the Proposed Action. Adequate capacity is available in the City of Cheyenne's treatment and distribution system to process the additional demand.

Wastewater. Program-related wastewater flows to the City of Cheyenne treatment plant would peak in 1992 at 0.14 MGD, which is 0.01 MGD greater than the flows identified in the Proposed Action. The city has adequate capacity to treat the additional flows from the base.

Solid and Hazardous Waste. Solid waste generation from the increased construction and operations activities of the Alternative Action are slightly greater than the Proposed Action. Solid waste generation for both the city and the base would be 0.5 T/day greater during the construction and operations phases. These increases would not adversely affect the city or private haulers. Landfill space would not be available after 1992. A new landfill site or another waste disposal option is being considered by the city to process both baseline and program-related wastes. Program-related hazardous waste generation at the base would be slightly greater than the Proposed Action and would be incorporated into the existing management system.

Energy Utilities. Demands for electricity for the City of Cheyenne are 0.08 MW greater for the Alternative Action than the Proposed Action. The current CLFP generation and transmission system has adequate capacity to meet the increased demands. Demands for natural gas are four MMcf greater for the Alternative Action than the Proposed Action. The CLFP has an adequate infrastructure and reserves to meet these increased demands. Diesel fuel consumption would be slightly greater than the Proposed Action. Supplies would continue to be filled by the Defense Fuel Supply Center through contracts with local and regional suppliers.

Summary of Impacts. Utility requirements associated with the Alternative Action would be slightly greater than those identified for the Proposed Action. Because the peak year requirements would not be substantially greater than the impacts associated with the operations requirements, all utility impacts would be of long duration. These impacts would remain low because the increases are less than five percent. Impacts would not be significant because potable water, wastewater, and energy systems have adequate capacity to meet existing and new demands without increasing or expanding existing facilities. The city will be developing a new landfill site or some other waste disposal option by 1992 to dispose of baseline wastes.

4.2.2.5 Cumulative Impacts

Potable Water Treatment and Distribution. The cumulative impacts of the Peacekeeper Rail Garrison and Small ICBM programs would be greater during the years 1992 to 2000. Potable water treatment requirements for both the City of Cheyenne and the base would gradually rise to a peak in 1999 with an increase of 1.68 MGD or 8.7 percent. Once both programs reach the operations phase, the requirements would be 1.6 MGD, which is 1.3 MGD greater than the Proposed Action. Treatment requirements for the city and the base would be 19.1 MGD in 1999 (the peak year). Treatment facilities currently have a 26-MGD capacity, which is adequate to meet the projected demand. Onbase requirements would increase average daily demands by 0.3 MGD to 1.3 MGD.

Wastewater. Program-related wastewater flows to the city's system from the base and the city would reach a peak of 0.62 MGD in 1999. The city's two treatment plants, with a total capacity of 11 MGD, would be processing a total of 10.05 MGD. Onbase wastewater flows would increase by 0.2 MGD to 1.44 MGD.

Solid and Hazardous Waste. Solid waste generation from the City of Cheyenne and F.E. Warren AFB would increase by ten percent in 1999. The existing landfill would run out of capacity by 1992 and a new landfill site or another waste disposal option would be developed by the city to handle baseline and program-related wastes. Onbase hazardous wastes would be managed by the base and would be transported to treatment and disposal facilities by the DRMO.

Energy Utilities. Requirements for electricity for both programs would increase peak demands on the CLFP system by 3.6 percent. Demands at F.E. Warren AFB would increase by 15.4 MW. Programmed improvements to the base's electrical system and substation would provide the capacity necessary to meet the projected increases. The WAPA would have an adequate supply of power to meet the increased demands. Natural gas consumption for the base and the city would increase by 218 MMcf or 1.7 percent. The CLFP would have adequate reserves to meet the increased demands. Diesel fuel consumption would increase because of the requirements of the two missions.

Summary of Impacts. Utility requirements associated with the cumulative impacts of the Peacekeeper Rail Garrison and Small ICBM programs would increase demands on the City of Cheyenne's utility systems by six percent to ten percent in 1999. During the operations phase, the increases would be slightly reduced but would remain between six percent and nine percent. Both peak year and operations requirements on energy utilities would be less than five percent. Because the peak year requirements would not be substantially greater than the impacts associated with the operations requirements, all utility impacts be of long duration. These impacts would be moderate because the program-related increases to the city's utility systems are between five percent and ten percent. Impacts would not be significant because potable water, wastewater, and energy utilities have adequate capacity to meet the new demands. It is anticipated that the city will site a new landfill or develop another waste disposal option to handle the existing waste before 1992.

Utility requirements associated with the cumulative impacts of the Alternative Action and the Small ICBM program would be slightly greater than the cumulative impacts with the Proposed Action. Potable water treatment requirements would be 0.02 MGD greater in the peak year (1999). Wastewater treatment requirements would be 0.01 MGD greater in 1999. Both of the city's treatment facilities have adequate capacity to meet those demands. Solid waste generation would be 0.04 T/day greater in 1999. A new landfill would be developed by 1992 to dispose of baseline and program-related wastes. Demands for energy utilities would be slightly greater; however, adequate capacity is available to meet these demands. Impacts are the same as those identified for cumulative impacts with the Proposed Action.

4.2.3 TRANSPORTATION

4.2.3.1 Region of Influence

The ROI for roads includes the principal city streets in Cheyenne, Wyoming and the primary highways leading to F.E. Warren AFB. The ROI for airports includes the Cheyenne Municipal Airport, located within the City of Cheyenne about one mile east of F.E. Warren AFB.

4.2.3.2 Existing and Future Baseline Conditions

Roads. The principal city streets in Cheyenne consist mostly of sections of the primary highways that pass through the city. The section of U.S. 85, named Central Avenue within the city, had segments with an average annual daily traffic (AADT) of 10,650 to 18,100 in 1985. Within the central business district, Central Avenue and Warren Avenue are one-way couplets and had an AADT of 6,470 to 12,200 in one direction. Lincolnway, which is part of U.S. 30, had an AADT of 11,770 to 26,500; Happy Jack Road, part of Wyoming State Highway 210, had an AADT of 2,500; and College Drive, part of Wyoming State Highway 212, had an AADT of between 3,200 and 7,000. The other principal streets in the city include Pershing Drive, Dell Range Boulevard, Ridge Road, and Powerhouse Road. They had AADTs ranging between 18,000 within the central business district and 300 toward the outskirts of the city. Interstate 25 had sections with AADTs ranging from 7,600 to 14,800 in 1985. Interstate 80, west of Interstate 25, had an AADT of 5,500 in 1985.

Current level of service (LOS) ratings at these principal city streets vary from free-flowing to almost unstable flow conditions. Sections of U.S. 85 (Central Avenue) had a LOS varying from A to C during the peak hours in 1985. (Refer to Section 3.4.4 and Table 3.4.4-1 for descriptions of LOS letter scores). Central Avenue and Warren Avenue (one-way couplets) had sections providing service at LOSs B and D. Sections of Lincolnway (U.S. 30) provided service at LOSs A to D. The ratings at other principal city streets were free-flowing at LOS A. Based on population projections for the city, traffic volumes on these principal streets are only expected to increase slightly and the resulting LOS ratings would remain the same or at most drop by one level along Central Avenue by 1994.

The primary access to F.E. Warren AFB is provided by Interstate 25, which runs north-south through Cheyenne and adjacent to the eastern border of the base. The main gate, located at Randall Avenue, is a 24-hour manned, four-lane gate where all visitors enter. The base has six other gates which are used for different purposes. The second manned gate is located in the southern base area on Missile Drive at the intersection of Interstate 25. The third gate is located west of the intersection of Randall Avenue and Post Loop Road and serves Round Top Road. The fourth gate, near the Wyoming Highway Department offices, is open for morning and evening commuting and is used for the movement of the stage transporter and, on occasion, the transportation of horses to and from the stables. The three other gates, located in the northern area of the base, are used on occasion and only for special purposes by either the Air Force or the U.S. Department of Agriculture Experimental Research Station, which is located north of the base.

Traffic volume data for 1985, obtained from the Wyoming Highway Department, show the main gate had an AADT of 10,385. In comparison, the second gate (Missile Drive) had an AADT of 2,400. The LOS ratings at these main access points to F.E. Warren AFB were estimated at B and A, respectively. Short delays and queues usually occur at Randall Avenue during the morning and evening rush hours.

Airports. Cheyenne Municipal Airport, which is owned by the City of Cheyenne and Laramie County, is classified as a primary service airport by the Wyoming Aeronautics Commission. It handles general aviation, military, and regional/commuter aircraft operations. In 1984, the airport had 52,122 general aviation, 12,886 military, and 8,656 regional/commuter aircraft takeoff and landing movements. The Wyoming Aeronautics Commission projected that the airport would handle 73,030 and 91,830 general aviation operations in 1990 and 1995, respectively; 12,900 military aircraft operations in both 1990 and 1995; and 8,800 and 9,400 regional/commuter aircraft operations in 1990 and 1995, respectively. The airport has three concrete runways, 105 tie-downs, and 6 private and 85 public hangar spaces available. Presently, 135 aircraft are based at the airport. This number is projected to increase to 184 and 231 in 1990 and 1995, respectively.

4.2.3.3 Impacts of the Proposed Action

Roads. During the construction phase, an increase in incoming vehicular traffic would occur as a result of the movement of construction workers, materials, and equipment. The construction activities would require an estimated 624 program-related personnel during the peak employment year (1992). Of these, 341 program-related employees would reside in Cheyenne and commute daily to the base. They would generate an additional 310 passenger vehicle trips to the base during the peak hours in 1992. The increase in traffic would add to delays and queues at the main gate to F.E. Warren AFB. Additional heavy vehicle trips to the base would also increase traffic volumes at the gate. However, these movements could occur during off-peak hours and would not cause additional delays at the main gate during the rush hours. Other gates which are accessible to the construction sites could also be used by construction vehicles and equipment.

During the construction phase, program-related commuters would cause the LOS rating along Randall Avenue to drop from B to C and increase delays and queues at the main entrance to the base. Short queues may occur at the entrance gate during the peak hours and may extend to the adjacent intersection along Randall Avenue. These, however, would not continue over a considerable period of time and would only cause a short-duration, low impact. This impact would not be significant.

If the garrison is located at the south site, construction workers would commute through Interstates 25 and 80 and the county road to the site. The traffic flow rating along Interstates 25 and 80 would not be reduced below LOS A. The LOS would still be reduced from B to C along Randall Avenue through the main gate because of workers commuting to the Missile Assembly Building and other support facility construction sites. As a result, short-duration impacts would be low if the garrison is located at the south site. Impacts would not be significant.

During the operations phase, an estimated 306 out of 442 program-related personnel would reside in Cheyenne. They are expected to add 278 passenger vehicle trips to the base and would cause a slight increase in delays and queues at the main entrance gate. Because the majority of the operations personnel would still commute to the main base even if the garrison is located at the south site, the LOS along Randall Avenue would be reduced from B to C. In addition, occasional program-related deliveries of supplies and equipment could also increase traffic volumes at the gates. However, the deliveries are expected to occur during off-peak hours and could use other access routes to the base. Because of the reduction in LOS from B to C along Randall Avenue and the formation of short queues at the entrance gate which would not continue indefinitely, long-duration impacts would be low. Impacts would not be significant.

If the garrison is located at the south site, interruptions to vehicular flow along the public roads, which cross the Burlington Northern and the Union Pacific railroads, would also occur. The trains would move out of the garrison when either major maintenance or repair necessitates that they be transported to the main base or depot facilities, or when directed to disperse during times of national need. In addition a training train would travel periodically to the garrison installation to accomplish operations, security, and maintenance training. These train interruptions at railroad/road crossings would not cause substantial delays to vehicular traffic. Moreover, these train interruptions would only occur occasionally. For both north and south site options, long-duration impacts on roads would be low because of the reduction in LOS along Randall Avenue from B to C. Impacts would not be significant.

Airports. The reentry system would be transported from Cheyenne Municipal Airport to the various garrisons using special C-141 aircraft. The reentry system would be escorted to and from the airport under constant surveillance that would include security and safety escort forces providing traffic and public interface control. For purposes of this analysis, there would be 4 reentry systems at F.E. Warren AFB and a total of 46 reentry systems at up to ten garrison installations. This would generate an increase of 92 military aircraft takeoff and landing operations during the initial delivery of the 46 reentry systems to the garrisons, or an increase of 46 aircraft takeoff and landing operations per year on average (assuming that deployment would be completed within 2 yrs). In addition, the reentry system requiring major maintenance would be returned via military air facilities from the various garrisons to F.E. Warren AFB at an estimated rate of ten reentry systems per year. Cheyenne Municipal Airport is estimated to handle 12,900 military aircraft takeoff and landing operations each year. The projected total aircraft takeoff and landing operations at the airport are 94,730 in 1990 and 114,130 in 1995. An increase of 20 to 46 takeoff and landing operations per year would have a negligible impact on aircraft operations at the airport.

Summary of Impacts. The overall short- and long-duration impacts on transportation by the deployment of the Peacekeeper Rail Garrison system at either the north or south site

option would be low because of the reduction in LOS from B to C along Randall Avenue. Short increases in queues and waiting times at the main gate would occur but this would not continue indefinitely. Employees commuting from Cheyenne would not reduce the LOS rating along the principal city streets. Impacts would not be significant.

4.2.3.4 Impacts of the Alternative Action

Roads. Compared to the Proposed Action, the Alternative Action would require more program-related personnel. An estimated 687 program-related personnel would be generated during the peak employment year (1992). Of these, 382 are expected to reside in Cheyenne and would add 347 passenger vehicle trips (an increase of 37 trips over the Proposed Action) to the base during the peak hours. They would also increase delays and queues at the entrance gate as with the Proposed Action. Short-duration impacts would be low and not significant because of the reduction in LOS along Randall Avenue from B to C.

During the operations phase, an estimated 337 out of 486 program-related personnel would reside in Cheyenne. They are expected to add 306 passenger vehicle trips (28 more than for the Proposed Action) to the base during the peak hours and would cause additional delays and congestion at Randall Avenue and the main gate. Peacekeeper and training train impacts on vehicular traffic at road crossings would be the same as the Proposed Action. Long-duration impacts would be low and not significant because of the reduction in LOS from B to C along Randall Avenue.

Airports. Compared to the Proposed Action, the Alternative Action would generate more military aircraft operations at Cheyenne Municipal Airport. For purposes of this analysis, there would be 8 reentry systems at F.E. Warren AFB and a total of 92 reentry systems at up to ten garrison installations. During initial delivery of these 92 reentry systems to the various garrisons, an average increase of 92 aircraft takeoff and landing operations would be generated per year for two years. In addition, the reentry systems requiring major maintenance would be returned via military air facilities from the garrisons to F.E. Warren AFB at a rate of ten per year. This increase of 20 to 92 military aircraft takeoff and landing operations per year would be negligible compared to the total volume of military aircraft takeoff and landing operations (12,900 per year) at Cheyenne Municipal Airport.

Summary of Impacts. Commuting associated with the Alternative Action would be slightly greater than that associated with the Proposed Action. However, the overall short- and long-duration impacts on transportation from the deployment of the Peacekeeper Rail Garrison system at F.E. Warren AFB would remain low and not significant because of the reduction in LOS from B to C along Randall Avenue. If the garrison is located at the south site, both short- and long-duration impacts on transportation would be low and not significant also because of the reduction in LOS from B to C along Randall Avenue.

4.2.3.5 Cumulative Impacts

The cumulative transportation impacts of the Peacekeeper Rail Garrison and the Small ICBM programs would be only slightly greater than deployment of the Small ICBM program alone at F.E. Warren AFB. The Small ICBM program requires more construction workers and operations personnel than the Peacekeeper Rail Garrison program and, therefore, would generate more vehicular traffic to and from the base. Construction for the Small ICBM program would start in 1992, after most of the construction activities for the Peacekeeper Rail Garrison program would have been completed. An estimated 264 Small ICBM-related personnel would inmigrate to the area in 1992. This would increase to 2,245 in 1997. Of these, 711 are expected to reside in Cheyenne and would add about 646 vehicle trips to the base during the peak hours in 1997. Short-duration impacts on roads as a result of the Small ICBM program would be high because of the

reduction in LOS from B to D along Randall Avenue and the resultant delays and queues that would occur at the main gate. Impacts would be significant because the LOS would be reduced to substandard level D.

With the Peacekeeper Rail Garrison program alone, short-duration impacts would be low and not significant. Concurrent deployment of both programs at F.E. Warren AFB would cause short-duration, high impacts because of the reduction in LOS from B to D along Randall Avenue. Impacts would be significant because the LOS is reduced to level D.

During the operations phase for the Small ICBM program alone, an estimated 2,324 program-related personnel would inmigrate to the area by the year 2000. Of these, 603 employees would reside in Cheyenne and would add about 548 vehicle trips to the base during the peak hours. Long-duration impacts on roads caused by the Small ICBM program would be high because of the reduction in LOS from B to D along Randall Avenue and the accompanying delays and queues at the main gate. Queues may extend to adjacent intersections along Randall Avenue. Impacts would be significant because the LOS would be reduced to substandard level D. Long-duration impacts generated by the Peacekeeper Rail Garrison program would be low and not significant. Concurrent deployment of both programs would cause long-duration, high impacts because of the reduction in LOS from B to D and increased congestion and delays along Randall Avenue. Impacts would be significant because the LOS would be reduced to substandard level D.

Airports. Deployment of the Small ICBM program at F.E. Warren AFB would not cause impacts on Cheyenne Municipal Airport. Therefore, impacts of concurrent deployment of the Peacekeeper Rail Garrison and Small ICBM programs at F.E. Warren AFB would be negligible.

Summary of Impacts. The overall short- and long-duration impacts on transportation by the concurrent deployment of the Peacekeeper Rail Garrison and Small ICBM programs at F.E. Warren AFB would be high because of the reduction in LOS from B to D along Randall Avenue and the resulting increase in delays and congestion at the main gate. Impacts would be significant because of the reduction in LOS rating along Randall Avenue to substandard level D.

Only a small increase in traffic demand would be generated by the Alternative Action as compared to the Proposed Action. The Alternative Action would induce 347 passenger vehicle trips daily (37 more than the Proposed Action) to the base during the peak employment year (1992). During the operations phase, 306 passenger vehicles (28 more than the Proposed Action) would commute daily to the base. These 28 or 37 additional vehicle trips would not change the LOS ratings along the principal streets leading to F.E. Warren AFB lower than those with the Proposed Action. Impacts would be the same as for the Proposed Action with the Small ICBM. Both short- and long-duration impacts would be high and significant. Mitigation measures identified for the Proposed Action could reduce or eliminate program impacts.

Mitigation Measures. The following mitigation measures could be undertaken to reduce or eliminate program impacts on transportation. All or some of these measures may be implemented. For each measure, the agencies that may be involved in implementation are identified.

- Schedule work hours for program-related employees to avoid commuting during normal traffic peak hours, and encourage ride sharing. This mitigation would reduce peak-hour traffic flow increases and therefore reduce congestion and delay without additional cost to the Air Force and its contractors (U.S. Air Force and its contractors).

- Provide additional manpower for registration and card checks at the entrance gate during the peak hour. This mitigation would be effective in reducing the

queuing and waiting times at the base entrance and prevents the queue to backup into a major thoroughfare (U.S. Air Force).

- Encourage the use of the second gate at Missile Drive to divert some trips to the base from the main gate at Randall Avenue. This mitigation would be effective in reducing the congestion at the main gate (U.S. Air Force).

If these measures are undertaken, impacts on roads with the Peacekeeper Rail Garrison and Small ICBM programs at F.E. Warren AFB would become low because of the reduction in LOS along Randall Avenue from B to C (instead of B to D without mitigation). Impacts would not be significant.

4.2.4 LAND USE

4.2.4.1 Region of Influence

The land use ROI includes F.E. Warren AFB and adjacent public and private lands located east, north, and west of the affected areas of the base. It also includes a new proposed base expansion area (south site) located on private land approximately 1.7 miles south of the southern boundary of the base, and affected lands surrounding it. The ROI also includes an area which would contain a main line connector rail spur 0.7 mile long located at the junction of the main lines of the Union Pacific and the Burlington Northern railroads (about 6 mi south of the present base boundary).

4.2.4.2 Existing and Future Baseline Conditions

F.E. Warren AFB is located on the western limits of the City of Cheyenne in Laramie County. The city has adopted zoning regulations as well as comprehensive plan development policies which extend land use proposals for a distance of five miles beyond the city limits. The policies of the comprehensive plan generally support the expressed desire to maintain Laramie County's agricultural character. No specific or generalized land use plan map is included in the comprehensive plan. The offbase area adjoining the northern one-third of the base is outside the city urban service area and is shown on the plan as rural residential development or agricultural use. The south site option would be located approximately one mile southwest of the Cheyenne city limits. The Cheyenne Area Development Plan proposes a variety of land uses for the south site option, south of Interstate 80 and east of Interstate 25. These uses include low-, medium-, and high-density residential; business; commercial; industrial; and open space. The Laramie County Comprehensive Plan is a policy document which indicates continued agricultural uses in these areas. The county zoning regulations are in preparation.

Figure 4.2.4-1 presents the generalized land use at F.E. Warren AFB and surrounding areas. The primary land uses are military (associated with F.E. Warren AFB), agriculture, mixed open space, residential, and public land uses. Agricultural land uses just west of the base are a part of the U.S. Department of Agriculture (USDA) High Plains Grasslands Research Station. The experimental plots can be either nonirrigated or irrigated cropland, or rangeland depending on the scope of a given research project. Public facilities at the research station belong to that agency, to the Cheyenne Water Department, and to the Girl Scouts (camp). Mixed open-space land is generally rangeland devoted to the grazing of cattle or sheep on both public and private land. Public land in the area north and west of the base is owned by the USDA, the City of Cheyenne, and the Laramie County School District. The residential land uses consist of single-family subdivisions within the City of Cheyenne on the eastern side of the base. The area near the base north of the Cheyenne city limits contains low-density, single-family subdivisions. The rural areas north and west of the base have ranch houses and associated structures scattered about the rangeland. County school district land, located northeast of the base, contains Future Farmers of America facilities. No prime or unique farmlands are designated by the U.S. Soil Conservation Service in the vicinity of the base.

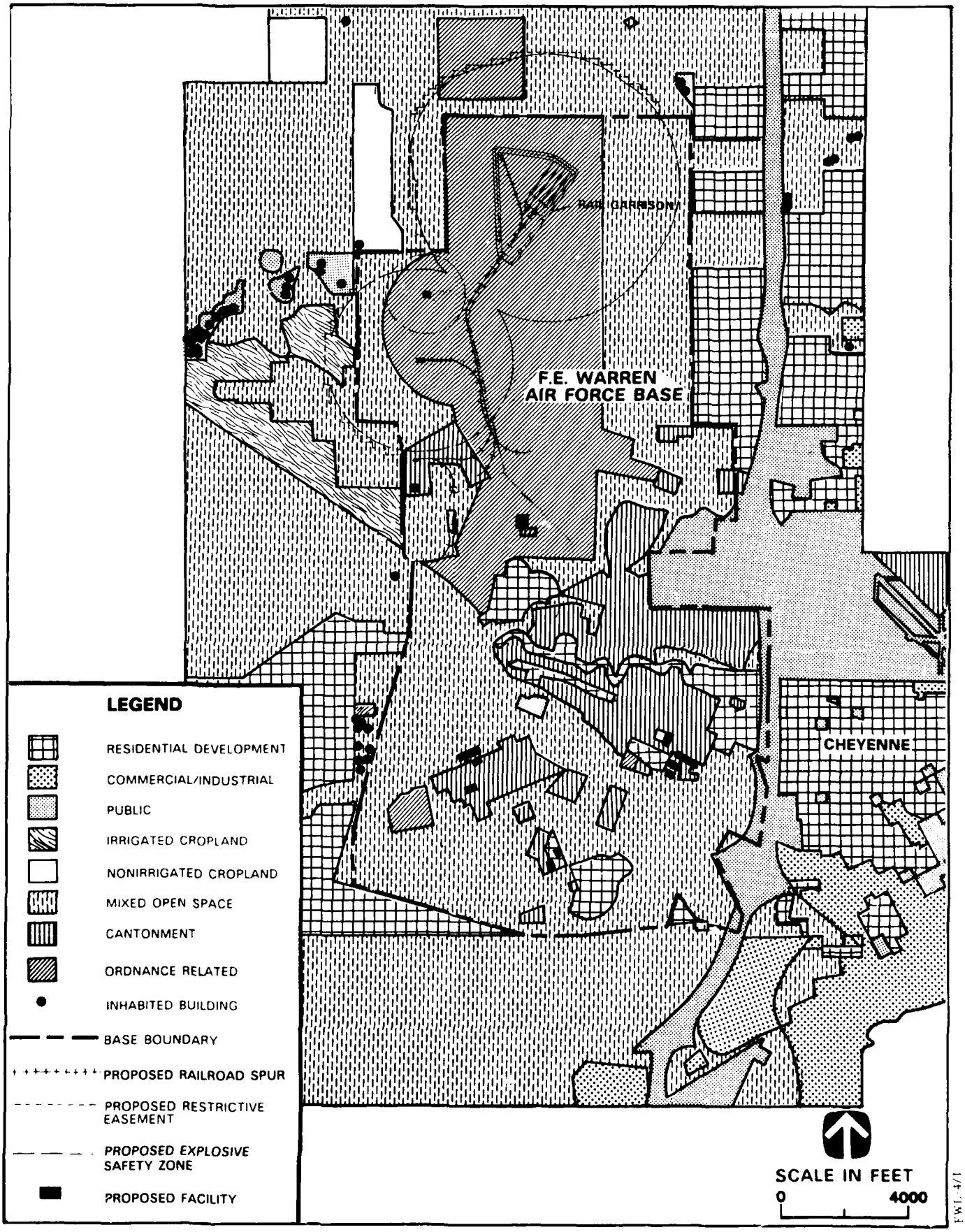


FIGURE 4.2.4-1 LAND USE AT F.E. WARREN AFB, WYOMING (NORTH SITE OPTION) AND VICINITY

Figure 4.2.4-2 presents the generalized land use at the south site option. The south site area contains agriculture, mixed open space, commercial, and public land uses. Agricultural land use consists of one irrigated field, probably used for growing hay. Mixed open space consists of rangeland and small earthfill dams and reservoirs. Commercial land use consists of commercial structures located east of the offramps of Interstate 25 and an area west of the interstate where a truck stop and motel are currently being constructed. Public use consists of a state-owned truck weighing station and an information center/rest area off Interstate 25. Near the center of the south site are a bunkhouse, cookhouse, and barns associated with sheep ranching, all of which are used on a seasonal basis. No prime or unique farmlands are designated by U.S. Soil Conservation Service in the vicinity of the south site option.

Offbase infrastructure in the ROI contains some public access roads which serve the public facilities within the research station and nearby subdivisions. The south site has four gas lines and one electrical line. The main line connector spur has one high pressure gas line, one underground fiber optic communication line, and one railroad communication line.

The visual attributes of the ROI are typical of the Great Plains Physiographic Province. The topography at the base is characterized by generally flat to gently rolling grassland with very few trees. Landscape forms are undulating, and lines are straight to curving. Colors are pale green to gold, with darker browns and white in winter. Textures are smooth to medium. Existing onbase structures are very low on the horizon as viewed from Interstate 25 (average annual daily traffic [AADT] 14,800), east of the base. Interstate 25 and subdivisions on the eastern base boundary are the key observation points for the north site option. Because of the rolling terrain, residents of the area between Interstate 25 and the east base boundary are unable to see more than 1,000 feet to 2,000 feet into the north base area. A 90-acre undeveloped subdivided area occurs just outside the northeast base corner that could have better views into the north base area. The key observation point for the south site option is also Interstate 25 (AADT 9,200 at that location) and the information center/rest area off Interstate 25. Wyoming State Highway 225 (AADT 730) is located north of the south site. There are no residences in the vicinity of the south site. The south site is also generally flat to gently rolling with the same landscape character as the north site.

4.2.4.3 Impacts of the Proposed Action

If the north site option is selected, the proposed garrison site would be located within the northern portion of F.E. Warren AFB and the Missile Assembly Building (MAB) would be located in the northwestern portion of the base. No land acquisition would be required. The proposed program would include the establishment of approximately 450 acres of restrictive easements for the garrison and the MAB, both north and west from the base boundary. These easements would include both nonirrigated cropland and rangeland, but no inhabited buildings. Although the restrictive easements would preclude the use of occupied buildings, it would be compatible with agricultural zoning in the area. The connector spur is located onbase and would not affect land use resources located offbase. Development of the garrison on the north site would require relocation of the present explosive ordnance disposal range and either relocation or baffling of the base small-arms range.

For the north site option, the distance between the key observation points on Interstate 25 and the proposed Train Alert Shelters (TASs) would be about 6,000 feet. The TASs would also be located about 3,750 feet directly west of the partially developed subdivision located on Wrangler, Powell, and Laughlin Roads between Interstate 25 and the eastern base boundary. Other subdivisions (including Western Hills) located between Interstate 25 and the base are even farther from the TASs. The intervening terrain from all of the key observation points would preclude views of the TASs. The Training Train Shelter (TTS) is proposed to be located about 2,300 feet west of the base main gate just west of Interstate 25. The Interstate 25 interchange is elevated at that location,

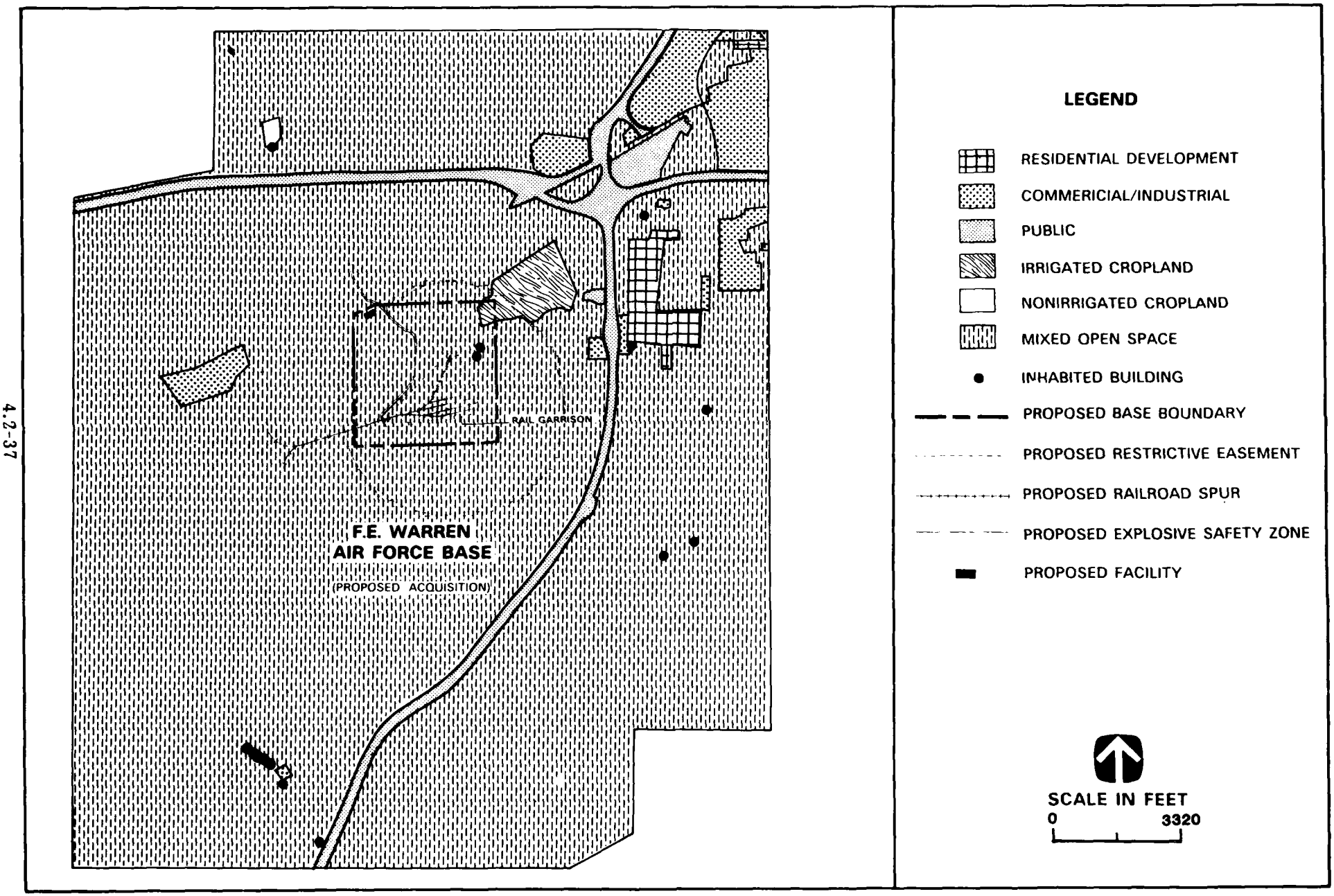


FIGURE 4.2.4-2 LAND USE AT F.E. WARREN AFB, WYOMING (SOUTH SITE OPTION) AND VICINITY

providing uninterrupted views from the overpass into the proposed TTS site. The TTS would be about two-thirds the size of one TAS, however, and would be noticeable to users of the interstate. In its setting, the TTS would be compatible with nearby existing and proposed onbase buildings and therefore not objectionable. The proposed MAB would be located only about 2,000 feet from Round Top Road, the base's western boundary, but the AADT on Round Top Road is only 100.

If the south site option is selected, the proposed program would require the fee simple acquisition of about 650 acres, including the necessary connector rail spur right-of-way in an area of private land detached from the main base between Interstate 25, Interstate 80, and the Union Pacific Railroad. The explosive safety zone would require about 825 acres of easements including 109 acres for the MAB at the main base. The MAB would remain at the same site as with the north site option. Access to the base from the south site would be by existing rail and a new access road between the south site and the base. The 650 acres are mixed open space (rangeland and small reservoirs). A portion of the reservoir would fall within the proposed garrison site and would be abandoned. Currently, the land in the explosive safety zone contains two ranch-related inhabited buildings at Swan Camp consisting of a bunkhouse and a cookhouse which are used on a seasonal basis. Relocation of these structures may be necessary. The 650 acres proposed for acquisition at the south site are currently unzoned but are shown on the Cheyenne Area Development Plan for a variety of residential, commercial, industrial, and open-space uses. The proposed acquisition for the Peacekeeper Rail Garrison program would be incompatible with the development plan designation.

The access from F.E. Warren AFB to the south site would be via Happy Jack Road (Wyoming State Highway 210) and Round Top Road (Wyoming State Highway 222). Any road improvements would occur within the existing state right-of-way. Round Top Road would be extended south on an existing unpaved private road where the land use consists of vacant land or rangeland. The road crosses over the two main lines of the Union Pacific Railroad and Wyoming State Highway 225 (Otto Road).

The south site option TASs would be located about 5,000 feet from Interstate 25 and 5,000 feet from Wyoming State Highway 225, with some intervening terrain in both cases. Because of the distance and terrain, the TASs would not be noticeable to viewers from either highway or from residences along Wyoming State Highway 225.

Summary of Impacts. For the north site option, no base expansion, and therefore, fee acquisition for either the garrison or connecting spur would be required. The restrictive easement would not require relocation of any offbase inhabited buildings. Because of the distance to key observation points (3,750-6,000 ft) and intervening terrain, the TASs would not be noticeable from those areas. The TTS would be located only about 2,300 feet from the key observation point (I-25), but because of its similarity to existing buildings in the area, would cause little visual contrast. For these reasons, short- and long-duration impacts on land use at the F.E. Warren AFB north site would be low. Impacts would not be significant because no inhabited buildings would require relocation.

For the south site option, the proposed acquisition of about 650 acres of mixed open space would consist of only about 0.05 percent of the inventory of this type of land use in Laramie County. The TASs would not be noticeable to the casual observer from the key observation points because of distance and intervening terrain. Visual impacts of the TTS would be the same as the north site option. For these reasons, short- and long-duration impacts on land use at the F.E. Warren AFB south site would be low. Impacts would not be significant because no inhabited buildings would require relocation.

4.2.4.4 Impacts of the Alternative Action

Impacts of the Alternative Action at the F.E. Warren AFB north site would be about the same as for the Proposed Action except that the restrictive easements would be about

540 acres (including about 110 acres for the MAB). No inhabited buildings would be affected. The TTS, however, would be noticeable from Interstate 25, but not objectionable because of its similarity to existing buildings in the area. Therefore, short- and long-duration impacts of the Alternative Action on land use at the north site would be low. Impacts would not be significant because no inhabited buildings would require relocation.

Impacts of the Alternative Action at the F.E. Warren AFB south site would be about the same as the Proposed Action with the south site option except that the restrictive easements would increase to 890 acres. Therefore, the short- and long-duration impacts on land use would be low. Impacts would not be significant because no inhabited buildings would require relocation.

4.2.4.5 Cumulative Impacts

If the Peacekeeper Rail Garrison and Small ICBM programs are developed concurrently at F.E. Warren AFB, 275 acres of mixed open space (rangeland) would be acquired northwest of the base to accommodate Small ICBM facilities. The 275 acres of fee acquisition would equal only 0.02 percent of the mixed open space in Laramie County. This potential acquisition area is zoned for agriculture and indicated in the comprehensive plan for agriculture. Small ICBM program-related use would be compatible with those designations. About 385 acres of restrictive easement for the Proposed Action and 420 acres for the Alternative Action would be required to accommodate the garrison. No inhabited buildings would require relocation from the easement area. One inhabited building (residence) is located within the 275-acre fee acquisition area (southwest corner of Section 10 at the northwest corner of the base) and may require relocation. Views of the TASs and TTS from the key observation points would be the same as for the Peacekeeper Rail Garrison program. Therefore, the cumulative impacts on land use would be low. Impacts would be significant because of the necessity to possibly relocate one inhabited building.

4.2.5 CULTURAL RESOURCES

4.2.5.1 Region of Influence

The ROI for F.E. Warren AFB covers the western edge of the Cheyenne Table and the "Gangplank" (Tertiary-age sediments south of Lodgepole Creek) areas of the High Plains in southeastern Wyoming. The region is bounded by the Goshen Hole Rim and Horse Creek to the north and the Chalk Bluffs and Pine Bluffs lowlands to the south. The western boundary is the Laramie Range and the eastern boundary consists of the Pine Bluffs and the Wyoming-Nebraska state line. This ROI encompasses a variety of environmental settings such as drainages, terrace and bluff edges, breaks and escarpments, and upland plains, which contribute to the variation in cultural resource types.

4.2.5.2 Existing and Future Baseline Conditions

Known cultural resources on F.E. Warren AFB include prehistoric camps, stone circle sites and limited activity sites, military structures, transportation routes, water supply and irrigation systems, homesteads, and ranches. Extensive cultural resource investigations including survey, excavation, and monitoring were conducted at the base during the Peacekeeper in Minuteman Silos program (1983-1985) and recent explosive ordnance disposal (EOD) clearance activities (1987). Most of the rest of the base was surveyed by base archaeologists in 1987. F.E. Warren AFB includes a National Register of Historic Places (NRHP) Historic District and National Historic Landmark consisting of Fort D.A. Russell, an Army post established in 1867 to provide protection for the construction crews working on the Union Pacific transcontinental railway. The northwestern corner of Cheyenne Depot is within the district and most of the depot is included in the National Landmark. Consultation with Native American groups was conducted during the

Peacekeeper in Minuteman Silos program, and no sensitive resources were identified on areas now occupied by the base. No paleontological localities have been identified onbase.

Prehistoric Resources. Two prehistoric sites are located in proposed program impact areas for the north site option (Table 4.2.5-1). Both sites are eligible for the NRHP and consist of stone circle sites. The types and locations of prehistoric sites onbase suggest a local settlement pattern of large habitation sites along the creek terraces and small temporary campsites and hunting stands in upland settings. The latter site types are less likely to have important research potential. Two small prehistoric sites were recently recorded in the south site option impact area (Table 4.2.5-1), but their NRHP-eligibility status has not yet been evaluated.

Historic Resources. Historic resources located in program impact areas at the north site include various features of Fort D.A. Russell, including small arms and artillery target ranges, the Cheyenne to Black Hills Stage Road, the Laramie Road, the Cheyenne Water Supply system ditches, and Cheyenne Depot.

The four barracks buildings and artillery workshop located within the NRHP Historic District/National Landmark were fully documented during Peacekeeper in Minuteman Silos architectural surveys. The Cheyenne to Black Hills Stage Road, the Cheyenne Water Supply System, the 1897 to 1909 and 1910 to 1940 small-arms target ranges, and the Cheyenne Depot have all been determined eligible for the NRHP. A red brick feature, the Laramie Road, and the 1910 artillery range are considered potentially eligible for the NRHP. The two historic rock cairns located immediately north of the 1910 artillery range have not yet been evaluated for eligibility.

A search of the Wyoming state archives indicated that three historic sites have been recorded at the south site. These sites are part of the historic Swan Camp, a sheep ranch owned by Francis E. Warren. Francis E. Warren was a prominent Wyoming resident who attained the political offices of Territorial Governor of Wyoming and United States senator, and F.E. Warren AFB was named in his honor. The Swan Camp facilities, including the main headquarters, lambing pens, and the reservoir, were built between 1900 and 1920 by Warren's son who managed the ranch. In a 1979 report on Swan Camp, the sites were not considered eligible for the NRHP. However, there appears to be some question whether the sites were evaluated for their association with an individual important in history, or their architectural characteristics (Code of Federal Regulations 1986c, 36 CFR §60.4(b) and (c), respectively). The State Historic Preservation Officer (SHPO) recently suggested that additional research may be necessary to reevaluate Swan Camp in accordance with criterion (b).

Native American Resources. Meetings with Native American groups were held by the Air Force during the Peacekeeper in Minuteman Silos program in 1984. Traditional religious leaders from the Dakota (Sioux), Arapaho, Southern and Northern Cheyenne, and Plains Apache nations were consulted in order to identify sensitive locations in the Peacekeeper program impact areas. No areas of concern were identified on lands now occupied by the base.

Paleontological Resources. Although the Ogallala Formation outcrops along Crow Creek and could contain Pliocene-age mammals, no paleontological localities were identified during the Peacekeeper in Minuteman Silos program studies.

4.2.5.3 Impacts of the Proposed Action

Areas to be affected by the Proposed Action include approximately 393 acres onbase. If the south site option is selected, up to 652 acres of fee acquisition lands would be affected.

Table 4.2.5-1

Cultural Resources Located Within Program Impact Areas at F.E. Warren AFB, Wyoming

Site Number	Type	National Register Eligibility
Rail Garrison Program		
48LA71	Fort D.A. Russell	Eligible
Bldg 222	1905 Infantry Barracks	
Bldg 223	1904 Engineers Barracks	
Bldg 224	1904 Artillery Barracks	
Bldg 226	1906 Cavalry Barracks	
Bldg 348	1904 Artillery Work Shop	
48LA71J	1890-1950s trash scatter	Not eligible
48LA71X	1887-1909 small-arms target range	Eligible
48LA71II	1910-1940 small-arms target range	Eligible
48LA71XX	Red brick feature	Eligible
48LA71JJJ	1910 artillery range	Potentially eligible
48LA71BBB	Two historic cairns	Undetermined
48LA106	Cheyenne Depot	Eligible
48LA448*	Cheyenne to Black Hills Stage Road	Eligible
48LA482*	Cheyenne City Water Supply System	Eligible
48LA620*	Laramie Road	Potentially eligible
48LA651	Prehistoric stone circle site	Eligible
48LA671	Prehistoric stone circle site	Eligible
48LA78**	Swan Camp headquarters	Undetermined
48LA79**	Swan Reservoir	Undetermined
48LS80**	Swan Camp, south complex	Undetermined
none**	Historic debris scatter	Undetermined
none**	Prehistoric lithic scatter	Undetermined
none**	Prehistoric stone circle site	Undetermined
Small ICBM Program		
48LA71UU	Red brick feature	Potentially eligible
48LA71YY	Historic depression with red brick	Eligible
48LA71EEE	Two historic depressions	Not eligible
48LA71FFF	Two historic depressions	Not eligible
48LA541	Happy Jack Road	Eligible
48LA617	Historic trail	Not eligible
48LA626	Lithic scatter	Not eligible
48LA640	Lithic scatter	Not eligible
48LA641	Lithic scatter	Not eligible
48LA646	Stone circle site	Eligible
48LA652	Lithic scatter	Not eligible
48LA657	Lithic scatter	Eligible
48LA658	Stone circle site	Eligible
48LA659	Stone circle site	Eligible
48LA660	Lithic scatter	Not eligible
48LA662	Stone circle site	Eligible

Notes: *Affected by both proposed programs.
**Affected by south site option.

Sources: Wyoming State archives, base records, and fieldwork in progress.

Prehistoric Resources. Two NRHP-eligible prehistoric sites occur in proposed garrison areas at the north site (Table 4.2.5-1). Small stone circle sites are relatively common in the ROI; however, they can provide information on limited occupations which are pertinent to understanding local and regional settlement and subsistence patterns. Two prehistoric sites would be affected at the south site; their eligibility for the NRHP will be evaluated as part of the fieldwork effort in progress.

Historic Resources. Eight NRHP-eligible historic sites (Table 4.2.5-1), including three contributing elements of the Historic District, would be affected by the Proposed Action. The two small-arms target ranges are the second and third oldest ranges at Fort D.A. Russell. Structural details or archival design plans for the 1897 to 1909 small-arms range have not yet been identified. The 1910 artillery range may represent the first formal artillery range built at Fort D.A. Russell and may be eligible for the NRHP. The target ranges represent unique features of military life with little or no archival documentation.

Portions of two historic trails and the Cheyenne Ditch system would be affected by construction of the MAB and relocation of the EOD range. Segments of the Old Laramie Road and the Cheyenne Ditch would be destroyed, but portions would also remain intact. The construction of new facilities and the relocation of the EOD range would obliterate the last segments of the Cheyenne to Black Hills Stage Road remaining on the base.

A red brick feature of undetermined function is potentially eligible for the NRHP. This site may represent either early civilian or military activity and may contribute information pertinent to early land uses in this portion of the base.

Cheyenne Depot was the second largest quartermaster depot in the Rocky Mountains and High Plains from 1867 to 1893. Most of the workshops and storage facilities were not duplicated on Army posts of the period, and the site is eligible for the NRHP. Construction of the Missile Rail Trainer would affect buried remnants of the 1882 to 1890 Indian Agency storehouse. The First Street extension may disturb buried remains of the 1867 to 1890 Commissary Officer's residence and associated outbuildings, the 1867 to 1890 Quartermaster and Commissary offices, the 1870s superintendent's and storekeeper's offices, the 1880s Bell and Fire Engine House and associated outbuilding, and the 1867 to 1890 corrals and sheds. No buried features were encountered during Peacekeeper in Minuteman Silos cultural resources data recovery; however, a thin layer of Cheyenne Depot materials was identified at a depth of 75 to 100 centimeters during construction monitoring in 1985.

The five historic structures within the NRHP Historic District of F.E. Warren AFB are potential alternative locations for proposed building alterations. Such modifications have the potential to affect the historical context and style of these buildings, which are contributing features to the Fort D.A. Russell Historic District. However, impacts would be minimized under the Cultural Resources Management Plan in effect for the Historic District. Any alterations or additions to contributing district buildings must follow strict guidelines of compatibility in regard to size, scale, color, material, and character of the property, neighborhood, or environment.

The three Swan Camp sites have not yet been reevaluated for NRHP eligibility and could be determined eligible based on their association with Francis E. Warren (Code of Federal Regulations 1986c, 36 CFR §60.4(b)).

Native American Resources. No Native American resources have been identified on lands now occupied by the base and none are likely to be affected in the proposed impact areas.

Paleontological Resources. No paleontological localities were identified onbase during 1984 Peacekeeper in Minuteman Silos related surveys. The Ogallala Formation may outcrop at the south site, and localities may yet be identified.

Summary of Impacts. Long-duration impacts on cultural resources at the north site would be moderate. Most of the resources are related to Fort D.A. Russell, an early Army post and Cheyenne Depot, the second largest quartermaster depot of the area. Both properties are unique in the ROI and these contributing features do not occur elsewhere in the region. A total of 11 NRHP-eligible sites would be disturbed by construction. Two of these are small prehistoric stone circle sites or lithic scatters which may provide information on limited subsistence activities and small short-term occupations. The other nine are historic sites that are contributing features of the Fort D.A. Russell/F.E. Warren National Register District. Both the prehistoric and historic sites have the potential to provide information to the historic development of southeastern Wyoming; therefore, the loss of such resources would be a significant impact. No short-duration impacts would occur.

Long-duration impacts at the south site would be low because six cultural sites would be affected. These impacts would be significant because the disturbance of the prehistoric sites during construction could constitute a loss of important scientific data. The sites at Swan Camp are not likely to be affected by physical disturbance, but garrison construction would cause a visual intrusion to the historical context of the camp. However, if the south site is acquired, protection of the resources under federal law would be a beneficial effect of the program. The level of impact would be reduced if the research in progress indicates the sites are not eligible for the NRHP.

Mitigation Measures. In 1984, a Programmatic Agreement was signed by the Wyoming SHPO, the Advisory Council on Historic Preservation, and the U.S. Air Force for the preservation and mitigation of cultural resources at F.E. Warren AFB. A Cultural Resources Management Plan was finalized in 1984 and provides detailed guidelines on the treatment of cultural resources.

Avoidance is the preferred treatment for all cultural resources; however, if avoidance is not possible, data-recovery plans and various architectural treatments would be implemented. Surface collection, mapping, and excavation may be acceptable data-recovery techniques for prehistoric resources and historic archaeological properties. Program alteration or modification to any historic structure within the National Register District or National Historic Landmark would be mitigated by following the guidelines for maintaining architectural integrity established in the Cultural Resources Management Plan. Additional standing structures, such as the 1910 to 1940 concrete small-arms target ranges, may require additional archival research and documentation according to the Historic American Building Survey or the Historic American Engineering Record standards for historic structures. Because it is impossible to predict the location of all subsurface resources, ground-disturbing construction activities would be monitored by a qualified archaeologist to ensure identification and documentation of newly uncovered resources.

If data-recovery plans, site treatments, and monitoring programs are implemented, a finding of no adverse effect to cultural resources may be identified by the Wyoming SHPO and Advisory Council on Historic Preservation. The appropriate level of data recovery would compensate in part for the loss of scientific information resulting from the destruction of cultural resources.

4.2.5.4 Impacts of the Alternative Action

The Alternative Action would enlarge the garrison on the western edge by an additional 39 acres. All other program areas are identical to the proposed program.

Prehistoric Resources. Only one additional prehistoric site would be affected by the expansion of the garrison area. This site contains several stone circles and is considered eligible for the NRHP.

Historic Resources. Only one additional historic site (48LA71YY), a depression with a red brick scatter, would be affected. This site is considered eligible for the NRHP.

Native American and Paleontological Resources. No Native American or paleontological resources would be affected by the Alternative Action.

Summary of Impacts. As a result of the Alternative Action, only two additional NRHP-eligible sites would be affected. The small stone circle site could contribute information on temporary campsites in upland settings. The small historic feature would provide information on early civilian or military use of this area and may be a contributing feature to the Fort D.A. Russell/F.E. Warren National Historic District. Long-duration impacts on cultural resources (north site option) are considered to be similar to the Proposed Action, moderate and significant.

The Alternative Action at the south site option would affect the same cultural resources as the Proposed Action. Long-duration impacts would be low and significant and the acquisition of Swan Camp would be a beneficial effect of the program. Both the impacts and benefits would be reduced if Swan Camp is eventually determined not eligible for the NRHP.

Mitigation Measures. Mitigation measures would be the same as for the Proposed Action.

4.2.5.5 Cumulative Impacts

Additional impacts on cultural resources would result if both the Peacekeeper Rail Garrison and Small ICBM programs are implemented at F.E. Warren AFB. The proposed Small ICBM program would affect areas in the northern portions of the base and in the extreme southern portions of the base. Program impact areas include construction of missile maintenance facilities, administrative and industrial facilities, community service building, and unaccompanied housing. If the Small ICBM program is constructed at F.E. Warren AFB along with the Peacekeeper Rail Garrison, an additional 290 acres would be affected.

Prehistoric Resources. Ten additional prehistoric sites (Table 4.2.5-1) would be affected in the northern portions of the base designated for industrial facilities. Five of these sites, four stone circle sites and one lithic scatter, are considered eligible for the NRHP. These small sites appear to have good site integrity though they are located in a former artillery range. Both site types are relatively common in the ROI, though a small stone circle site in good condition may provide information in a confined temporal and spatial setting.

Historic Resources. Ten historic sites, including three NRHP-eligible sites affected by Peacekeeper Rail Garrison facilities (the Cheyenne to Black Hills Stage Road, the Cheyenne City Water Supply System, and the Laramie Road), would be disturbed if both programs are implemented. Additional segments of all three of the preceding sites would be affected by the implementation of Small ICBM facilities in Sections 10 and 14 in the northern portions of the base. The last 1,500 feet of the Cheyenne to Black Hills Stage Road onbase would be destroyed. About 0.25 mile of the Cheyenne City Water Supply System would be destroyed, but parts of the ditch system would remain intact in Section 14. Approximately 1,500 feet of the Laramie Road would also be affected.

Two NRHP-eligible red brick features in the northern portions of the base would be affected. Happy Jack Road, established in 1867, crosses the southern portion of the base and would be affected during the construction of unaccompanied housing; however, during the 1984 cultural resource inventories, no surface indications of this road were visible from field examination. Extensive surface disturbance from World War II training activities disturbed any surface remnants of this road. Subsurface trash deposits could be identified during construction activities representing roadside scatter and the only indication of the road.

Proposed Small ICBM facilities in the southern part of the base are located in areas used for World War II-era barracks and training facilities. Numerous building foundations from the World War II era were encountered in these areas during construction of Peacekeeper in Minuteman Silos program facilities in 1985 and are likely to occur in program impact areas.

Native American Resources. Consultations with Native American groups were conducted in 1984 during the Peacekeeper in Minuteman Silos program. No Native American resources were identified onbase.

Paleontological Resources. No paleontological localities were recorded during previous cultural resources work and are not expected to occur onbase.

Summary of Impacts. Cumulative long-duration impacts on cultural resources would be high. A total of 18 NRHP-eligible sites would be affected. Most of these sites contribute valuable information to understanding early military activities at Fort D.A. Russell and early civilian settlement of southeastern Wyoming; therefore, impacts would be significant. In some cases, the construction of both programs would alter or destroy the last remnants of several historic sites onbase. In some cases, the NRHP-eligible cultural resources onbase retain excellent site integrity because of the restricted access to base land. Similar sites located offbase may not retain the same integrity. There would be no short-duration impacts.

If the Alternative Action and the Small ICBM program are implemented at F.E. Warren AFB, impacts on cultural and paleontological resources would be high. A total of 20 NRHP-eligible sites would be affected. The construction of both programs would destroy the last remnants of several historic sites and one site type (small red brick features) onbase. Because of the unique nature of the historic resources and the good site integrity, most of these sites contribute information pertinent to understanding early military activities and civilian settlement in southeastern Wyoming. The loss of these resources would create a significant impact on the regional resource base.

Mitigation Measures. Mitigation measures are the same as the Proposed Action.

4.2.6 BIOLOGICAL RESOURCES

4.2.6.1 Region of Influence

The ROI for biological resources species for F.E. Warren AFB is defined as the areas where these resources would be directly affected by the construction of new facilities onbase (Section 4.2, Figure 4.2-1). The proposed garrison site (north site option) is located in the northern portion of the base and an alternative site (south site option) is located approximately two miles south of the current F.E. Warren AFB boundary. The south site is privately owned and is currently used for livestock grazing. Areas of indirect disturbance in the ROI where program-induced impacts may occur are defined as those recreational areas within a 1-hour driving time of Cheyenne, Wyoming, including the North Platte River, Medicine Bow National Forest, Roosevelt National Forest, Rocky Mountain National Park, and Curt Gowdy State Park.

4.2.6.2 Existing and Future Baseline Conditions

Biological Habitats. F.E. Warren AFB lies within a grassland biome dominated by short-grass prairie species such as blue grama and buffalograss. Much of F.E. Warren AFB has been disturbed by previous base activities, including a recent effort during 1987 and 1988 to clear large portions of the proposed garrison north site of explosive ordnance. Following EOD activities, the area was reseeded with native species. An environmental assessment was prepared prior to clearance activities and it was determined no significant impacts would occur on biological resources. Various introduced species

(e.g., crested wheatgrass) have been seeded in the developed portions of the base. Ash, plains cottonwood, and American elm have also been planted throughout the base for landscaping. Much of the area surrounding the base is used for farming and ranching (Figure 4.2.6-1). The south site supports some native species (e.g., blue grama) and is currently used for sheep grazing (Figure 4.2.6-2). The area within one mile of F.E. Warren AFB (including north and south sites) supports cropland and native vegetation (grassland and forest). Habitats onbase (at both sites) and in the immediate vicinity support numerous wildlife species such as pronghorn, white-tailed deer, sharp-tailed grouse, pheasant, raccoon, coyote, plains pocket gopher, white-tailed jackrabbit, and various amphibian and reptile species. Crow Creek, Diamond Creek, and Lake Pearson occur onbase; Lake Pearson provides limited fisheries resources. The vegetation along Crow and Diamond creeks is dominated by riparian and wetland plant species including cottonwood, willow, box elder, golden currant, cattails, rushes, and sedges. These riparian habitats along Crow and Diamond creeks provide important habitat for numerous wildlife species. Intermittent streams and several small ponds occur at both the north and south sites. Riparian vegetation along the intermittent stream consists primarily of herbaceous species such as sedges and rushes. Future baseline conditions onbase are expected to be similar to existing conditions based on current base management plans.

The remaining ROI includes native grasslands, agricultural lands, deciduous woodlands along the streams and rivers, and coniferous forests in the mountainous areas. Aquatic habitats in the ROI include Lodgepole, Bear, Chugwater, and Horse creeks, and the North Platte River. These aquatic habitats provide warmwater fisheries of varying quality. Coldwater fisheries occur in nearby mountain streams. Riparian habitats along these streams provide important habitat for numerous wildlife species. Regulated habitats that are available for recreation include the Pawnee National Grassland and Bamforth and Hutton Lake national wildlife refuges. Additional recreational areas in the ROI are located along rivers, streams, and in mountainous areas. Future baseline conditions for the ROI would be similar to existing conditions based on projections for population increases and increased recreation use in the ROI.

Threatened and Endangered Species. No federally listed species are known to occur in the north or south sites; however, the federal-candidate (Cat. 2) Colorado butterfly plant occurs onbase in restricted stream drainages that are currently protected by the base. Six other federal-candidate species and three state-recognized species may occur onbase. One federal-candidate species and seven federally listed species may occur in the region (Table 4.2.6-1).

4.2.6.3 Impacts of the Proposed Action

Biological Habitats. Construction of garrison facilities, roads, and rail lines, and upgrading the existing transportation systems at the proposed north site, would permanently affect 102.4 acres in the northern part of the base and temporarily affect 206.7 acres (Section 4.2, Table 4.2-3). Much of this area (175.3 acres) was extensively disturbed in 1987 and 1988 during the EOD clearance activities (Table 4.2.6-2). Wildlife species will reestablish in the disturbed area as recovery progresses. In addition to the EOD disturbance area, there would be impacts to 36.5 acres of grassland, 1.3 acres of agricultural land, 1.5 acres of mineral extraction, and 0.2 acre of wetland (Table 4.2.6-2). The disturbance of 309.1 acres of land during construction would cause increased mortality for less mobile species (e.g., plains pocket gopher) and displace more mobile species (e.g., coyote and white-tailed jackrabbit) into adjacent habitats. The 0.2 acre of wetlands that would also be affected by construction activities (Table 4.2.6-2) are relatively small and provide only limited forage and cover for wildlife species. These seasonal wetlands may not meet the technical criteria for wetlands as defined by the U.S. Army Corps of Engineers (1987).

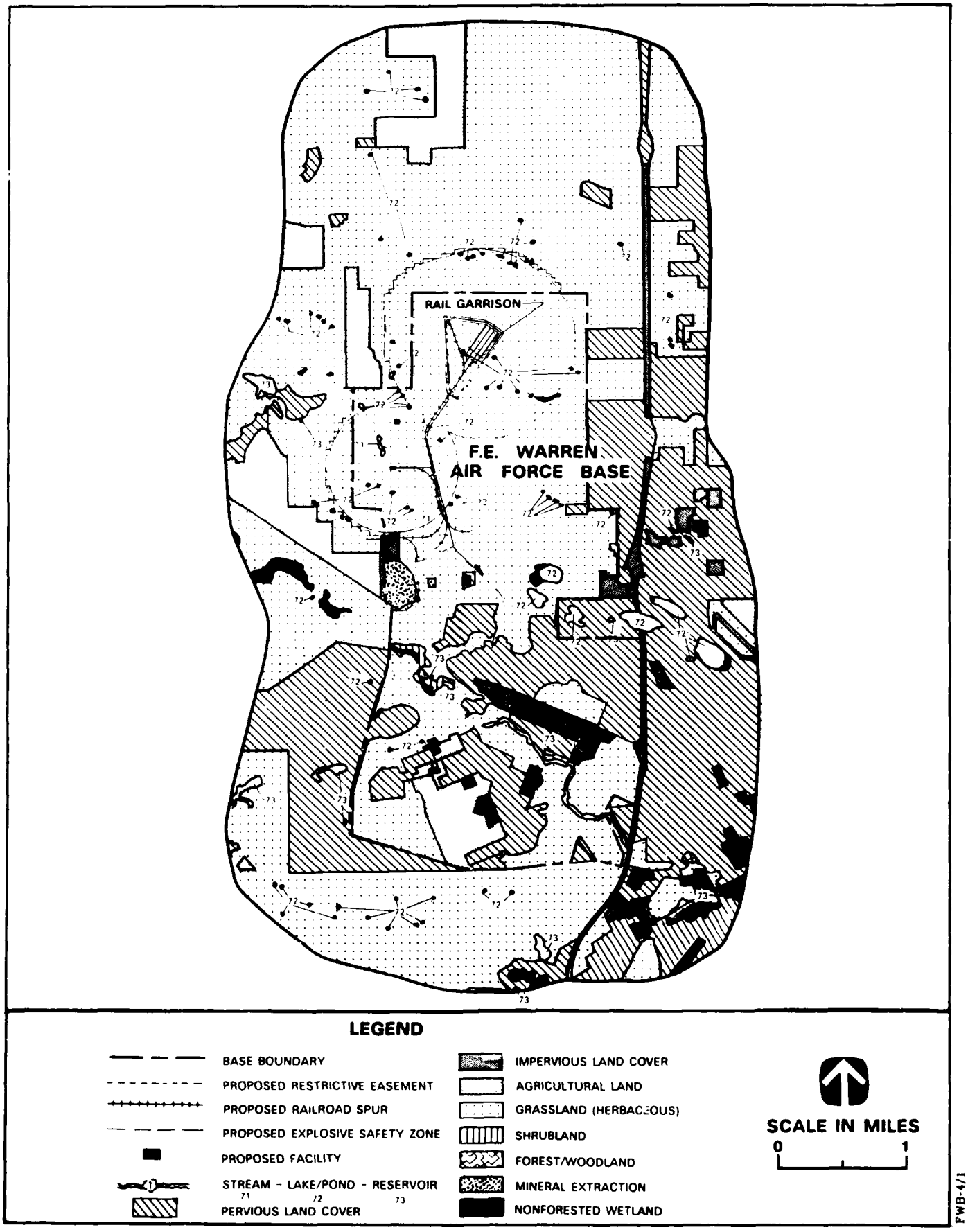


FIGURE 4.2.6-1 HABITAT AND LAND COVER TYPES AND POTENTIAL DISTURBANCE AREAS ON F.E. WARREN AFB, WYOMING (NORTH SITE OPTION) AND IN THE VICINITY

Table 4.2.6-1

Federally Listed, Federal-Candidate, and State-Sensitive Species
F.E. Warren AFB, Wyoming and Vicinity

Common Name	Scientific Name	Federal Status	State Status	Distribution
American peregrine falcon	Falco peregrinus anatum	E	1	Migrant in region; may occasionally occur onbase
Bald eagle	Haliaeetus leucocephalus	E	1	Migrant and possible winter resident in region
Black-footed ferret	Mustela nigripes	E	1	May occur in region
Burrowing owl	Athene cunicularia	-	3	May occur onbase
Colorado butterfly plant	Gaura neomexicana ssp. coloradensis	2	-	Occurs onbase
Ferruginous hawk	Buteo regalis	2	-	May occur onbase as migrant
Least tern	Sterna antillarum	E	-	Migrant in region
Long-billed curlew	Numenius americanus	2	-	May occur onbase as migrant
Milk snake	Lampropeltis triangulum	-	3	May occur onbase
Mountain plover	Charadrius montanus	2	-	May occur onbase as migrant
Northern swift fox	Vulpes velox hebes	E	-	May occur in region
Osprey	Pandion haliaetus	-	3	May occur onbase
Piping plover	Charadrius melodus	T	-	Migrant in region
Preble's jumping mouse	Zapus hudsonius preblei	2	-	Occurs in region
Sharp-tailed grouse	Tympanuchus phasianellus	-	3	May occur onbase
Swainson's hawk	Buteo swainsoni	2	-	May occur onbase as migrant
White-faced ibis	Plegadis chihi	2	-	May occur onbase as migrant
Whooping crane	Grus americanus	E	1	May occur in region as migrant

Notes: Federal Status
E = Endangered
T = Threatened
1 = Federal candidate, Category 1
2 = Federal candidate, Category 2
State Status
1 = State-protected group 1
3 = State-protected group 3

Sources: Clark T. and R.D. Dorn 1981; U.S. Air Force 1986d; Metz, W. 1987.

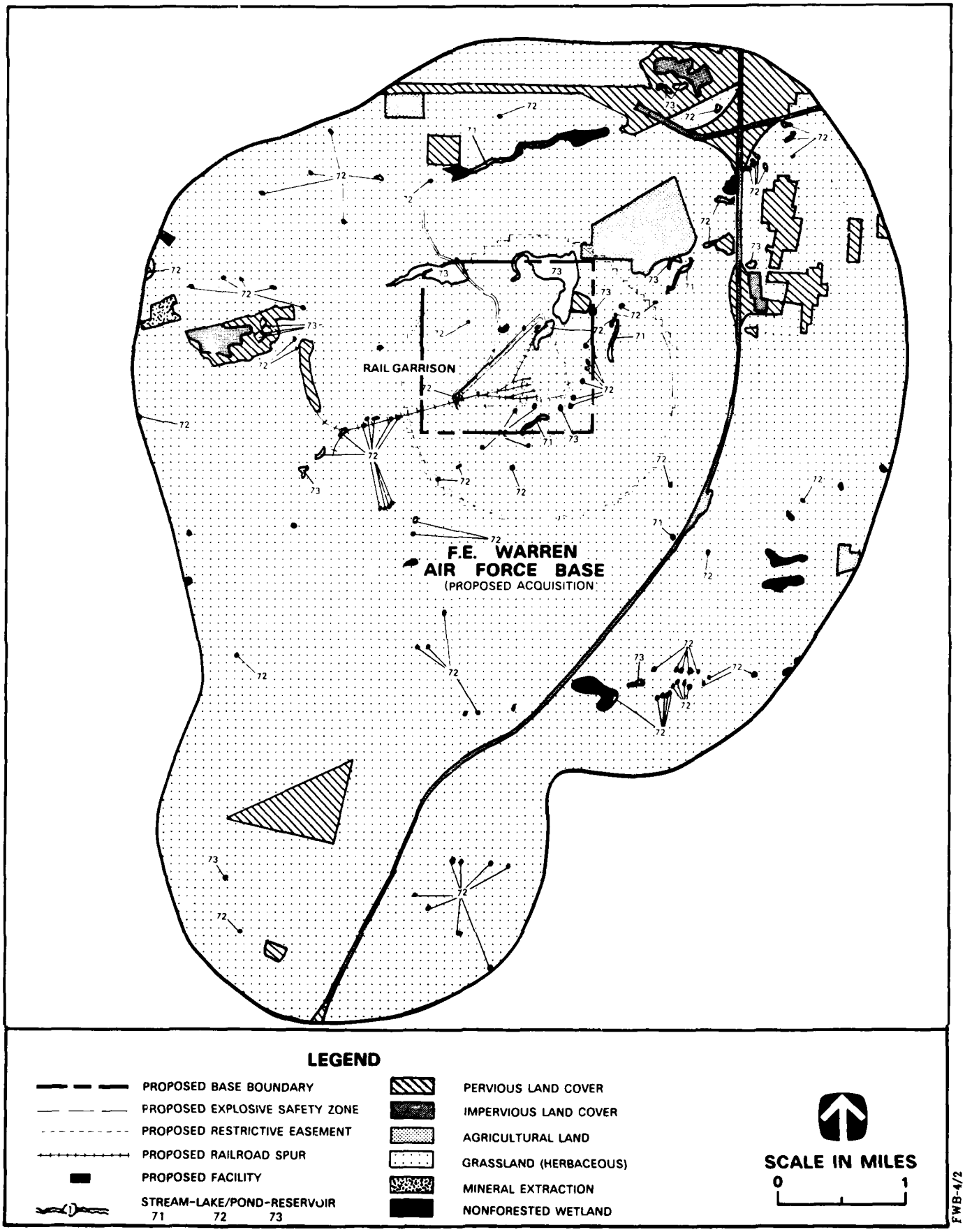


FIGURE 4.2.6-2 HABITAT AND LAND COVER TYPES AND POTENTIAL DISTURBANCE AREAS ON F.E. WARREN AFB, WYOMING (SOUTH SITE OPTION) AND IN THE VICINITY

Table 4.2.6-2

Habitat and Land Cover Types Potentially Disturbed by the Peacekeeper Rail Garrison Program at F.E. Warren AFB, Wyoming

Habitat Type	Garrison, Support, and Relocated Facilities (acres)	Rail Line (acres)	Total (acres)
	North Site Option		
Proposed Action			
Grassland	31.9	4.6	36.5
Agriculture	1.3	0.0	1.3
Nonforested wetland	0.2	0.0	0.2
Mineral extraction	0.0	1.5	1.5
Developed land	83.9	10.4	94.3
EOD-cleared area	154.4	20.9	175.3
TOTAL:	271.7	37.4	309.1
Alternative Action			
Grassland	31.9	4.6	36.5
Agriculture	1.3	0.0	1.3
Nonforested wetland	0.2	0.0	0.2
Mineral extraction	0.0	1.5	1.5
Developed land	86.5	8.5	95.0
EOD-cleared area	192.8	20.9	213.7
TOTAL:	312.7	35.5	348.2
	South Site Option		
Proposed Action			
Grassland	157.0	6.2	163.2
Nonforested wetland	0.2	0.0	0.2
Ponds	2.3	0.1	2.4
Reservoirs	0.5	0.0	0.5
Developed land	117.0	4.4	121.4
TOTAL:	277.0	10.7	287.7
Alternative Action			
Grassland	203.7	6.2	209.9
Nonforested wetland	0.2	0.0	0.2
Ponds	2.3	0.1	2.4
Reservoir	0.5	0.0	0.5
Developed land	105.3	3.4	108.7
TOTAL:	312.0	9.7	321.7

In compliance with Executive Order No. 11990, alternative sites were considered for location of program facilities. In order to collocate facilities of the proposed program with existing facilities and meet engineering and operational constraints, it was determined that there is no practicable alternative to the proposed construction of some facilities in wetlands. Furthermore, site-specific program design and construction techniques will include all practicable measures to minimize harm to wetlands.

The south site is currently used for sheep grazing, but has not experienced any other disturbance. Areas that would be affected include 163.2 acres of grassland, 2.4 acres of ponds, 0.5 acre of reservoir, 0.2 acre of wetlands, and 121.4 acres of previously

developed land (Table 4.2.6-2). The vegetation and wildlife in these habitats are similar to those found in the north site, but the diversity may be greater because the area is relatively undisturbed. Locating the program at the south site area would permanently disturb 92.4 acres and temporarily disturb 195.3 acres of grassland habitat and would generate similar impacts on wildlife in the area (Section 4.2, Table 4.2-5). The 0.2 acre of wetland and the intermittent stream that would be affected provide only limited forage and cover for wildlife species. Sections of the intermittent stream may not meet the technical criteria for wetlands under Section 404 of the Clean Water Act of 1972.

Locating the Peacekeeper Rail Garrison program at F.E. Warren AFB would cause a slight increase in the Laramie County population, which would affect recreational activities in the ROI. Popular fishing areas along the North Platte River may experience increased use and the number of hunters and campers using the Medicine Bow and Roosevelt national forests may also increase; however, the biological resources in these areas are protected and managed by natural resource management agencies.

Threatened and Endangered Species. No impacts on threatened and endangered species are expected to result from the location of this program at the north or south site.

Summary of Impacts. Disturbance of approximately 309.1 acres of habitat for the north site option or 287.7 acres for the south site option would have a minor affect on the biological resources onbase and in the region because the habitats that would be affected represent a relatively small area in the region and provide minimal cover and forage for wildlife species. Furthermore, much of the area in the proposed north site has already undergone extensive disturbance. Program-induced recreation would not affect regional biological resources because projected increases in recreational activities are expected to be minor. Therefore, short- and long-duration impacts would be low. In addition, impacts associated with the Proposed Action would not be significant for either site option.

4.2.6.4 Impacts of the Alternative Action

The Alternative Action would permanently affect 110.9 acres at the north site and 101.8 acres at the south site (Section 4.2, Tables 4.2-3 and 4.2-5). At the north site, 237.3 acres and at the south site, 219.9 acres would be temporarily disturbed. Impacts on habitats for either site would not differ greatly in magnitude (Table 4.2.6-2). No threatened and endangered species are expected to be affected by this alternative. Impacts of the Alternative Action would be similar to those described for the Proposed Action. Short- and long-duration impacts would remain low and not significant.

4.2.6.5 Cumulative Impacts

Deployment of the Peacekeeper Rail Garrison and ICBM programs at F.E. Warren AFB for the north site would generate cumulative impacts as a result of the additional disturbance that would occur onbase. Approximately 1,470 acres of habitat onbase would be disturbed. The extent and severity of the impacts on biological resources would depend on the number of new facilities required, but disturbance would mainly occur in areas which have been developed or previously disturbed in some manner. Cumulative impacts on biological resources from the Peacekeeper Rail Garrison and Small ICBM programs are expected to be minor. Cumulative impacts would be further minimized if disturbances were confined to areas that do not represent biologically important habitats. Therefore, short- and long-duration impacts would be low. In addition, cumulative impacts would not be significant.

4.2.7 WATER RESOURCES

4.2.7.1 Region of Influence

The ROI encompasses the Crow Creek drainage from just west of F.E. Warren AFB to a point several miles downstream of Cheyenne (Figure 4.2.7-1). It includes the two alternative garrison sites and the support community of Cheyenne, and covers about 100 square miles.

4.2.7.2 Existing and Future Baseline Conditions

Major Water Users. Total water use in Laramie County was 180,000 acre-feet (acre-ft) in 1985. Although agricultural irrigation was the dominant water use in Laramie County (157,000 acre-ft), only about 4,000 acre-feet per year (acre-ft/yr) of agricultural water use occurred in the ROI. Most water use in the ROI is municipal water supplied by the Cheyenne Board of Public Utilities (CBPU). The CBPU also supplies water to F.E. Warren AFB. Current and projected water use by both entities is shown in Figure 4.2.7-1. The CBPU has an unusually well-diversified group of water sources. About 25 percent of the supply is surface water diverted from the upper drainage of Crow Creek. Groundwater pumped from several wellfields west and northwest of the city is an additional ten percent of the supply. The majority of the water is imported from the North Platte River drainage, about 70 miles to the west. A major expansion in the capacity of the water import system will be completed by the end of 1988, increasing the total city supply to about 27,000 acre-ft/yr, and assuring an adequate supply well beyond the year 2000.

Surface Water Hydrology and Quality. The ROI is in a water-short area and Crow Creek is its only perennial stream. Most of its flow is diverted for municipal and irrigation uses and it may go dry in the stretch above Cheyenne in some years. In addition to receiving runoff from the city, the creek receives about 8,980 acre-ft/yr (8 million gallons per day [MGD]) of secondary-treated effluent from the city's two wastewater treatment plants. Because of the low flows and relatively degraded water quality, Crow Creek is a Class IV stream downstream of Cheyenne (designated for industrial and agricultural use), the state's lowest water quality classification. Both Crow Creek and the intermittent streams with larger drainages are vulnerable to infrequent flooding, particularly during summer thunderstorms. Disastrous flooding occurred along Crow Creek and its tributaries in August 1985, causing four deaths and $61 million in damage. Several small lakes are found in the ROI, including Pearson Lake, located on F.E. Warren AFB, and Swan Reservoir, a small irrigation reservoir south of the base (Figure 4.2.7-1).

Groundwater Hydrology and Quality. The ROI lies near the western edge of the regional High Plains Aquifer. Good quality groundwater and moderate to large well yields are generally available from this aquifer, primarily from the Ogallala Formation. This formation supplies water to the Cheyenne wellfields. Pumpage from the Cheyenne wellfields has resulted in local groundwater level declines of as much as 40 feet. North of Cheyenne, large numbers of new domestic wells have also caused local declines. In eastern Laramie County, extensive groundwater pumpage for irrigation has resulted in groundwater drawdowns of 20 feet or more. The eastern two-thirds of Laramie County is within a groundwater control area where the establishment of new wells is carefully controlled by the state.

4.2.7.3 Impacts of the Proposed Action

Major Water Users. Program-related water use in the Cheyenne area would peak at about 390 acre-ft (0.3 MGD) in 1992 and level off to about 290 acre-ft/yr (0.2 MGD) by 1995 (Table 4.2.7-1). All of this water would be supplied by the CBPU. Total baseline-plus-program water use in 1995 would be 20,390 acre-ft (18.2 MGD), a 1-percent increase in baseline municipal water use. This would represent about 75 percent of the available supply of 27,000 acre-ft/yr and can be readily accommodated. All future increases in water use in Cheyenne would be supplied by imported water. The water supplies to other major water users in the ROI would not be adversely affected by the

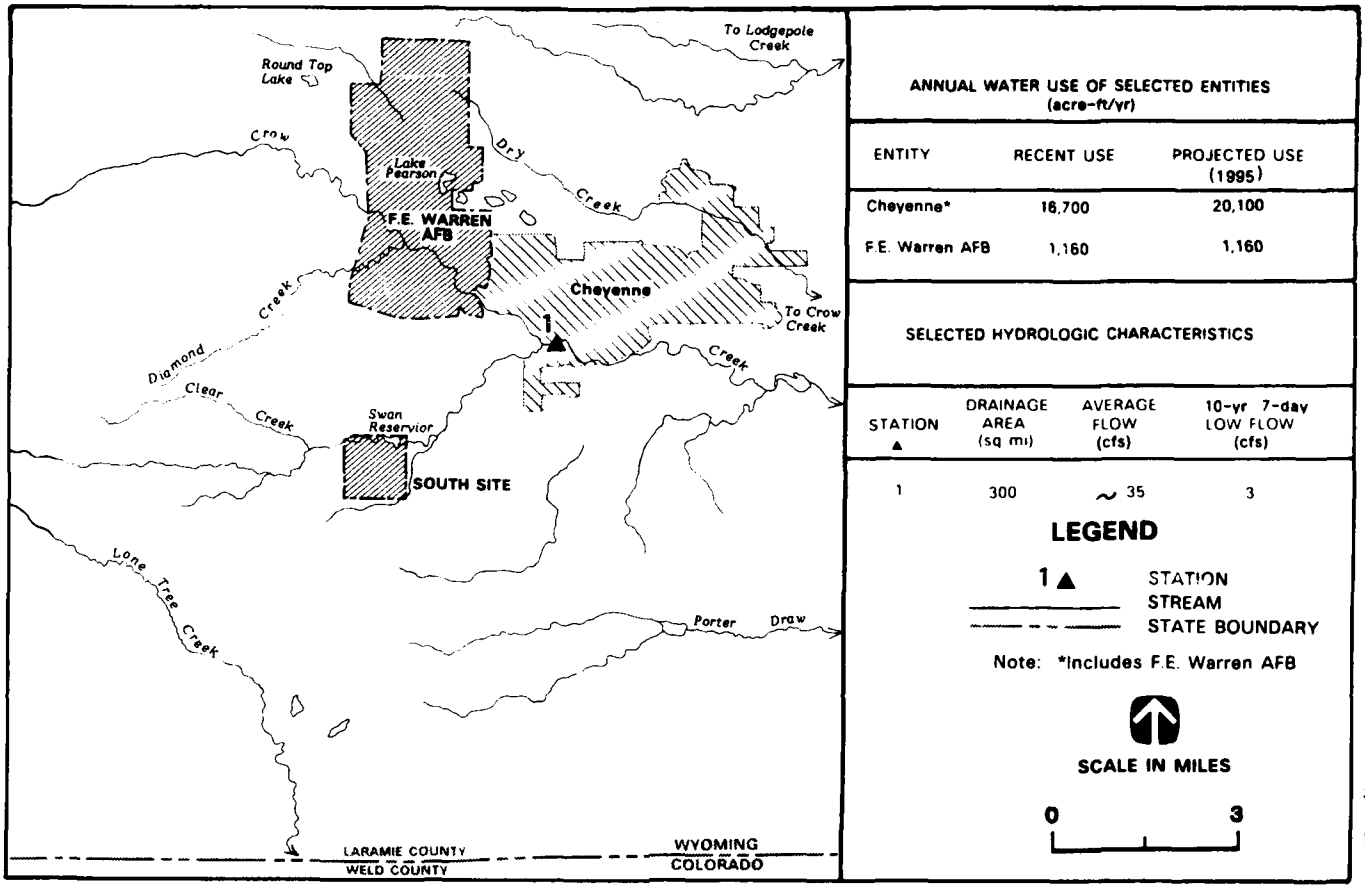


FIGURE 4.2.7-1 HYDROLOGIC FEATURES OF THE F.E. WARREN AFB, WYOMING REGION OF INFLUENCE

Table 4.2.7-1

Program-Related Water Use
Within the F.E. Warren AFB Region of Influence
Peacekeeper Rail Garrison Program (Proposed Action)
(values in acre-ft)

	1989	1990	1991	1992	1993	1994	1995 Onwards
F.E. Warren AFB							
Construction/Operations	27	56	37	35	34	28	25
Domestic	0	0	7	24	24	24	24
Cheyenne Domestic	68	155	180	326	323	266	240
TOTAL:	95	211	224	385	381	318	289

proposed program. The long-term water use at F.E. Warren AFB would be about 30 acre-ft/yr (0.03 MGD), a 3-percent increase over the baseline use of 1,150 acre-ft/yr (1 MGD). The water supply to the base from Cheyenne can readily accommodate this increase.

Surface Water Hydrology and Quality. A similarly small increase in baseline wastewater discharge into Crow Creek would result from the program. The additional 190 acre-ft/yr (0.2 MGD) of wastewater generated in the peak year of 1992 could be treated with the existing wastewater treatment capacity in Cheyenne (Section 4.2.2.3). The discharge into Crow Creek should not substantially change baseline water quality in the creek. The slightly increased flow in the creek downstream of Cheyenne may result in a slight increase in irrigated acreage within Laramie County.

Approximately 146 acres would be disturbed by the north garrison site. This area is located 0.5 mile from the nearest stream channel (an intermittent, local drainage). No runoff from the garrison site would flow directly into Crow Creek (Section 4.2, Figure 4.2-1). The garrison site would be located on flat terrain. Little erosion and sedimentation would occur and there would be no appreciable water quality degradation. The new rail spur connecting the garrison to the main rail line would disturb a narrow corridor 3.3 miles long. In addition, approximately five acres of support facilities disturbance would occur in the vicinity of lower Diamond and Crow creeks. Minor impacts on the quality of Crow Creek may result during the construction phase should runoff from this disturbed area reach the creek.

The south site garrison is located almost entirely within the Clear Creek drainage (Section 4.2, Figure 4.2-2). The 144-acre garrison site and 0.7 mile of new connecting rail spur are located about 0.1 mile north of an intermittent stream. There is substantial potential for short-term erosion and sedimentation because of the rolling nature and moderate slopes at this site (Section 4.2.8.3). Crow Creek is located five miles downstream and could be affected by increased sediment yield until stabilization measures are completed. The primary entry road to the facility would use an existing road which crosses the perennially flowing Clear Creek less than one mile above Swan Reservoir. Temporary sedimentation associated with a bridge upgrade at that location would have minimal effect on the reservoir and would probably not affect Clear Creek below the reservoir.

Groundwater Hydrology and Quality. With the north garrison site option, no groundwater impacts are anticipated. If the south garrison site option is selected, the site would be several miles distant from the nearest municipal water lines. A city water line may be extended to supply the water needs of the south site. Alternatively, the approximately four acre-ft/yr (3,500 gal/day) of water supply for the site might come from one or more wells drilled at the site. The Air Force would comply with state well permit procedures prior to drilling any new wells. Additionally, one or more septic drain fields would be installed for domestic wastewater disposal. These actions are expected to have a minor effect on the local groundwater resources.

Summary of Impacts. The municipal water supply is adequate to meet program-related water needs. Minor surface water impacts are expected if the north site option is selected. The overall short- and long-duration impact on water resources would be low. These impacts would not be significant. If the south site option is selected, short-duration impacts would be moderate because of the substantial sedimentation which would occur within the Clear Creek drainage, perhaps reaching Crow Creek. The long-duration water resource impact from this option would be low. The stretch of Crow Creek potentially affected is a Class IV stream which is currently experiencing degraded water quality because of urban runoff and low summer flows. The impacts would therefore not be significant.

4.2.7.4 Impacts of the Alternative Action

Major Water Users. Total program-related water use during the operations phase would be 320 acre-ft/yr, a 10-percent increase over the Proposed Action use of 290 acre-ft/yr. However, the percentage increase over baseline water use in Cheyenne and at F.E. Warren AFB would be virtually identical to that of the Proposed Action. The available water supply is adequate to meet the water needs of this alternative.

Surface Water Hydrology and Quality. With six Train Alert Shelters (TASs), the disturbed area at the north garrison site would increase by 28 percent to 187 acres. Program-induced erosion could be expected to increase somewhat over that of the Proposed Action. Because of the distance of the garrison from the nearest stream, water quality effects are not expected to change from those of the Proposed Action.

For the south site option, the disturbed area at the garrison would increase 24 percent to about 179 acres. Program-induced sedimentation to Clear Creek could be expected to increase by a similar amount until stabilization measures have taken effect. However, the effect on downstream water quality should not vary markedly over that discussed for the Proposed Action south site option.

Groundwater Hydrology and Quality. No groundwater impacts are expected as a result of this alternative.

Summary of Impacts. For the north site option, short- and long-duration impacts are expected to remain low. For the south site option, short-duration impacts would be moderate and long-duration impacts would be low. None of the impacts would be significant.

4.2.7.5 Cumulative Impacts

If F.E. Warren AFB is also selected as the Main Operating Base for the deployment of the Small ICBM system, relatively large amounts of municipal water from the Cheyenne system would be needed. Total water use to support the Peacekeeper Rail Garrison and Small ICBM programs would increase steadily, starting at about 90 acre-ft (0.1 MGD) in 1989 and peaking at 1,890 acre-ft (1.7 MGD) in 1999 (Table 4.2.7-2). Program-related water use would be 1,780 acre-ft/yr (1.6 MGD) in the year 2000, the first year of full Small ICBM operations. Baseline-plus-cumulative program water use in Cheyenne would be about eight percent over the baseline of 22,000 acre-ft (19.6 MGD) in the year 2000. Baseline-plus-program water use in the year 2000 represents about 88 percent of the available water supply and should be readily accommodated by the city. Cumulative water use at F.E. Warren AFB would peak at 340 acre-ft (0.3 MGD) in the year 2000.

This would increase baseline water use at the base by nearly 30 percent to a total of 1,490 acre-ft/yr (1.3 MGD). The city supply to the base is ample to meet this increase. The combined programs would not affect the availability of water to other major water users other than potentially providing a small increase in irrigation water resulting from additional wastewater discharge to Crow Creek as discussed below.

Program-induced wastewater discharges would peak at 940 acre-ft (0.8 MGD) in 1999. The utilities analysis has shown that there is adequate wastewater treatment capacity to handle this increase (Section 4.2.2.3). The water quality impact of the effluent on Crow Creek should therefore be minimal because most of its flow downstream of Cheyenne is currently treated effluent. The permanent increment of 880 acre-ft/yr of effluent from the city during the operations phase may be used to irrigate an additional 250 acres of farmland in Laramie County, assuming it is reused in a manner similar to that of current effluent discharges.

Table 4.2.7-2

Cumulative Water Use for the Peacekeeper Rail Garrison and Small ICBM Programs at F.E. Warren AFB, Wyoming (in acre-ft)

	1989	1991	1993	1995	1997	1999	Year 2000 Onwards
Peacekeeper Rail Garrison	90	220	380	290	290	290	290
Small ICBM	0	0	280	860	1,170	1,600	1,490
TOTAL:	90	220	660	1,150	1,460	1,890	1,780

Construction of the Small ICBM facilities at F.E. Warren AFB would disturb large areas within or adjacent to present base boundaries. In the northwestern portion of the base, the Hard Mobile Launcher (HML) vehicle operations training area would require approximately 250 acres. Most of this area would serve as an off-road training area and would be repeatedly disturbed over the life of the program. The northern portion of the vehicle operations training area has a 6-percent to 8-percent slope and could experience substantial erosion. This area drains to Pearson Lake, located 2.7 miles to the southeast. Substantial amounts of sediment may potentially be carried to the lake. Turbidity levels in the lake could increase and the increased sedimentation would cause the lake to lose volume at an accelerated pace.

In the southern portion of the base, south of Crow Creek, an additional 82 acres at four locations would be disturbed. These sites all drain directly to Crow Creek. During the construction phase, short periods of increased turbidity in the creek would occur during rainstorms. The water quality effects would be transient and would cease altogether once these areas were stabilized and revegetated. A permanent increase in stormwater runoff to the creek would result, requiring additional stormwater collection facilities to convey this runoff to the creek. This small amount of additional runoff should not be enough to affect downstream flooding. Assuming that all the new Small ICBM facilities would be supplied from the existing base water system and from the Cheyenne municipal supply system, no groundwater impacts are anticipated.

The city has an adequate supply to meet the combined requirements of the two programs. Minor, local increases in turbidity may occur in Crow Creek during the construction phase; therefore, the short-duration, local-level impact would be low and not significant. The large area of permanently disturbed land in the HML vehicle operations training area has the potential to result in substantial sedimentation problems in Pearson Lake. The long-duration, local-level impact would therefore be moderate and not significant.

The cumulative effect of the Alternative Action and the Small ICBM program would be the temporary disturbance of an additional 40 acres at the garrison site and the long-term use of an additional 30 acre-ft/yr of water. Both represent small increases over the cumulative effects previously discussed and would not change the overall cumulative impact.

4.2.8 GEOLOGY AND SOILS

4.2.8.1 Region of Influence

The ROI at F.E. Warren AFB for geology and soils includes the installation and associated program-related areas in the immediate vicinity. The land within a 1-mile radius of the installation and a 1,000-foot-wide corridor along the connecting rail spur was characterized for purposes of establishing the local baseline context. In addition, a regional ROI was established for geologic hazards for the purpose of developing a regional framework for seismicity at the installation.

4.2.8.2 Existing and Future Baseline Conditions

F.E. Warren AFB is located in the high Great Plains Physiographic Province. It is an area of broadly rolling uplands bounded by the Laramie Range to the west and Hartville Uplift to the north. Tertiary deposits of the Ogallala Formation, which consists of shale, sandstone, and gravel, occur at the surface with Quaternary alluvium. The installation lies in seismic zone 1 (Uniform Building Code 1985) in which a maximum credible earthquake with a magnitude of 6.1 is the largest predicted for the area. Maximum horizontal acceleration in rock is expected to be 0.04 g, with a 90-percent probability of not being exceeded in 50 years (Algermissen et al. 1982). Active faults have not been identified in the local ROI and the area is not susceptible to liquefaction. Areas susceptible to landslides or terrain failure were not discovered in the ROI.

Energy and Mineral Resources. Oil and gas resources have been identified in the ROI. Oil and gas leases occur within the proposed garrison facility at the north site. No uranium or coal mines/leases have been identified. Known Geothermal Resource Areas have not been identified, but it is possible that the ROI is underlain by aquifers containing thermal waters between 50 degrees Celsius (°C) and 100°C. No metallic/nonmetallic mineral resource mining operations or leasing activities exist in the ROI.

Soil Resources. The U.S. Soil Conservation Service is currently mapping the western portion of Laramie County which includes F.E. Warren AFB. Five soil types are known to occur in areas where program-related facilities may be located for each siting option. They occur on level to moderately sloping surfaces, range from poorly drained to excessively drained, and have a loamy texture. Soil erosion susceptibility was evaluated for wind and sheet erosion. Wind erosion of unvegetated/disturbed ground in the ROI is a major concern of the U.S. Soil Conservation Service in Wyoming and has been identified as a potential problem in the ROI, especially for sandy soils. The prevailing westerly wind direction would make east-west elongated tracts of land susceptible to wind erosion. The proposed garrison, rail spur, and other facilities at either site would be located on soils with a low to moderate susceptibility to wind erosion and a low to high susceptibility to sheet erosion.

4.2.8.3 Impacts of the Proposed Action

Energy and Mineral Resources. The proposed location of the garrison facility at the north site is currently under an oil and gas lease agreements which would result in long-duration impacts because leases would be terminated for the life of the program. Impacts on mineral resources are not expected because these resources have not been identified in the ROI.

Soil Resources. Program-related wind erosion at the proposed garrison, other facilities, and rail spur for the north site option is projected to occur at rates of 2.1 tons per acre per year (T/ac/yr) to 10.3 T/ac/yr. The application of one ton per acre (T/ac) of straw mulch would temporarily reduce the rate of erosion to less than 0.1 T/ac/yr for all soils affected. During garrison construction, soils would also erode at rates of 11.9 T/ac/yr to 21.6 T/ac/yr for large exposed areas of a soil type. The application of one T/ac of straw

mulch would temporarily reduce the rate to less than 0.1 T/ac/yr. Program-induced sheet erosion at the proposed garrison site, other facilities, and along the rail spur for the north site option is projected to occur at rates of 2.7 T/ac/yr to 8.1 T/ac/yr. The application of one T/ac of straw mulch after construction would temporarily reduce the rate of erosion to 0.5 T/ac/yr to 1.6 T/ac/yr for all soils affected.

For the south site option, program-related wind erosion at the proposed garrison, other facilities, and the rail spur is projected to occur at rates of 2.1 T/ac/yr to 10.3 T/ac/yr. The application of one T/ac of straw mulch would temporarily reduce the rate of erosion to less than 0.1 T/ac/yr for all soils affected. During garrison construction, soils would also erode at rates of 11.9 T/ac/yr to 21.6 T/ac/yr for large exposed areas of a soil type. The application of one T/ac of straw mulch would temporarily reduce these rates to less than 0.1 T/ac/yr. Program-related sheet erosion at the proposed garrison, other facilities, and rail spur for the south site option is projected to occur at rates of 2.7 T/ac/yr to 8.1 T/ac/yr. The application of one T/ac of straw mulch would temporarily reduce the rate of erosion to 0.5 T/ac/yr to 1.6 T/ac/yr for all soils affected. The range of soil erosion rates identified for either site option of the proposed program (4.8 to 29.7 T/ac/yr) are comparable to those determined for general urban land development (16 to 156 T/ac/yr) as supplied by the U.S. Department of Housing and Urban Development (1981).

Soil erosion impacts are based on the combined effects of wind and sheet erosion values and how they compare to the maximum tolerable soil loss for each soil type. Soil erosion rates would exceed the maximum tolerable soil loss (4 to 5 T/ac/yr) of the affected soil types during construction. Program-related soil erosion is therefore expected to cause short-duration impacts for either siting option. Long-duration impacts at either siting option are not expected because accelerated rates of erosion would occur for only a short period of time prior to mulching and reestablishing a vegetative cover in the disturbed areas.

Summary of Impacts. Overall short-duration impacts of the proposed program for either siting option on the geology and soils resource are expected to be high because accelerated rates of erosion during program-related construction would exceed the maximum tolerable soil loss of the soils affected. Long-duration impacts at the north site are expected to be low because onbase oil and gas leases in the ROI would be terminated for the life of the program. Long-duration impacts at the south site option would be negligible. Long-duration impacts (south site option) would be negligible. Impacts for either siting option are not expected to be significant because increased rates of erosion would not result in an appreciable net loss of topsoil over the short period of time under consideration, and the potential oil and gas resources of the leases do not appear to represent a major contribution to state or local reserves.

4.2.8.4 Impacts of the Alternative Action

The Alternative Action would slightly increase the size of the garrison. Therefore, impacts on the geology and soils resource would be about the same as for the Proposed Action. Consequently, all levels of impact and significance would remain the same as for the Proposed Action. Short-duration impacts would be high at both siting options, while long-duration impacts would be low at the north site and negligible at the south site. These impacts would not be significant.

4.2.8.5 Cumulative Impacts

Basing the Peacekeeper Rail Garrison and Small ICBM programs at F.E. Warren may result in the termination of additional oil and gas leases. Cumulative long-duration impacts would be moderate because of the termination of offbase leases for both this and the Small ICBM program. These impacts would not be significant because the oil and gas resources of the leases do not appear to represent a major contribution to state or local reserves.

Concurrent basing of these programs would increase the amount of soil eroded because of the permanent disturbance of 350 acres associated with the Small ICBM program. Short-duration impacts would remain high as a result of the construction of both Peacekeeper Rail Garrison and Small ICBM facilities. Short-duration impacts would not be significant. Long-duration impacts would be moderate because of long-term rates of erosion at the HML vehicle operations training area, which would be barren for the life of the program. Long-duration impacts would be significant because soil erosion would result in an appreciable net loss of topsoil.

Cumulative impacts of the concurrent deployment of the Alternative Action and Small ICBM program would slightly change from the Proposed Action and Small ICBM program. Consequently, all levels of impact and significance would remain the same. Short-duration impacts would remain high and not significant while long-duration impacts would remain moderate and significant.

Mitigation Measures. Mitigation measures which could reduce long-duration impacts resulting from increased rates of soil erosion during operations of the HML vehicle operations training area for the Small ICBM include the following, along with the agencies responsible for implementation:

- Build sediment traps where appropriate on drainages flowing away from the training area to control the long-duration sediment load potentially leaving the site or entering nearby streams (U.S. Air Force and U.S. Army Corps of Engineers).

- Reduce the ground slopes to control the rate of runoff, such as routing the runoff across adjacent, gently sloping grassed areas. Reductions in the amount of ground slope often require an increase in disturbed area. Consequently, the benefits of slope reduction are partially offset by the increased lengths of disturbed ground over which runoff would flow (U.S. Air Force and U.S. Army Corps of Engineers).

4.2.9 AIR QUALITY

4.2.9.1 Region of Influence

The ROI for the air quality resource includes F.E. Warren AFB, the City of Cheyenne, and the interstate highways and principal traffic arterials in Laramie County.

4.2.9.2 Existing and Future Baseline Conditions

The proposed program area currently experiences excellent air quality because of many favorable factors associated with atmospheric dispersion of air pollutants, such as neutral atmospheric stability, extensive mixing heights and high wind speed, as well as relatively few sources of air pollutants in the immediate area.

F.E. Warren AFB is located within the Metropolitan Cheyenne Intrastate Air Quality Control Region (AQCR) (No. 242). There are no Prevention of Significant Deterioration Class I areas within 50 miles of the base. In 1986, air quality data (total suspended particulates [TSP] and particulate matter [PM_{10}]) within the AQCR were taken at Cheyenne in Laramie County. No other criteria pollutants were monitored because of the minimal number of either point or area sources. Ambient air quality at F.E. Warren AFB has not been monitored. The air quality measurements in Cheyenne indicate that the maximum 24-hour TSP observation was 69 micrograms per cubic meter ($\mu g/m^3$) and the highest annual TSP geometric average was 28.1 $\mu g/m^3$. The maximum recorded PM_{10} 24-hour average was 38 $\mu g/m^3$ and the highest annual geometric mean was 17 $\mu g/m^3$; both are within the standards. The City of Cheyenne and F.E. Warren AFB are in attainment for all criteria pollutants.

The latest regional air quality emissions inventory for Laramie County, extracted from the U.S. Environmental Protection Agency (EPA) National Emission Data System, is provided in Table 4.2.9-1. Emissions data were available for TSP, sulfur oxides (SO_x), nitrogen oxides (NO_x), carbon monoxide (CO), and volatile organic compounds (VOC, a measure of reactive hydrocarbons).

The data include the four most important source categories: fuel combustion in stationary sources, transportation, solid waste disposal, and industrial processes, as well as a fifth source category, miscellaneous. Stationary fuel combustion sources include both area sources and point sources of fuel used for heat and power in residences, industries, institutions, and commercial buildings. The transportation category includes automobiles, trucks, buses, aircraft, trains, and water transportation vessels. Solid waste disposal emissions include those from all sources of open burning and incineration, while emissions from industrial processes include only those industrial air pollutants emitted during the manufacturing process. Miscellaneous emissions types vary according to the region involved, but most commonly include fugitive dust, solvent evaporation, agricultural burning, forest fires, and structural fires.

Based on the air quality inventory, emissions of NO_x, CO, and hydrocarbons derive primarily from transportation-related sources. Evaporation of petroleum products and solvents is an additional source of hydrocarbons. Electrical generation is an additional source of NO_x. Emissions of SO_x are mostly from coal and oil combustion and petroleum industry processes. The TSP emissions occur primarily as fugitive dust resulting from vehicular traffic on unpaved roads. Existing major point sources of air pollutants include the Husky oil refinery, the Wycon chemical fertilizer plant, the Morrison-Knudsen quarry, and the F.E. Warren AFB central heating plant, all located in Laramie County.

Future air quality in this region will continue to be excellent. Proposed, commercial, and other road construction projects in the region should not cause violations of ambient air quality standards.

4.2.9.3 Impacts of the Proposed Action

Direct air emissions would result from construction of the rail spur and support facilities and from operation of the proposed program at F.E. Warren AFB. Emission sources associated with construction include light-duty vehicle traffic, diesel trucks, offsite heavy-duty vehicles, diesel construction equipment, and fugitive dust from ground disturbance.

Table 4.2.9-1
Laramie County, Wyoming Air Emissions Inventory, 1987
(tons per year)

Emission Source	TSP	SO_x	NO_x	VOC	CO
Fuel Combustion	553	5,628	22,402	790	3,959
Industrial Process	354	1,584	299	2,313	24
Solid Waste Disposal	277	17	36	626	1,874
Air/Water Transportation	59	10	79	116	535
Land Transportation	1,550	552	5,332	4,151	31,699
Miscellaneous	39,049	-	9	1,185	314
TOTAL:	41,842	7,791	28,157	9,181	38,405

Source: U.S. Environmental Protection Agency 1988d.

The highest monthly fugitive dust emissions from proposed program construction activity would be about 26 tons for the north site and 24 tons for the south site. Fugitive dust calculations assume a 50-percent reduction due to watering of the construction sites. All of the fugitive dust emissions at F.E. Warren AFB were conservatively assumed to be within the 10-micrometer particle size and referenced against the PM_{10} standard for impact analysis. It is expected that actual PM_{10} emissions would be smaller than the emissions calculated under the EPA guidelines for TSP.

Construction-related impacts were calculated for 24-hour and annual averaging periods. A program-related increase of 0.3 $\mu g/m^3$ at the north site would occur, increasing the 24-hour average background concentration to 38.3 $\mu g/m^3$. The predicted fugitive dust background concentrations would not equal or exceed the 24-hour National Ambient Air Quality Standards (NAAQS) of 150 $\mu g/m^3$ (PM_{10}). The annual background concentration would increase to 17.1 $\mu g/m^3$, which would not equal or exceed the PM_{10} standards of 50 $\mu g/m^3$. Fugitive dust generated at either the north or south site for the peak construction year would have negligible impacts on Cheyenne air quality. The EPA-minimum threshold levels for fugitive dust would not be exceeded, and no violation of the NAAQS would occur.

Overall short- and long-duration air quality impacts would be negligible.

4.2.9.4 Impacts of the Alternative Action

The Alternative Action (6 TASs) at the north site would cause a 0.2-percent increase in fugitive dust emissions over the Proposed Action. This would result in a total increase of 0.4 $\mu g/m^3$ above existing background concentrations, increasing the 24-hour average ambient concentration to 38.4 $\mu g/m^3$. The Alternative Action impacts would be negligible and would not cause any violation of the NAAQS. Overall short- and long-duration air quality impacts would be negligible.

At the south site, the increase in fugitive dust would be 0.2 percent. Therefore, the Alternative Action impacts at the south site would also be negligible for fugitive dust emissions. Overall short- and long-duration air quality impacts would be negligible.

4.2.9.5 Cumulative Impacts

Concurrent deployment of the Peacekeeper Rail Garrison and Small ICBM programs at F.E. Warren AFB would result in additional onbase construction and operational activities, creating additional air pollutant emissions. The combined short-duration fugitive dust emissions for the two programs at F.E. Warren AFB would be negligible and would not cause violations of ambient air quality standards. Short-duration construction and long-duration operations combustion-related emissions generated by the two programs would be minimal.

4.2.10 NOISE

4.2.10.1 Region of Influence

The ROI for the noise resource is broadly defined as that part of the proposed program area where program-related noise level increases occur. Specifically, the ROI includes F.E. Warren AFB, the City of Cheyenne, and the interstate highways and principal traffic arterials in Laramie County.

4.2.10.2 Existing and Future Baseline Conditions

There are three major noise sources in the City of Cheyenne and in the vicinity of F.E. Warren AFB: vehicular traffic; air traffic; and railroad trains.

Vehicular noise associated with road traffic is considered to be relatively constant. It varies in this respect from the intermittent peak-noise levels from air and rail traffic. Road traffic noise is also a more widespread source, and to some extent affects every environment. Actual levels of highway-generated noise will vary with traffic conditions, road design, physical surroundings, weather conditions, and particular vehicle types. Automobiles are usually a relatively minor source of roadside noise; heavy trucks and buses are generally the primary contributors to the noise levels. Exhaust, engine, and tire noise are the sources of the high noise levels associated with heavy vehicles. This problem is compounded when these vehicles carry a heavy load, travel uphill, or accelerate from a stopped position.

The principal vehicular noise source in Cheyenne is Interstate 25. Sensitive receptors (residential areas within 200 ft of the highway) experience noise levels of 55 decibels on the A-weighted scale (dBA) to 65 dBA expressed as day-night equivalent sound level (L_{dn}).

The major airport in the ROI is Cheyenne Municipal Airport. Existing air traffic noise levels for the airport were obtained from the Cheyenne Municipal Airport Master Plan (1986). The existing operations at this facility generated 60 dBA, 65 dBA, and 70 dBA (L_{dn}) contours. The 60 dBA (L_{dn}) contour extends to airport property or beyond in all directions, except to the north beyond Runway 16/34.

The 65 dBA (L_{dn}) contour extends beyond airport property in three directions; northwest, west, and southeast. To the northwest, the 65 dBA (L_{dn}) contour extends approximately 1,300 feet beyond the end of the runway and 850 feet beyond airport property. The contour encompasses a golf course for the most part, along with a few houses east of the highway. To the west, the contour extends approximately 4,200 feet beyond the end of the runway and 3,850 feet beyond airport property. This encompasses Frontier Park and Sloan Lake. To the southeast, the contour extends approximately 1,000 feet beyond the end of the runway and approximately 700 feet beyond airport property. The contour encompasses residential property for the most part, along with a cemetery and some commercial development.

The 70 dBA (L_{dn}) contour extends from airport property in the same three directions, although it does not extend beyond the airport boundary significantly to the northwest and southeast. To the west, the 70 dBA (L_{dn}) contour extends beyond airport property approximately 800 feet, and encompasses Frontier Park and Sloan Lake.

The Burlington Northern Railroad which passes near onbase and offbase residential areas is the only railroad noise source. An average of five coal trains per day pass on this line. The estimated noise levels expected are 60 dBA (L_{dn}) at the residential receptors within 100 feet of the rail line. There have been no noise complaints about this activity.

For the south site option, the nearest sensitive receptor (residential area) is located about 5,500 feet from the garrison area. The existing noise levels at the residential areas within 200 feet of Interstate 25 are 55 to 65 dBA (L_{dn}).

4.2.10.3 Impacts of the Proposed Action

Short-duration impacts resulting from construction-related noise would occur within the immediate vicinity of construction sites. The various activities that would take place include construction of industrial structures, the rail spur, roadways (grading, compacting, and paving); landscaping; and cleanup at F.E. Warren AFB.

Construction-related noise at F.E. Warren AFB (north site) is not anticipated to affect offbase or onbase residential areas because such noise levels from point sources attenuate quickly with distance. Potential construction-related noise levels of 80 dBA to 85 dBA at 100 feet from the source within the TAS construction site would be reduced to

49 dBA at the offbase residential areas which are located about 6,000 feet from the construction location. The noise levels at base residential areas and the hospital, which is located about 12,000 feet from the TAS construction site, would be 43 dBA. These noise levels would be masked by ambient noise levels of about 55 dBA to 65 dBA (L_{dn}). Once the construction activity ceases, noise levels would return to near ambient conditions. The short-duration noise impacts from all construction activities would be negligible.

During the operational phase, noise would be generated by road, air and railroad traffic. Additional traffic due to the proposed program would cause approximately a 0.3-dBA (L_{dn}) increase in noise levels at the sensitive receptors (residential areas) within 200 feet of Interstate 25. This increase in vehicular noise levels would have a negligible impact on the sensitive receptors.

Aircraft operations related to the transportation of the reentry system from Cheyenne Municipal Airport would cause increased takeoff and landing operations by 20 to 23 per year, which would result in an increase of less than 0.1 dBA (L_{dn}) in existing noise levels. Thus, program-related aircraft operations would have a negligible impact on sensitive receptors in the vicinity of the airport.

Operational railroad activities for the proposed program include train maintenance and repair activities and training train operations. Together, these activities would generate an average of about one train per day in the Cheyenne area. The noise impacts on offbase and onbase sensitive receptors would be negligible.

TAS construction-related noise for the south site option is not anticipated to affect residential areas because such noise levels from point sources attenuate quickly with distance. Potential construction-related noise levels of 80 dBA to 85 dBA at 100 feet from the source would be reduced to 50 dBA at the residential area which is located about 5,500 feet northeast of the construction location. This noise level could be masked by ambient noise levels of 55 dBA to 65 dBA (L_{dn}). The short-duration noise impacts from all construction activities would be negligible.

At the south site the operational vehicular traffic would cause an increase in noise levels of about 0.3 dBA (L_{dn}) at the sensitive receptors along Interstate 25. This increase in noise levels would have a negligible impact on the residential area.

The operations-phase air traffic and railroad noise impacts would be about the same as for the north site option.

The overall short- and long-duration noise impacts would be negligible for either site option.

4.2.10.4 Impacts of the Alternative Action

As with the Proposed Action, the short-duration (construction) noise impacts would be negligible for either site option. The increase in noise levels resulting from the construction of six TASs at the north or south sites would be negligible. Once the construction activity ceases, noise levels would return to near ambient conditions. The long-duration operations noise impacts (vehicular, air, and railroad traffic) would be negligible at both the north and south site options.

4.2.10.5 Cumulative Impacts

Concurrent deployment of the Peacekeeper Rail Garrison and Small ICBM programs at F.E. Warren AFB would create a cumulative impact because additional construction activity onbase would create an increase in noise levels. Cumulative noise impacts would consist of additional noise generated during construction of the Small ICBM facilities. The short-duration (construction) noise impacts would still be negligible.

The operations activities of both programs would cause small increases in vehicular, air, and railroad traffic noise levels. The cumulative long-duration noise impacts would be negligible.

4.2.11 Impacts of the No Action Alternative

With the No Action Alternative, the Peacekeeper Rail Garrison system would not be deployed. Activities at F.E. Warren AFB will continue to support other existing or proposed missions. For the host communities in the vicinity of the base, environmental changes would occur as a result of normal community growth. Future baseline conditions reflecting the No Action Alternative are described in earlier portions of this chapter.

4.2.12 Irreversible and Irretrievable Resource Commitments

Deployment of the Peacekeeper Rail Garrison program at F.E. Warren AFB would result in the irreversible and irretrievable commitments of some human and natural resources. The affected resources are the following:

- The proposed program requires the use of relatively small amounts of labor, materials, energy, and other economic resources during both the construction and operations phases. The local procurement of building materials (such as cement, sand, and gravel) may alter some resource characteristics in the deployment area. Although these economic factors, once used by the proposed program, generally cannot be recovered for other purposes, the extent of their use would be small in comparison to total resource availability.

- Lands utilized for the program facilities will be irreversibly committed for the duration of the program. Such use of land would not cause an irretrievable commitment because the land can be retrieved through removal of program facilities and implementation of necessary soil rehabilitation.

- Both irreversible and irretrievable commitments would occur if any National Register of Historic Places (NRHP) -eligible prehistoric sites are disturbed. Eight NRHP-eligible prehistoric sites have been recorded in program areas for both the Proposed Action and the Proposed Action and Small ICBM programs. Additional potentially eligible prehistoric resources could be encountered in the south site area.

- Both irreversible and irretrievable commitments would occur if any NRHP-eligible historic sites or components of the Fort D.A. Russell/F.E. Warren National Register District/National Historic Landmark are disturbed. Fourteen NRHP-eligible historic sites or features of the district have been identified in program areas onbase. Additional NRHP-eligible sites have also been located in the south site area.

- No Native American resources have been identified onbase; however, irreversible and irretrievable commitments could occur if Native American resources occur and are disturbed in offbase impact areas.

- Disturbed biological communities, given sufficient time, can recover to a state approximating predisturbance conditions once the disturbance ends. Therefore, few of the biological impacts due to temporary disturbance expected from the proposed program would be irreversible and irretrievable. Permanent disturbance would result in irreversible and irretrievable commitment of some resources affected. Removal of wetland habitats would represent irretrievable loss of affected habitat. Restoration or replacement is not likely to fully compensate the loss of these habitats because created

habitats are unlikely to have the ecological value of the habitat lost. However, the acreage affected is small.

- Soils would be permanently disturbed at construction and related sites (e.g., borrow pits, roads, buildings, and rail spur) and may be irreparably damaged during the life of the program if disturbed areas are not mulched or revegetated, especially at the garrison location. Aggregate resources would be used for construction of buildings, roads, and rail spurs.

4.2.13 Relationship Between the Local Short-Term Use of Man's Environment and the Maintenance and Enhancement of Long-Term Productivity

Deployment of the Peacekeeper Rail Garrison program at F.E. Warren AFB would result in the short-term use of some human and natural resources that may affect the maintenance and enhancement of long-term productivity. The affected resources are the following:

- Short-term program-generated disruption and delay of traffic would result in a decrease in the comfort, convenience, and safety afforded users of primary roads leading to the base. No effect on long-term productivity is expected.

- Additional information gained during program-related surveys of archaeological and historic resources may contribute to the data base and improve man's knowledge of the area's history. This would enhance the management of remaining cultural resources in the region.

- Areas temporarily disturbed by the construction activities would result in short-term losses of biological habitats. However, recovery rates are expected to be relatively fast and no effect on long-term productivity is expected.

- Soil erosion during construction would increase sedimentation to local streams resulting in a short-term deterioration of surface water quality. However, the additional loss of soil would not affect soil productivity or the long-term quality of streams.

- Reductions in air quality levels would result from fugitive dust levels during construction. However, no long-term reduction in air quality is expected.

4.2.14 Environmental Concerns Associated With a Possible Future Second Rail Connector

The Proposed Action for F.E. Warren AFB, the Main Operating Base, provides for rail connections to both the Burlington Northern and Union Pacific Railroads. No additional rail connections are being considered.

4.3 BARKSDALE AIR FORCE BASE, LOUISIANA

Barksdale Air Force Base (AFB), located in Bossier Parish in northwestern Louisiana, covers approximately 21,800 acres. The host organization at this Strategic Air Command base is the 2nd Bombardment Wing, with B-52G bomber and KC-10A tanker aircraft. Major tenant units at Barksdale AFB include Headquarters 8th Air Force and the 917th Tactical Fighter Group, an Air Force Reserve unit.

Barksdale AFB employed 6,569 military personnel (1,090 officers and 5,479 enlisted), 1,704 Air Force Reserve personnel, 1,227 appropriated fund civilian personnel, and 726 other civilian personnel at the end of fiscal year 1987. Approximately 37 percent of the military personnel live on Barksdale AFB, and 63 percent live in communities near the base.

The base is located in the Shreveport-Bossier City metropolitan area (Figure 4.3-1). Shreveport, located west of the base across the Red River, is the major commercial and industrial city in northern Louisiana. Bossier City, host community for Barksdale AFB, is located north of the base. Approximately 22 percent of the personnel living offbase live in Shreveport and the remaining 78 percent live in Bossier City. Some personnel live in smaller communities near the base. The region's economy is dominated by agriculture, lumber, oil and gas, transportation, and trade industries. The Shreveport/Bossier City area serves as the regional commercial, trade, and transportation center for the northwestern portion of Louisiana, parts of eastern Texas, and southwestern Arkansas.

The following sections provide a description of activities associated with the deployment of the Peacekeeper Rail Garrison program at Barksdale AFB for the Proposed Action (4 Train Alert Shelters [TASs]) and the Alternative Action (6 TASs).

Proposed Action. For the Proposed Action at Barksdale AFB, the Air Force would construct garrison facilities and provide personnel necessary for the deployment and operation of up to four Peacekeeper missile trains. Approximately $80 million (in 1986 dollars) of construction would occur at the base for the Proposed Action. Construction activities for the purpose of analysis are assumed to begin in 1990 and be completed in 1992, with full operations beginning in 1993. Direct employment requirements would be 211 in 1990, peak at 505 in 1992, and stabilize at 416 during the full operations phase. Peak construction employment of 242 would occur in 1991. Annual direct employment requirements for the Proposed Action are presented in Table 4.3-1 for site activation, construction, assembly and checkout, and operations activities.

The garrison would be located east of the runway in the western portion of the base and collocated with the existing weapons storage area (Figure 4.3-1). Seven buildings (including the 4 TASs), roads, utilities, parking, and approximately 1.5 miles of railroad track would be constructed within the garrison. No offbase land acquisition or restrictive easements would be required for the garrison (Table 4.3-2). Construction of the garrison would disturb approximately 94 acres permanently and 165 acres temporarily (Table 4.3-3).

A 2.7-mile connector rail spur (2 mi onbase and 0.7 mi offbase) would be constructed outside the garrison to the Midsouth Railroad main line north of the base (Figure 4.3-1). Approximately 15 acres would be acquired for construction of the offbase portion of the rail spur and a wye where the spur would join the main line (Table 4.3-2). Approximately 15 acres would be disturbed permanently and 11 acres temporarily outside the garrison for the connector spur and wye (Table 4.3-3).

The Proposed Action would require the construction of support facilities with a total floor space of approximately 102,600 square feet. To provide access to the Training Train Shelter, a 0.4-mile rail spur would be constructed from the connector rail spur (Figure 4.3-1). Construction of the support facilities, roads, utilities, and parking would

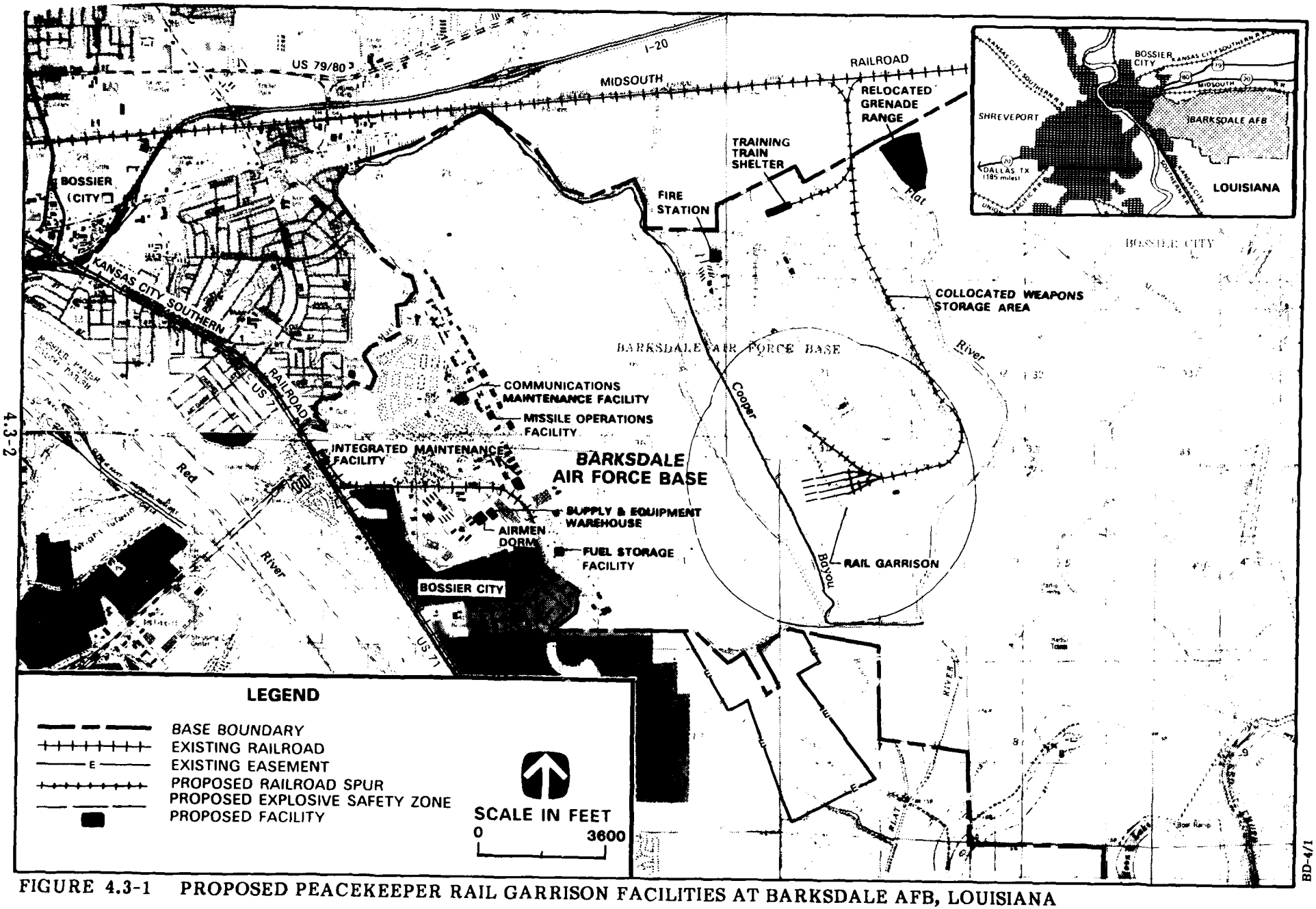


FIGURE 4.3-1 PROPOSED PEACEKEEPER RAIL GARRISON FACILITIES AT BARKSDALE AFB, LOUISIANA

BD-4/1

Table 4.3-1

Annual Direct Employment (Military and Civilian) for the Peacekeeper Rail Garrison Program in the Barksdale AFB Area by Calendar Year (Full-Time Equivalent Jobs)

	1989	1990	1991	1992	1993[1]
Proposed Action					
Site Activation	1	15	24	11	0
Construction	0	195	242	77	0
Assembly & Checkout	0	1	18	1	0
Operations	0	0	122	416	416
TOTAL:	1	211	406	505	416
Alternative Action					
Site Activation	1	15	24	11	0
Construction	0	213	256	77	0
Assembly & Checkout	0	2	27	2	0
Operations	0	0	135	459	459
TOTAL:	1	230	442	549	459

Note: [1]Employment would continue at these levels for the life of the program.

Table 4.3-2

Offbase Land Acquisition and Easement Requirements Peacekeeper Rail Garrison Program Barksdale AFB, Louisiana (acres)

	Proposed Action	Alternative Action
Land Acquisition		
Garrison Area	0	0
Rail Spur	15	15
Housing Area	0	0
Relocated Facilities	0	0
TOTAL:	15	15
Restrictive Easements	0	0

permanently disturb approximately 20 acres and temporarily disturb 16 acres (Table 4.3-3).

The Proposed Action would also require the relocation of the base grenade range to a new location (Figure 4.3-1). Relocation of this facility, in addition to some base roads and utilities, would permanently disturb approximately 41 acres and temporarily disturb less than 1 acre (Table 4.3-3).

Table 4.3-3
Summary of Area Disturbed by the Peacekeeper Rail Garrison Program
Barksdale AFB, Louisiana
(Proposed and Alternative Actions)

Facility Group	Area Disturbed (acres)		
	Permanent	Temporary	Total
Proposed Action			
Garrison Facilities	94.2	165.4	259.6
Rail Spur	14.7	11.5	26.2
Support Facilities	19.9	15.7	35.6
Relocated Facilities	40.8	0.2	41.0
TOTAL:	169.6	192.8	362.4
Alternative Action			
Garrison Facilities	99.6	165.2	264.8
Rail Spur	13.6	10.6	24.2
Support Facilities	19.9	15.7	35.6
Relocated Facilities	40.8	0.2	41.0
TOTAL:	173.9	191.7	365.6

Alternative Action. For the Alternative Action, the Air Force would construct garrison facilities and provide personnel for the deployment and operation of up to six Peacekeeper missile trains. Approximately $92 million (in 1986 dollars) of construction would occur at Barksdale AFB for the Alternative Action. Construction and operations activities are assumed to occur in the same time frame as the Proposed Action. Annual direct employment requirements for the Alternative Action are presented in Table 4.3-1.

The garrison for the Alternative Action would contain six TASs (instead of 4) and would be constructed in approximately the same location as the Proposed Action (Figure 4.3-2). Nine buildings (including the 6 TASs), roads, utilities, parking, and approximately two miles of track would be constructed within the garrison. No offbase land acquisition or restrictive easements would be required for the garrison for the Alternative Action. Construction of the six-TAS garrison would disturb approximately five additional acres permanently (100 acres total) and about the same number of acres temporarily (165 acres total) as the Proposed Action (Table 4.3-3).

The connector rail spur from the garrison to the Midsouth Railroad main line would require the construction of 1.8 miles of new track onbase and 0.7 mile offbase for the Alternative Action. For the Alternative Action, technical and personnel support facility requirements and the relocation of existing facilities would be similar to the Proposed Action.

Summary of Program Impacts. The Proposed Action at Barksdale AFB would result in significant impacts for transportation and biological resources. Both short- and long-duration impacts on transportation would be low because the level of service rating along Barksdale Boulevard would not change, remaining at D. These impacts would be significant because program-induced traffic would aggravate existing congested conditions. Long-duration impacts on biological resources would be high because the program would affect large areas, cause associated disturbances in surrounding wetland habitats, affect sensitive wildlife populations, and result in degradation of local and regional biological communities. These impacts would be significant because of ecological importance of the habitat and the level of concern these potential impacts would elicit from natural resource management agencies.

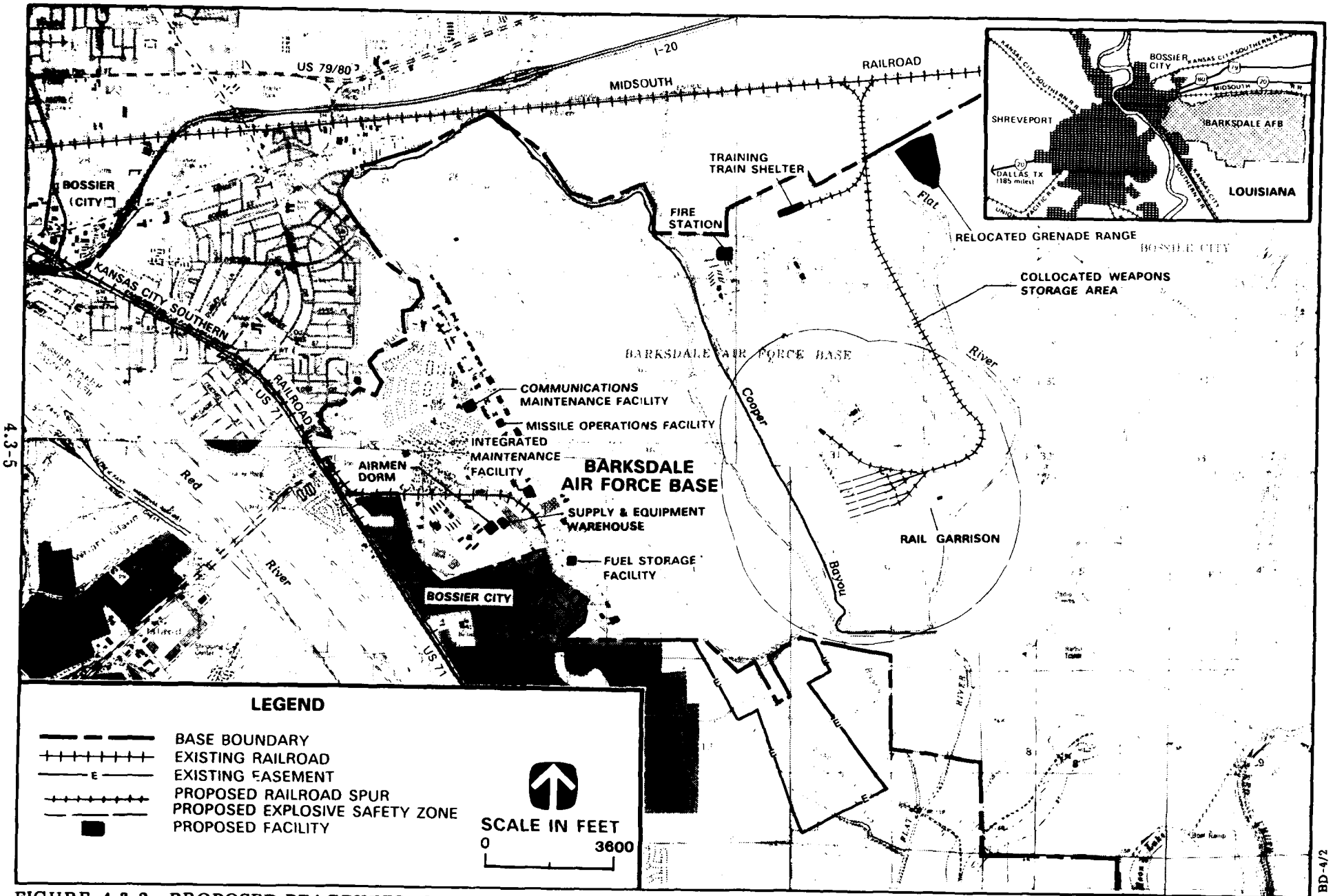


FIGURE 4.3-2 PROPOSED PEACEKEEPER RAIL GARRISON FACILITIES AT BARKSDALE AFB, LOUISIANA (ALTERNATIVE ACTION)

Impacts for all other resources would not be significant.

The Alternative Action at Barksdale AFB would not alter the level of impact or significance rating for any resource.

Both short- and long-duration beneficial socioeconomic effects would be generated by the Proposed and Alternative Actions, including increases in employment and income, and greater utilization of temporary and permanent housing.

4.3.1 SOCIOECONOMICS

4.3.1.1 Region of Influence

The Barksdale AFB Region of Influence (ROI) for the employment and income element consists of a five-county area from which the majority of program labor and material requirements are expected to be supplied. This ROI includes the parishes of Bienville, Bossier, Caddo, Claiborne, and Webster in Louisiana. The ROI for the remaining elements includes Bossier Parish, Bossier City, and the City of Shreveport. Because of the relatively large population in Shreveport (approximately 240,000 residents projected for 1990), the program-related socioeconomic effects in Shreveport and Caddo Parish would be inappreciable. For this reason, potential program-related effects and baseline analyses focus primarily on jurisdictions in the Bossier City area.

4.3.1.2 Existing and Future Baseline Conditions

Employment and Income. Total employment in the ROI increased 8.5 percent from 194,616 in 1980 to 211,195 in 1984. The finance, insurance, and real estate; retail trade; and government sectors gained jobs from 1980 to 1984; whereas, the farm, transportation and utilities, and manufacturing sectors lost jobs during the same timeframe. The government, retail trade, and manufacturing sectors accounted for 46 percent of the total ROI jobs in 1984. Construction employment was approximately 11,980 in 1984.

The government, services, and trade sectors accounted for 70 percent of the total employment in Bossier Parish in 1984 and has not changed appreciably since 1980. Government sector employment provides over one-third of the total employment in the parish. Total employment in Bossier Parish increased by 15 percent from 30,831 in 1980 to 35,537 in 1984.

Total employment in the ROI is projected to reach 218,193 in 1990 and 232,985 in 1995. The unemployment rate in the ROI is projected to be 11.5 percent in 1990 and 10.5 percent in 1995. Both of these projected unemployment rates are higher than the ROI unemployment rate of 8.1 percent in 1984.

Total earnings and per capita personal income in the ROI and Bossier Parish followed a trend similar to that of employment. From 1980 to 1984, total earnings (in current dollars) in the ROI increased from $2.6 billion to $3.5 billion and in Bossier Parish from $378 million to $529 million. Discounting for inflation these increases in total earnings represented, respectively, 7.9-percent and 11.7-percent growth over the 1980 to 1984 period. Per capita personal income in the ROI increased from $8,548 in 1980 to $11,230 in 1984 and in Bossier Parish from $7,648 in 1980 to $10,324 in 1984.

Total earnings (in 1986 dollars) in the ROI are projected to increase to $4 billion in 1990 and $4.3 billion in 1995. The corresponding per capita personal income is projected to increase to $11,682 in 1990 and $11,744 in 1995. For the same two years, per capita personal income in Bossier Parish would be $10,685 and $10,732, respectively.

Population and Demographics. In 1985, the population of Bossier Parish was estimated at 91,894, a 13.6-percent increase of over the 1980 population of 80,906. The population of Bossier Parish is projected to increase to 102,501 by 1990 and to 114,239 by 1995. The population of Bossier City increased from 50,817 in 1980 to 55,819 in 1985, a 10.4-percent increase. The city population is projected to reach 61,500 in 1990 and 68,540 in 1995. The City of Shreveport had a total population of 219,996 in 1984. This population is projected to increase to 240,409 by 1990 and to 253,700 by 1995.

Military personnel and their dependents accounted for approximately 24 percent of the estimated 57,954 population in Bossier City in 1987.

Housing. The number of permanent year-round housing units in Bossier City was approximately 17,928 in 1980. Available vacancies numbered 837 units (4.7%). A January 1988 survey of apartment units in Bossier City identified 4,017 individual units. The U.S. Department of Housing and Urban Development surveyed apartments in the Shreveport/Bossier City area in October 1987 and estimated occupancy rates to be approximately 84 percent, suggesting that 651 vacant apartment units existed in Bossier City. Hotels/motels in the Shreveport/Bossier City area have over 5,800 rooms, 1,500 of which have been added since 1984. During the horse racing season at nearby Louisiana Downs (April to October), when peak occupancy rates are experienced, it is estimated that over 1,150 hotel/motel rooms are still available.

By 1990, the stock of permanent year-round housing units in Bossier City is projected to be 21,697 units, 1,013 of which will be available. In 1995, the housing stock is projected to be 24,182 units, 1,129 of which will be available. No new temporary facilities are expected in Bossier City.

The number of permanent year-round housing units in the City of Shreveport was approximately 79,880. Of these units, 3,210 (4.0%) were reported to be available and vacant. Current estimates place the number of apartment units in the City of Shreveport at about 14,600 units. Vacancies are estimated to number about 2,300 units or 15.8 percent.

Barksdale AFB has 1,031 family housing units divided into three types: Wherry (167 officer and 435 noncommissioned officer [NCO]), Capehart (56 officer and 144 NCO), and appropriated (105 officer and 124 NCO). Existing Wherry units will undergo revitalization in the early 1990s, increasing the total number of units to 1,061. Onbase unaccompanied enlisted personnel housing facilities are undergoing a 5-year renovation program which will increase available living space. This will increase the capacity to house personnel by over 100. The housing referral office had listings of 105 offbase units in the Shreveport/Bossier City area in 1987. Of these units, 33 were one-bedroom, 59 were two-bedroom, 9 were three-bedroom, and 4 were more than three-bedroom.

Education. Bossier Parish School Board, consisting of five districts, had a 1987-88 school year K-12 enrollment of approximately 18,000 students. Bossier Parish School Board also includes Bossier Parish Community College, with an additional enrollment of approximately 2,000 students. Districts 13 and 27 include Bossier City and Barksdale AFB and have enrollments of approximately 12,000 students at 11 elementary, 4 junior high, and 3 high schools. Approximately 22 percent of the school districts' enrollment are dependents of federal employees. Under P.L. 81-874 guidelines, the school districts are classified as "regular." Current overall pupil-to-teacher ratios at the elementary level are 21.7-to-1, below the weighted average state standard of 23.4-to-1. The districts have a history of redefining school boundaries to even out disparities in enrollments among schools. Enrollments are projected to increase to 19,200 by 1990 and 21,400 by 1995, and staffing is expected to increase to maintain existing student-to-teacher ratios. Students in the Shreveport area are served by the Caddo Parish School Board. This school board currently has enrollments of approximately 51,500 students and operates 40 elementary, 17 middle, 12 high, and 6 special schools

Public Services. Bossier City employs approximately 480 people in 22 departments under the general fund, and has 607 total personnel. The Police Department is staffed by 136 sworn officers out of a total of 155 personnel. The Fire Department has 108 firefighters and a total staff of 115. Current staffing levels provide the city with 8.3 public service personnel per 1,000 population. To maintain these levels, the city's staffing levels would increase from 480 to 510 by 1990, and to 569 by 1995. If no additional personnel were hired, the number of personnel per 1,000 population would drop to 7.8 and 7.0 in these corresponding years. The City of Shreveport provides its residents with comprehensive public services. In 1987 the city employed approximately 2,100 full-time personnel.

Public Finance. Services provided by Bossier City are funded principally through the general and special revenue funds. In 1986, revenues in these funds totaled $16.6 million. Property and sales taxes are Bossier City's principal revenue sources. Expenditures in 1986 were $13.3 million. Outlays for public safety services (law enforcement and fire protection services) accounted for the majority of these expenditures. Over the 1990 to 1995 period, expenditures are projected to be $14.3 to $16 million. The year-end balance of the two funds amounted to $1.8 million, 14 percent of total expenditures for this year. Net bonded indebtedness at the end of 1986 was approximately $4.6 million. This represents approximately three percent of the city's assessed valuation of $145 million.

Budgeted revenues and expenditures of the Bossier Parish School Board were approximately $42.1 million in fiscal year 1987, or $2,300 per pupil. Year-end fund balances were $9.1 million, about 20 percent of expenditures in that year. Over the 1990 to 1995 period, expenditures and revenues are projected to be $50 million to $55.7 million.

In 1986, Bossier Parish expenditures and revenues were $7.4 million and $7.7 million, respectively. Year-end fund balances were $5.5 million, representing 72 percent of expenditures in that year. Over the 1990 to 1995 period, revenues and expenditures are projected to be $8.4 million to $9.4 million.

Revenues and expenditures of the general and special revenue funds of the City of Shreveport were $84.5 million and $90.3 million, respectively, in 1986. Year-end fund balances amounted to about $10.1 million, representing about 11 percent of expenditures in that year.

4.3.1.3 Impacts of the Proposed Action

Program impacts on employment, personal income, housing demand, and school district enrollment are presented in Table 4.3.1-1.

Employment and Income. The Proposed Action (4 TASs) would create new jobs in the ROI. During the construction phase, from 1990 to 1992, total jobs would range from 454 to 801. Of the peak (801) new jobs created in 1991, 406 would be direct (110 military and 296 civilian) and 395 would be secondary. The number of local hires would be about 580. All direct and most secondary jobs would occur in Bossier Parish. During the operations phase (1993 and thereafter), total new jobs would stabilize at 572. Of these 572 jobs, 416 would be direct (353 military and 63 civilian) and 156 secondary. The number of local hires is estimated at 174. Total program-related jobs would not exceed 0.4 percent of the total baseline jobs in the ROI in any given year.

Given the large number of people living in the ROI, approximately 600 new jobs would not have a noticeable effect on the unemployment situation in the ROI. Therefore, through both the construction and operations phases, the with-program and without-program unemployment rate would be almost identical.

Table 4.3.1-1

Selected Socioeconomic Indicators, Peacekeeper Rail Garrison Program
Barkdale AFB, Louisiana, 1990-1993
Proposed Action

	1990	1991	1992	1993[1]
Region of Influence				
Employment (Jobs)				
Total Program-Related Jobs	454	801	756	572
Direct Jobs	211	406	505	416
Civilian	205	296	150	63
Military	6	110	355	353
Secondary Jobs	243	395	251	156
Local Hires	381	580	325	174
Program-Related Spending (000s 86$)	$9,254	$15,484	$10,714	$7,021
Personal Income (000s 86$)				
Direct	$5,168	$9,285	$9,845	$7,655
Secondary	5,638	9,105	5,535	3,372
Total Personal Income	$10,806	$18,390	$15,379	$11,027
Bossier City				
Population				
Baseline Population	61,501	62,849	64,226	65,635
Program-Related Change	111	395	854	803
Change as % of Baseline	0.2	0.6	1.3	1.2
Housing Demand				
Temporary Units	12	19	15	10
Permanent Units	31	109	226	211
Total Units	43	128	241	221
School District Enrollment				
Elementary	8	32	74	71
Secondary	6	27	61	58
Total Enrollment	14	59	135	129
Shreveport				
Population				
Baseline Population	240,409	243,011	245,640	248,298
Program-Related Change	67	164	262	231
Change as % of Baseline	0.0	0.1	0.1	0.1
Housing Demand				
Temporary Units	8	11	6	3
Permanent Units	18	48	77	68
Total Units	26	59	83	71
School District Enrollment				
Elementary	1	5	23	20
Secondary	1	3	18	17
Total Enrollment	2	8	41	37

Note: [1]Program-related effects would continue at these levels throughout the life of the program.

The Proposed Action would generate personal income (in 1986 dollars) of $10.8 million in 1990, $18.4 million in 1991, and $15.4 million in 1992 in the ROI. During the operations phase (1993 and thereafter), personal income would stabilize at $11.0 million. Bossier Parish's share of that personal income would range from $3.7 million in 1990, to $7.4 million in 1991, to $9.0 million in 1992, and then stabilize at $7.5 million during the operations phase. Program-related spending including personal consumption expenditures would range from $9.2 million in 1990 to $15.5 million in 1991 to $10.7 million in 1992, and then stabilize at $7.0 million during the operations phase in the ROI.

Population and Demographics. The population increase associated with the Proposed Action's effect on population in the ROI would range from 179 in 1990 to 558 in 1991, and to 1,117 in 1992. During the operations phase, the population inmigration would be 1,035. Most of this inmigration would affect Bossier Parish. Of the total, Bossier Parish's share would range from 111 in 1990 to 854 in 1992, and then stabilize at 803 during operations. Bossier Parish's population increase would range from 0.1 to 0.8 percent of the total baseline population. The corresponding percentage in the ROI would range from 0.1 to 0.2 percent. Five to 18 weekly commuters would commute to work in Bossier City during the construction phase only.

Population inmigration into Bossier Parish would peak at 854 in 1992. This is an increase of less than one percent in the total population of the parish for that year. The operations-phase inmigration would level off at 803 beginning in 1993 and would account for a 0.7-percent increase in the total population.

The percentage increases in population as measured against the baseline population of Bossier City (whose boundaries include the base) would be 1.3 percent in the peak inmigration year (1992) and 1.2 percent in 1993. Military personnel and their dependents would account for 23 percent of the population in Bossier City in 1993. Approximately 230 persons, representing one-tenth of one percent of the baseline population, would be moving into Shreveport, Caddo Parish during operations.

Housing. Most program-related households would be housed in privately owned permanent housing units and temporary facilities in Bossier City. Some additional program-related households would likely elect to live in Shreveport. However, the effect of these new households on the housing market in Shreveport would be minimal. The remaining individuals (107 NCOs and airmen) would be housed onbase in renovated unaccompanied enlisted personnel housing facilities.

The offbase program-related demand for housing is expected to begin in 1990. In this year, about 30 permanent units (2.9% of available vacancies) and 10 temporary facilities (less than 1% of available vacancies) would be required in Bossier City. The peak demand for temporary facilities would occur in 1991. This short-duration demand would be for about 20 facilities (1.7% of available vacancies) in that year and would fall to the long-duration demand of 10 facilities (less than 1% of available vacancies) by 1993. The peak demand for permanent units would be experienced in 1992. This short-duration demand would be for about 225 units (out of 1,058 available or 21.3%) and would decline to the long-duration demand of 210 units (out of 1,081 available or 19.4%) by the following year (1993). The long-duration vacancy rate would fall from 4.7 to 3.8 percent as a result of the Proposed Action.

The short- and long-duration demand for temporary facilities in Bossier City would not cause a shortage even during periods of peak baseline occupancy. Therefore, the reduction of vacancies is considered to be a beneficial effect of the program. Similarly, the short- and long-duration demands for permanent units would utilize existing vacancies. Therefore, the program-related demand for permanent units would also be beneficial.

Education. Program-related population inmigration is expected to add about 130 additional students to the enrollment in schools governed by the Bossier Parish School Board during the operations phase. These students are expected to be distributed throughout the district; therefore, large concentrations of inmigrating students at selected schools are not likely to occur. The addition of these students to the districts governed by the Bossier Parish School Board is expected to increase elementary level pupil-to-teacher ratios from 21.7-to-1 to 21.9-to-1 during the operations phase. This is still below a weighted average state standard of 23.4-to-1. Thirty students are expected to enroll in schools governed by the Caddo Parish School Board. Increased enrollment in the Caddo Parish School Board would not effect pupil-to-teacher ratios. These increases in class size are not expected to have a measurable effect on educational service levels in the Bossier or Caddo parishes school boards.

Public Services. Program-related increases in population would lead to a 1.2-percent increase in demand for public services provided by Bossier City over baseline levels in 1993. The increased service demands would be experienced by the majority of departments now providing service to area residents. To maintain current service levels, as measured by the city's rate of 8.3 personnel per 1,000 population, the city would need 7 additional personnel by 1993, increasing city employment from a baseline level of 545 to 552. Most of the additional staffing would be needed in the Police, Fire, and Public Works departments. If no additional personnel were hired, the number of personnel per 1,000 population would drop from 8.3 to 8.2. This reduction in the number of personnel per 1,000 population would not result in an appreciable deterioration in the community's current level of public service provision.

Population inmigration into the Shreveport area and Caddo Parish would result in increases in service demands of less than one percent, which existing staff and facilities should be able to accommodate with no reduction in service levels.

Public Finance. Program-related increases in city and parish expenditures would be limited to outlays for additional personnel as required. Bossier City expenditures would be approximately $130,000 during the peak year (1992) and $120,000 during the operations phase. These increases would represent a less than 1-percent increase over projected baseline levels. With reserve funding levels of $1.8 million and additional revenues from sales taxes and miscellaneous charges, fines, and fees, existing revenue sources should be able to meet these expected outlays. In Bossier Parish, existing staff and facilities would be able to accommodate the additional service demands, and expenditure impacts would be inappreciable.

Based on an average per pupil cost of $2,300, program-related school district expenditure increases would amount to $310,000 in 1992 and decline to $300,000 during the operations phase. These increases would represent a less than 1-percent increase over projected baseline levels. Temporary revenue shortfalls (approximately $120,000 in 1992) could occur as state foundation program monies lag behind the additional enrollment. Reserve funding levels of approximately $9.1 million would be adequate to cover potential shortfalls.

Summary of Impacts. Both short- and long-duration socioeconomic impacts would be low because program-related population inmigration into Bossier City and the attendant increases in housing demand, public services, school enrollments, and public expenditures only represent a 1.3-percent increase over baseline levels in 1992 and a 1.2-percent increase during the operations phase. Impacts would not be significant because the demand for community housing could be filled by available vacancies, existing educational facilities could absorb program-related enrollment increases, no new public service facilities would need to be constructed, and existing revenue sources of the jurisdictions are adequate to meet potential shortfalls. Short- and long-duration beneficial effects would be experienced by hotel/motel operators and residential property owners.

4.3.1.4 Impacts of the Alternative Action

Impacts of the Alternative Action on employment, personal income, housing demand, and school district enrollments are presented in Table 4.3.1-2.

Employment and Income. Impacts of the Alternative Action on employment and income in the ROI would be greater than those of the Proposed Action. During the construction phase, the Alternative Action would create new jobs ranging from 489 in 1990 to 862 in 1991, which is 35 to 61 more jobs than created by the Proposed Action. Of the 862 new jobs during the peak construction year (1991), 442 would be direct (321 civilian and 121 military) and 420 would be secondary. The number of local hires would be 619, which is 39 more than for the Proposed Action. During the operations phase, new jobs created by the Alternative Action would number 631, which is 59 more than created by the Proposed Action. Of these 631 new jobs, 459 would be direct (69 civilian and 390 military) and 172 would be secondary. Local hires would number 192 or 18 more than local hires for the Proposed Action.

During the construction phase, the Alternative Action would generate personal income (in 1986 dollars) ranging from $11.6 million in 1990 to $19.8 million in 1991 in the ROI, $0.8 million to $1.4 million more than generated by the Proposed Action. Bossier Parish's share of that personal income would range from $4.0 million in 1990 to $8.0 million in 1991. During operations, the Alternative Action would generate $12.2 million in personal income for the ROI and $8.3 million of that would go to Bossier Parish. In the ROI, the program-related spending would range from $9.9 million in 1990 to $16.6 million in 1991, and then stabilize at $7.7 million during the operations phase.

Population and Demographics. The population increase associated with the Alternative Action in the ROI would range from 193 in 1990 to 1,227 in 1992, which is 14 to 110 more than the Proposed Action. During the operations phase, total inmigrants to the ROI would number 1,143, which is 108 more than the Proposed Action. During the construction phase, Bossier Parish's share of the inmigration would range from 120 in 1990 to 939 in 1992. Of the 1,143 total inmigrants during operations, 887 would move to Bossier Parish. The additional population would have almost no effect on the percentage change of the total baseline population of the ROI or Bossier Parish as calculated for the Proposed Action. The Alternative Action would add another 5 to 25 persons to the population of Caddo Parish. The proportional share of military personnel and their dependents in the Bossier City population would be 23 percent in 1993. The inmigration-related increase in population as measured against the baseline population of Bossier City (whose boundaries include the base) would be 1.5 percent in the peak inmigration year (1992) and 1.4 percent in 1993 and thereafter, and of Shreveport would be one-tenth of 1 percent both in 1992 and in 1993 and thereafter.

Housing. The Alternative Action would not change the expected program-related occupancy patterns within Bossier City and Shreveport. An additional 11 unaccompanied military personnel would live onbase in renovated unaccompanied enlisted personnel housing facilities.

The initial demand for housing in Bossier City would increase by about five permanent units in 1990. The additional workers would not change demand for temporary facilities appreciably after 1990, but would require about an additional 25 permanent units in 1992, reducing available vacancies by a total of 24.7 percent. The operational demand for permanent units would increase by about 20 units and would reduce available vacancies by a total of 21.3 percent. The long-duration available vacancy rate would fall from 4.7 percent to 3.7 percent as a result of the Alternative Action.

Because these additional housing demands would not be large enough to cause shortages they would have the generally beneficial effect of reducing vacancies.

Table 4.3.1-2

Selected Socioeconomic Indicators, Peacekeeper Rail Garrison Program
Barkdales AFB, Louisiana, 1990-1993
Alternative Action

	1990	1991	1992	1993[1]
Region of Influence				
Employment (Jobs)				
Total Program-Related Jobs	489	862	816	631
Direct Jobs	230	442	549	459
Civilian	224	321	157	69
Military	6	121	392	390
Secondary Jobs	259	420	267	172
Local Hires	409	619	343	192
Program-Related Spending (000s 86$)	$9,902	$16,554	$11,448	$7,737
Personal Income (000s 86$)				
Direct	$5,634	$10,125	$10,662	$8,443
Secondary	5,997	9,682	5,884	3,714
Total Personal Income	$11,631	$19,807	$16,546	$12,157
Bossier City				
Population				
Baseline Population	61,501	62,849	64,226	65,635
Program-Related Change	120	432	939	887
Change as % of Baseline	0.2	0.7	1.5	1.4
Housing Demand				
Temporary Units	13	20	17	12
Permanent Units	34	119	249	233
Total Units	47	139	266	245
School District Enrollment				
Elementary	9	36	82	78
Secondary	7	29	67	64
Total Enrollment	16	65	149	142
Shreveport				
Population				
Baseline Population	240,409	243,011	245,640	248,298
Program-Related Change	72	180	287	255
Change as % of Baseline	0.0	0.1	0.1	0.1
Housing Demand				
Temporary Units	8	11	7	3
Permanent Units	19	53	84	76
Total Units	27	64	91	79
School Distric Enrollment				
Elementary	5	15	25	22
Secondary	5	12	21	19
Total Enrollment	10	27	46	41

Note: [1]Program-related effects would continue at these levels throughout the life of the program.

Education. The Alternative Action would lead to an additional 15 students over those levels identified for the Proposed Action. Dispersed throughout Bossier Parish, these additional students would have an inappreciable effect on the community's ability to provide educational services. Pupil-to-teacher ratios would be the same as those reported for the Proposed Action for both Bossier Parish and Shreveport.

Public Services. The increased population inmigration in Bossier Parish with this alternative would result in slightly higher service demands in Bossier City (a 1.5% increase compared to 1.3% with the Proposed Action in the peak year [1992], and a 1.4% increase compared to 1.2% for the Proposed Action during the operations phase). These increases would not require a measurable increase in city or county personnel levels over what is projected for the Proposed Action. The number of personnel per 1,000 population would remain the same as for the Proposed Action. Increases in service demands in Bossier Parish, Caddo Parish, and the City of Shreveport would remain below one percent.

Public Finance. Because public service staffing levels would remain essentially unchanged for this alternative, expenditure increases would not vary from levels estimated for the Proposed Action. The slightly higher population may result in slightly higher revenues from sources such as fines, fees, and charges for services, but these amounts would be inappreciable.

Summary of Impacts. The short- and long-duration socioeconomic impacts of the Alternative Action would be low because population inmigration into Bossier City and the attendant increases in housing demand, public services, school enrollments, and public expenditures would represent only a 1.5-percent increase over baseline levels in 1992 and a 1.4-percent increase in 1993. Impacts would remain not significant because demand for housing could be met through available vacancies, no new school or public service facilities would be required, and existing revenue sources of the jurisdictions would be adequate to meet potential shortfalls.

4.3.2 UTILITIES

4.3.2.1 Region of Influence

The utilities ROI for Barksdale AFB includes the host communities of Bossier City and Shreveport, and the base.

4.3.2.2 Existing and Future Baseline Conditions

Potable Water Treatment and Distribution. The City of Shreveport supplies potable water to its residents and Barksdale AFB. The raw water is diverted from Cross Lake and Twelve Mile Bayou and treated at two plants with a combined capacity of 71 million gallons per day (MGD). Average daily potable water demand for 1987 equaled 35.04 MGD. Average daily demands are estimated to reach 38 MGD in 1990 and 41 MGD in 1994. Potable water treatment capacity is currently being expanded to 105 MGD. Storage facilities with 30 million gallons (MG) of capacity are available to assist in meeting peak demands.

Potable water treatment for Bossier City is provided by a plant with 20-MGD capacity. In 1987, average daily demands equaled 6.7 MGD. Potable water treatment requirements are expected to increase to 8 MGD in 1990 and 8.7 MGD in 1994. New treatment facilities are under consideration that will assist in meeting future demands.

Barksdale AFB receives potable water through a 16-inch pipeline. The present contract with the city allows for the use of approximately 1.37 MGD. The base's average daily potable water demand is 1.04 MGD or 76 percent of the contracted amount. The base also has a 12-inch interconnection with Bossier City that can be used during emergency

periods. There is potable water storage of 1.4 MG onbase to help with increased summer demands. Current water demands at the base without the program are expected to remain constant.

Wastewater. Wastewater treatment for the City of Shreveport is provided by two activated sludge plants and an oxidation pond. Total treatment capacity is 26.3 MGD. Average daily flows for the past three years equaled 25 MGD. Wastewater flows are estimated to reach 27.3 MGD in 1990 and 30.3 MGD in 1994. A new 7-MGD plant will be constructed by 1990 replacing an existing plant and the pond will be expanded to 1.8-MG capacity. With capacity equaling 33.8 MGD, projected flows will receive adequate treatment.

Wastewater treatment for Bossier City and Barksdale AFB is accomplished at the city's 8-MGD activated sludge plant. The average daily flow for 1986 equaled 5.5 MGD and flows are estimated to increase to 6.2 MGD in 1990 and 6.7 MGD in 1994. The base has a contract with Bossier City for the treatment of a maximum of one MGD. In fiscal year 1987, flows from the base were 0.7 MGD or 70 percent of the contract maximum. Wastewater flows from the base without the program are expected to remain constant in the foreseeable future.

Solid and Hazardous Waste. Solid waste for the City of Shreveport is collected by public and private collectors and 900 tons per day (T/day) are disposed of at a new 435-acre landfill. Bossier City collects approximately 100 T/day of solid waste and disposes of it at the parish landfill. The city and parish are presently involved in plans to develop a new regional solid waste landfill site. Solid waste generation at Barksdale AFB averaged 22.4 T/day in 1987 and is collected by a private contractor. An onbase landfill located adjacent to Musselshell Bayou receives this waste and will be available until 1989 when wastes will go to the regional site.

Onbase hazardous wastes are managed by Barksdale AFB; the Defense Reutilization and Marketing Office (DRMO) is responsible for providing for the proper handling of the wastes and arranging for transport to treatment and disposal facilities. The base stores the wastes in a conforming storage facility located adjacent to the DRMO. The wastes include solvents, batteries and battery acids, oils, paints, thinners, and other regulated materials.

Energy Utilities. Southwestern Electric Power Company provides electricity to Barksdale AFB and to 365,000 customers in portions of Texas, Arkansas, and Louisiana. In 1986, peak demands reached 3,140 megawatts (MW) with the installed system capacity equaling 4,491 MW. Annual sales in 1986 were 8.9 percent less than 1985 as a result of the depressed economy in this region. Peak demands are projected to increase to 3,210 MW in 1990 and to 3,615 MW in 1994. The company has adequate generating capacity to meet these projected demands.

Electric power is supplied to the base through two separate substations. The base consumed 86,565,000 kilowatt-hours in fiscal year 1987 and receives power through two substations that have adequate capacity to handle increased loads.

Arkansas/Louisiana Gas Company supplies natural gas to the region and to Barksdale AFB. Sales equaled 210,213 million cubic feet (MMcf) in 1986 and the company expects sales to increase by 1.5 percent to 2 percent annually. Currently there is a 17-year supply of natural gas and the company is attempting to increase the number of customers it serves. Barksdale AFB consumed 319 MMcf in fiscal year 1987 and owns and maintains the onbase distribution system.

Liquid fuels are delivered to Barksdale AFB by pipeline, rail car, and tanker truck. Diesel fuel storage consists of 29 tanks with a total capacity of 97,000 gallons. In 1987, diesel fuel consumption equaled 343,000 gallons. Gasoline storage consists of 35 tanks

with a capacity of 217,000 gallons. To support the flying missions at the base, 60 tanks, with a storage capacity of 8,580,000 gallons, are devoted to JP-4.

4.3.2.3 Impacts of the Proposed Action

Potable Water Treatment and Distribution. Program-related requirements of 0.09 MGD, including onbase demands, would increase average daily demands in the City of Shreveport by less than one percent. Average daily demands would increase from a baseline level of 39.5 MGD to 39.6 MGD in 1992. The city's treatment facilities, with a capacity of 105 MGD, would be operating at 38 percent and storage would be adequate to meet summer demands. Program-related requirements of 0.1 MGD would increase average daily demands in Bossier City by 1.2 percent from a baseline level of 8.35 MGD to 8.45 MGD in 1992. The city's treatment facilities, with a capacity of 20 MGD, would be operating at 42 percent and storage would be adequate to meet summer demands. Daily requirements at Barksdale AFB would increase by 0.04 MGD or 3.4 percent in the same year. Average daily demands would increase from a baseline level of 1.15 MGD to 1.19 MGD and would be met through the 16-inch interconnection with the city. The existing contract allowing the city 500 MG annually or 1.37 MGD would be adequate.

Wastewater. Average daily flows for the City of Shreveport would increase from a baseline level of 28.7 MGD to 28.8 MGD in 1992 because of a 0.03-MGD or a less than 1-percent program-related increase. The existing treatment plant, with a 34.1-MGD capacity, would be operating at 84 percent and would be able to adequately treat the increased flows. Average daily flows for Bossier City (including onbase flows) would increase from a baseline level of 6.42 MGD to a peak of 6.52 MGD in 1992 because of a 0.1-MGD or 1.6-percent program-related increase. The existing treatment plant, with an 8-MGD capacity, would be operating at 82 percent and would be able to adequately treat the increased flows. Wastewater flows at Barksdale AFB would increase from a baseline level of 0.80 MGD to a peak of 0.83 MGD because of a 0.03-MGD or 3.4-percent program-related increase in 1992. The existing contract with the city limits flows to one MGD. Wastewater flows for the entire base would stabilize at 0.83 MGD which is slightly less than the contract.

Solid and Hazardous Waste. Solid waste generation would increase by 1.8 T/day or less than one percent in Bossier City and Shreveport in 1992. Solid waste generation at Barksdale AFB would increase by 0.47 T/day or two percent in 1992 (peak year). With the city and private haulers already adequately disposing of 421 T/day, the program-related increase would require no additional equipment or personnel. Program-related hazardous waste generation at the base would be incorporated into the existing management system, stored onbase, and then transported to treatment and disposal facilities.

Energy Utilities. Program-related electricity demands would peak in 1992 with an increase of 3.5 MW. This demand would increase the projected peak demand of 3,510 MW for the Southwestern Electric Power Company system by less than one percent. Southwestern's system has adequate power supplies to meet this increase. Electrical requirements at Barksdale AFB would be 2.9 MW or a 17-percent increase at the two existing substations. Adequate capacity is available from these substations to meet the demands. Natural gas consumption would increase from a baseline level of 232,000 MMcf by 37 MMcf or less than one percent. The Arkansas/Louisiana Gas Company has an adequate infrastructure and reserves to meet the new demand. Natural gas use at Barksdale AFB would increase from a projected demand of 333 MMcf to 338 MMcf, or by 1.6 percent. Direct program requirements for diesel fuel would increase the need for diesel fuel supplies at Barksdale AFB. A new fuel storage tank (20,000 gal) would be constructed near the existing vehicle fuel station to support the program. Supplies would continue to be filled by the Defense Fuels Supply Center through contracts with local and regional suppliers.

Summary of Impacts. Utility requirements associated with the Peacekeeper Rail Garrison program would increase demands on Bossier City's and the City of Shreveport's systems by less than two percent in 1992 (peak year). During the operations phase, the increases would be reduced slightly and remain less than two percent. Because the peak year requirements would not be substantially greater than the impacts associated with the operations requirements, all utility impacts would be of long duration. These impacts associated with the demands for utility service in Bossier City and the City of Shreveport would be low because the increases are between one percent and two percent. Impacts would not be significant because each utility system has adequate capacity to meet the new demands without increasing personnel or expanding existing facilities.

4.3.2.4 Impacts of the Alternative Action

Potable Water Treatment and Distribution. With the additional construction associated with six TASs and the operations personnel to support the program, potable water requirements would be 0.1 MGD, which is 0.01 MGD greater than the Proposed Action. Adequate capacity is available from the City of Shreveport's treatment and distribution system to process the additional demand. Program-related requirements of Bossier City's system would increase to 0.11 MGD, which is 0.01 MGD greater than the Proposed Action.

Wastewater. Program-related wastewater flows to Bossier City's treatment plant would peak at 0.11 MGD in 1992, which is 0.01 MGD greater than the flows identified for the Proposed Action. Bossier City has adequate capacity to treat the additional flows, and the force main from the base can transmit the new onbase flows. Wastewater flows to the City of Shreveport's plant would equal those anticipated with the Proposed Action.

Solid and Hazardous Waste. Solid waste generation from the increased construction and operations activities of the Alternative Action would be slightly greater than the Proposed Action. Solid waste generation for both cities would be 0.2 T/day greater during the construction and operations phases. These increases would not adversely affect public or private haulers. Adequate landfill space would continue to be available. Hazardous waste generation would be slightly greater than the Proposed Action as a result of the maintenance activities associated with the additional trains. These wastes would be incorporated into the existing management system and transported to treatment and disposal facilities.

Energy Utilities. Demands for electricity would be 0.73 MW greater for the Alternative Action than the Proposed Action. Southwestern's current generation system and the existing substations have adequate capacity to meet the increased demands. Demands for natural gas would be 2.35 MMcf greater for the Alternative Action than the Proposed Action. The Arkansas/Louisiana Gas Company has an adequate infrastructure and reserves to meet these increased demands. Diesel fuel consumption would be greater than with the Proposed Action. A new fuel storage tank would be constructed near the existing vehicle fuel station to support the program. Supplies would continue to be filled by the Defense Fuels Supply Center through contracts with local and regional suppliers.

Summary of Impacts. Utility requirements associated with the Alternative Action would be slightly greater than those identified for the Proposed Action. Because the peak year requirements would not be substantially greater than the impacts associated with the operations requirements, all utility impacts would be of long duration. These long-duration impacts would be low because the increases on the municipal systems are greater than one percent but less than two percent. Impacts would not be significant because each utility system has adequate capacity to meet the new demands without increasing personnel or expanding existing facilities.

4.3.3 TRANSPORTATION

4.3.3.1 Region of Influence

The ROI for transportation includes the principal city streets within Bossier City, Louisiana and the primary highways leading to Barksdale AFB.

4.3.3.2 Existing and Future Baseline Conditions

The principal city streets in Bossier City consist mostly of sections of the primary highways that pass through the city. The section of U.S. 71, named Barksdale Boulevard, is the most heavily used street south of Interstate 20 and had segments with an average annual daily traffic (AADT) ranging from 22,000 to 23,530 in 1986. The segment of Airline Drive south of Interstate 20 had a 1986 AADT of 18,200 to 20,000. North of Interstate 20, the principal streets include Texas Street (part of U.S. 79/80), which had a 1986 AADT of 7,950 near the old town center and 19,400 toward the Louisiana Downs area; Benton Road (part of Louisiana State Highway 3), which had an AADT ranging between 15,630 and 26,190 south of Interstate 220; and Airline Drive, which had an AADT between 9,900 and 25,620. Interstate 20, within Bossier City, had an AADT ranging between 36,400 and 79,560; and Interstate 220, immediately north of the city, handled between 10,320 and 13,630 vehicles.

Current level of service (LOS) ratings at these principal city streets vary from reasonably free-flowing to almost unstable flow conditions. Barksdale Boulevard and Airline Drive, both located south of Interstate 20 and adjacent to the base, were rated at LOS C during the peak hours in 1986. (Refer to Section 3.4.4 and Table 3.4.4-1 for descriptions of LOS letter scores.) Along Texas Street, between the old town center and the Louisiana Downs area, LOS varies from A to C; and along Benton Road, LOS varies from B to D. The section of Airline Drive north of Interstate 20 provided service at LOS A to D during the peak hours in 1986. Along Interstate 20, LOS varies from B to E; and along Interstate 220, the LOS was rated at A. Based on population projections for the city, traffic volumes on these principal streets are expected to increase and the resulting LOS ratings would drop by one level by 1994. Barksdale Boulevard, near the main entrance to the base, would be at LOS D. The most critical sections are Benton Road and Airline Drive which could almost reach capacity by 1994.

Primary access to Barksdale AFB is provided by Interstate 20 and U.S. 71, which pass immediately north and west of the base, respectively. The main gate, also referred to as the west gate, is located at Barksdale Boulevard. The base has two other gates: the north gate at Davis Avenue and the south gate at First Street South. Traffic flow along the main gate and the north gate is heavy only during the morning and evening peak hours when short delays and queues occur. The Planning Assistance Team Study conducted for Barksdale AFB in 1985 recommended the construction of a major base access gate to be located at the base boundary on Bodcau Road. Barksdale AFB is expected to experience increased facility development and activity to the north and east of the main base area in the near future. This proposed Bodcau Road gate entrance would require the provision of an access/service road along Interstate 20 or to suitable exits/entrances to the major highway system.

4.3.3.3 Impacts of the Proposed Action

During the construction phase, an increase in incoming vehicular traffic would occur as a result of the movement of construction workers, materials, and equipment. Construction activities would add an estimated 505 program-related personnel during the peak employment year (1992). Of these, 244 program-related employees would reside in the Bossier City area and commute daily to the base. They would generate an additional 221 passenger vehicle trips to the base during the peak hours. This increase in traffic would add to the delays and queues at the main gate to Barksdale AFB. Additional

heavy-vehicle trips to the base would also increase traffic volumes at the main gate. However, these movements could occur during off-peak hours and would not cause additional delays at the main gate during the rush hours. Program-related commuters would cause additional delays and congestion along Barksdale Boulevard and Airline Drive, but without reducing their LOS ratings of D and C, respectively. Increased queues and waiting times at the gates would also occur.

During the operations phase, an estimated 222 out of 416 program-related employees would reside in the Bossier City area. They are expected to generate 202 passenger vehicle trips to the base and would cause a slight increase in congestion and delays along Barksdale Boulevard and Airline Drive but without reducing their LOS ratings of D and C, respectively. Increased queues and waiting times would also occur at the entrance gates. In addition, occasional program-related deliveries of supplies and equipment could increase traffic volumes at the gates. However, deliveries are expected to occur during off-peak hours and could use other access routes to the base.

Interruptions to vehicular flow along the private road where the connector spur crosses would also occur. The trains would only move out of the garrison when either major maintenance or repair necessitates that they be transported to the Main Operating Base or depot facilities, or when directed to disperse during times of national need. In addition, a training train would travel periodically to the garrison installation to accomplish operations, security, and maintenance training. These train interruptions at railroad/road crossings would not cause substantial delays to vehicular traffic. Moreover, these train interruptions would only occur occasionally.

Both short- and long-duration impacts on transportation would be low because the additional vehicular traffic generated by program-related commuting along Barksdale Boulevard and Airline Drive would not reduce their LOS ratings of D and C. Increased queues and waiting times at the main gate would also occur. Impacts would be significant because traffic flow would further degrade at substandard level D.

Mitigation Measures. The following mitigation measures could be undertaken to reduce or eliminate program impacts on transportation. For each measure, the agencies that may be involved in implementation are identified.

- Schedule work hours for program-related employees and movement of construction vehicles and equipment to avoid commuting during normal traffic peak hours, and encourage ride sharing. This mitigation would be effective in controlling peak-hour traffic flow increases and therefore reduce congestion and delay without additional cost to the Air Force and its contractors (U.S. Air Force and its contractors).

- Encourage the use of the north gate to divert some trips to the base from the main gate at Barksdale Boulevard. This mitigation would be effective in reducing the congestion at Barksdale Boulevard and at the main gate. (U.S. Air Force).

If these measures are undertaken, transportation impacts would become negligible because commuting by program employees would not affect the LOS ratings of roads leading to the base.

4.3.3.4 Impacts of the Alternative Action

Compared to the Proposed Action (4 Train Alert Shelters [TASs]), the Alternative Action (6 TASs) would require slightly more program-related personnel. An estimated 549 program-related personnel would inmigrate to the area during the peak employment year (1992). Of these employees, 268 are expected to reside in the Bossier City area. They are estimated to generate 244 passenger vehicle trips to the base during the peak

hours. They would also increase delays and queues at the entrance gate as with the Proposed Action. The increased delays along Barksdale Boulevard would not reduce its LOS rating of D.

During the operations phase, an estimated 245 out of 459 program-related personnel would reside in the Bossier City area. They are expected to add 223 passenger vehicle trips (21 more than that for the Proposed Action) to the base during the peak hours and would cause additional delays and congestion along Barksdale Boulevard and at the main gate. Peacekeeper and training train impacts on vehicular traffic at road crossings would be about the same as those associated with the Proposed Action.

Commuting associated with the Alternative Action would be slightly greater than with the Proposed Action. However, both short- and long-duration impacts on transportation would still be low because the LOS rating along Barksdale Boulevard and Airline Drive would not be reduced from level D and C, respectively. Impacts would be significant because traffic flow along Barksdale Boulevard would further degrade at substandard level D.

Mitigation Measures. The same mitigation measures identified for the Proposed Action could be undertaken to reduce or eliminate program impacts of the Alternative Action on transportation. If these measures are implemented, impacts on roads would become negligible because commuting by program employees would not affect the LOS ratings of roads leading to the base.

4.3.4 LAND USE

4.3.4.1 Region of Influence

The land use ROI includes Barksdale AFB, adjacent private lands located north and south of the affected areas of the base, and a connector rail spur corridor approximately 0.9 mile long offbase. The connector spur corridor would be located on private land and extends northward from the base to the main line of the Midsouth Railroad.

4.3.4.2 Existing and Future Baseline Conditions

Barksdale AFB is located on the eastern limits of Bossier City which has adopted a zoning ordinance, but has not adopted a comprehensive plan. The area north of the base is zoned for industrial uses. Private land south of the Barksdale AFB runway has a 2,000-foot-wide airport zone (A-1) adopted by Bossier Parish in order to protect the southern runway approach of the base.

Figure 4.3.4-1 presents a generalized overview of land use onbase and in the surrounding area. The primary land uses are agriculture, military, and silviculture (the commercial raising of trees). Residential and public land uses are located south and west of the base. Agricultural land uses consist of cotton, soybeans, and grain sorghum farming in crop rotation; truck farming (vegetables); improved pasture; and unimproved pasture. None of the cropland is irrigated, and the soils are not designated as prime or unique farmland. Silvicultural land uses occur within Barksdale AFB. The onbase timber resources are hardwood trees with average ages of 30 years to 60 years which the Air Force manages under its adopted Forest Management Plan. This management program is considered an interim land use until another Air Force mission requires the use of the land.

The residential and public uses in the ROI are concentrated southwest of the base. They consist of medium-density residential subdivisions and the Mike Woods Memorial Park, which contains recreation facilities including tennis courts, a swimming pool, a covered picnic area, and three children's playgrounds. There are no inhabited buildings located in the area of the proposed connector spur north of the base, with only one abandoned farm complex with two abandoned single-family residences. In addition, the ROI north of the

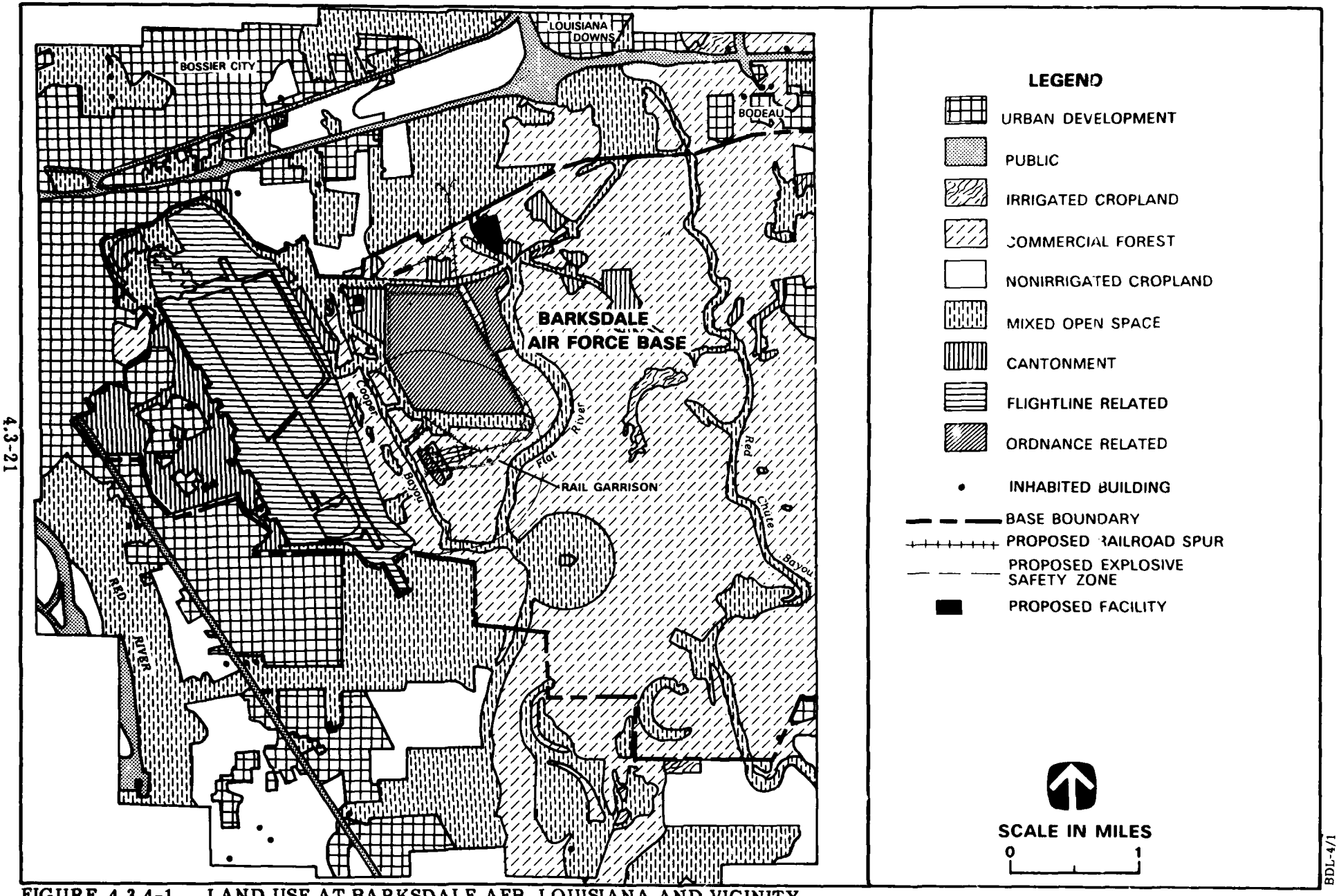


FIGURE 4.3.4-1 LAND USE AT BARKSDALE AFB, LOUISIANA AND VICINITY

base contains a low-voltage electrical distribution line and an unimproved single-lane private road.

The visual attributes of the ROI are typical of the West Gulf Coastal Plain section of the Coastal Plain Physiographic Province. Most native vegetation has been removed and replaced with cropland and pasture, or is urbanized. Landscape forms are undulating to flat and lines are horizontal and curving. Colors are mostly green and gold with darkbrowns in winter. Textures are smooth to medium and well ordered. Existing onbase structures are very low on the horizon (where visible) as viewed toward the south from Interstate 20 (AADT 45,400), which is one key observation point for the base. Another key observation point is the Mike Woods Memorial Park on the southwestern boundary of the base. A water tower and power poles are the most obvious structures. There are a number of box-like offbase industrial structures located between Interstate 20 and the Midsouth Railroad line north of the base, but no residences. For the most part, Interstate 20 is slightly elevated where it parallels the north base boundary in a generally east-west direction.

4.3.4.3 Impacts of the Proposed Action

The proposed site of the garrison and explosive safety zone would be located entirely within the west-central portion of Barksdale AFB, and no offbase inhabited buildings would need to be relocated. The proposed program would require the permanent removal of approximately 240 acres of onbase commercial hardwood forest, with timber approximately 30 years to 60 years old. The 0.9-mile connector spur would require acquisition of approximately 16 acres of nonirrigated improved pasture, and its location would be compatible with the industrial zoning in the area. Construction of Rail Garrison facilities would require relocation of the existing grenade range.

The TASs at Barksdale AFB are proposed to be located about 14,000 feet southeast of Interstate 20 (a key observation point for the base), and the Training Train Shelter (TTS) would be located about 6,000 feet from that highway. The TASs would also be located about 6,000 feet from the Mike Woods Memorial Park. The proposed new rail spur and wye would be located about 2,500 feet southeast of Interstate 20, but because of intervening structures and vegetation, could not be seen from that highway. For these reasons, the program facilities would not be noticeable to highway users or users of the Mike Woods Memorial Park.

Summary of Impacts. The proposed connector spur would remove about 16 acres of nonirrigated improved pasture. This is about 0.02 percent of the Bossier Parish inventory of nonirrigated cropland. No fee land other than for the connector spur would be required, and no offbase inhabited buildings would be located within the explosive safety zone. Because of the distance between the TASs and key observation points, and because intervening vegetation would block the views, none of the program's facilities would be noticeable to users of Interstate 20 or to offbase residential or recreation areas. As a result of these conditions, short- and long-duration program impacts on land use at Barksdale AFB would be negligible.

4.3.4.4 Impacts of the Alternative Action

Impacts of the Alternative Action at Barksdale AFB would be about the same as for the Proposed Action except that the garrison would require the removal of about 275 acres of onbase commercial hardwood forest. The short- and long-duration impacts of the Alternative Action on land use would remain negligible.

4.3.5 CULTURAL RESOURCES

4.3.5.1 Region of Influence

The Big Bend region of the Red River in northeast Texas and southwest Arkansas, and the alluvial floodplain, adjacent bluffs, and ephemeral lakes along the periphery of the Red River in northwest Louisiana constitute the ROI for Barksdale AFB. On the north, the ROI boundary extends along the Red River floodplain to the Arkansas/Texas state boundary. On the east, the boundary is a line running along the Coushatta, Loggy, and Dorcheat bayous. and Bodcau Creek north to the junction with the Red River floodplain in Arkansas. The southern boundary is the confluence of the Coushatta Bayou with the Red River, and the western boundary is a line through Bayou Pierre, west of Shreveport, running diagonally northwest to the Red River. The area encompassed by the Big Bend region of the Red River, its floodplain, and peripheral lakes in northwest Louisiana provides sufficient comparable data to evaluate the cultural resources of Barksdale AFB.

4.3.5.2 Existing and Future Baseline Conditions

Prehistoric Resources. Cultural resources in the ROI date from 10,000 B.C. to the twentieth century. The Paleoindian period is represented in the area by projectile points on older land surfaces which may date as early as 10,000 B.C. In Caddo and Bossier parishes, there are at least 12 previously recorded major Paleoindian sites. The transition between the Paleoindian and Archaic is particularly well documented in the ROI by the San Patrice Complex, generally dated from 8000 to 6000 B.C. The most well-known sites of this period in northwest Louisiana are the John Pearce site and the Springridge site located approximately 20 miles and 30 miles southwest of the base, respectively. The San Patrice type site is approximately 50 miles south of the base. San Patrice sites occur on upland terrace margins overlooking rivers and lakes, and along small stream tributaries to major valleys.

The Archaic period (6000 to 2000 B.C.) is interpreted as a time of increasing exploitation of riparian resources such as fish, shellfish, and reptiles. Concentrations of Archaic sites, mainly small seasonal camps, occur in the ROI; some of these are buried under alluvial fill at depths of 4 feet to 32 feet. A gradual transition from the Archaic hunters and gatherers to ceramic-producing horticulturalists occurred at about 2000 B.C. The horticulturalists constructed villages and elaborate burials in conical mounds. A succession of cultural groups producing site complexes with ceremonial centers and outlying hamlets occurred from approximately A.D. 1 until the Caddo period at about A.D. 800.

Remains of the height of Caddo culture (A.D. 800 to 1540), one of the major cultural complexes in North America, are concentrated in northwestern Louisiana, northeastern Texas, southeastern Oklahoma, and southwestern Arkansas. The Caddo was an advanced culture characterized by an extensive trade network and a series of traits such as ceremonial architecture and maize (corn) agriculture, attributed by some researchers to contact with Mesoamerica. The ROI is in the heart of the Caddo area, and numerous Caddoan sites have been recorded. They include mounds containing floors of structures and elaborate burials, ceremonial centers, villages, and small farmsteads or hamlets. One Caddo burial was found on the base, and it was estimated to date to approximately A.D. 1000. Within four miles of the base, there are at least 4 mound sites, 2 burial sites, 16 farmsteads, and 1 village, all attributable to Caddo occupations.

These sites have been recorded primarily by avocational archaeologists in the area. Systematic cultural resources surveys have not been conducted on or near the base. No archaeological or prehistoric sites are listed on or considered eligible for the National Register of Historic Places (NRHP) by the Louisiana State Historic Preservation Office in either Caddo or Bossier parishes. Caddo sites are generally located near streams or bayous, and it can be expected that such sites would also be found onbase. The potential

also exists for finding buried prehistoric resources onbase because of its location in an alluvial floodplain.

Historic Resources. Initial Spanish explorers reached the ROI as early as 1541 and found the Caddo living as they had been for hundreds of years. By the time early Spanish missionaries and French traders came into the area in the late 1600s and early 1700s, the Caddo culture was already disintegrating as a result of depopulation from the introduction of European diseases. In 1835, the Caddos ceded their land claims to the United States and moved to east Texas, eventually settling in Oklahoma. In 1836, the Red River became a primary communication and transportation corridor in and through the area, and Shreveport was established. Most historic settlements concentrated along rivers because of the transportation networks and the rich alluvium for crops. Plantations in the area were primarily cotton producers. The City of Shreveport contains 1 National Historic Landmark, 4 historic districts, and 18 individual structures listed on the NRHP.

Barksdale Army Air Field was dedicated in 1933 after the townspeople of Bossier City and Shreveport bought the land and offered it to the government for an air base. Onbase structures are all Colonial Revival style, and many may qualify for the NRHP because of structural integrity, age, historical association, or architectural style. No onbase structures are currently listed on the NRHP.

During base expansion in 1953, the Old Stonewall Cemetery (late 19th century) was relocated offbase. Subsequent construction in the vicinity of its original location disturbed four burials in 1961 and 27 more in 1976. Burials were found in unmarked graves outside the reported cemetery boundaries and the U.S. Army Corps of Engineers (COE) estimates that as many as 150 burials may remain in the area. The COE report recommends that no subsurface construction occur in the cemetery area. Cemeteries do not ordinarily qualify for the NRHP and are not, therefore, considered important historic resources. However, this has been identified as a black pauper cemetery; it could be important because it contains the remains of a socioeconomic group underrepresented in the histories of the period.

Native American Resources. Native Americans who have historic associations with program impact areas are the Caddo, now living in Oklahoma. The Jena Band of Louisiana Choctaw, the closest Native American group to the base in La Salle Parish, Louisiana, have expressed concern about impacts on Native American resources in the ROI. Consultations with these groups have been initiated but sensitive sites or resources have not yet been identified in the vicinity of the base.

Paleontological Resources. Surface and near-surface geology of the base is recent Quaternary alluvium from the Red River and tributaries. The soil is a silt or silty clay and fine sand which could contain Pleistocene fossils. None have been found onbase nor are there any fossil localities near Shreveport in recent Quaternary alluvium. Earlier Eocene and Miocene formations exist away from the alluvial floodplain and may contain marine fossils.

4.3.5.3 Impacts of the Proposed Action

Program impact areas on Barksdale AFB in previously undisturbed areas total 262 acres. This includes the TTS, the TAS, and a portion of the relocated grenade range. In addition, two miles of rail access spurs would be located between the TAS and the base boundary. Offbase, a 12-acre railroad wye and 0.9 mile of proposed rail access spur would be built.

Prehistoric Resources. There is a high probability of affecting prehistoric Caddo sites in areas proposed for relocated facilities and along portions of the proposed rail access spur outside the garrison. Buried prehistoric sites may also be found. Archaeological survey and testing is underway to identify and evaluate resources in proposed program areas.

Historic Resources. Several potentially eligible historic structures onbase are likely to be affected. Building modifications or new construction would occur near buildings 4186 and 5821, the only structures that will be 50 years of age during this program. Construction designs not conforming to the Barksdale AFB Exterior Architectural Plan and Guidelines would cause visual intrusions on the historic context of existing structures. Construction of the proposed unaccompanied enlisted personnel housing could affect burials associated with the Old Stonewall Cemetery.

Native American Resources. Areas of sacred or heritage concern to Native Americans have not been identified near the base, and none are expected to occur in proposed program impact areas.

Paleontological Resources. Paleontological resources in the program area could occur in recent Quaternary alluvial fill. However, no fossils have yet been reported on or near the base.

Summary of Impacts. Long-duration impacts of the Proposed Action at Barksdale AFB on cultural resources are anticipated to be moderate because some important resources which are relatively uncommon in the area are likely to be affected. The significance of impacts has yet to be determined, pending the results of fieldwork in progress. At present, the impacts are not considered significant. No short-duration impacts would result from the Proposed Action. The level of impact may be lower if field studies identify fewer sites than anticipated.

Mitigation Measures. The preferred treatment of prehistoric and historic resources is avoidance and preservation in place, in which case impacts could be eliminated altogether. Designing building modifications in keeping with the French Colonial Revival style prevalent onbase would minimize impacts on potentially eligible structures. If a resource is significant for its scientific research value, implementation of appropriate data recovery measures can result in a finding of no adverse effect.

4.3.5.4 Impacts of the Alternative Action

Prehistoric Resources. For the Alternative Action, impacts on prehistoric resources would occur in the same areas affected by the Proposed Action except that more ground disturbance would occur at the TAS. Extension of the garrison to the southeast would increase the potential for affecting sites along the Flat River.

Historic Resources. The additional ground disturbance resulting from the Alternative Action would not affect any historic resources.

Native American and Paleontological Resources. No additional impacts would occur as a result of the Alternative Action.

Summary of Impacts. Long-duration impacts resulting from the Alternative Action at Barksdale AFB would be similar to the Proposed Action. Some prehistoric habitation sites and historic structures are likely to be affected and impacts are considered to be moderate and not significant. No short-duration impacts would result from the Alternative Action.

Mitigation Measures. Mitigation measures would be the same as for the Proposed Action.

4.3.6 BIOLOGICAL RESOURCES

4.3.6.1 Region of Influence

The ROI for biological resources at Barksdale Air Force Base (AFB) includes the areas where these resources would be directly affected onbase by the construction of new Air Force facilities and offbase by the construction along 0.7 mile of rail spur (Section 4.3,

Figure 4.3-1). Areas of indirect disturbance in the ROI where program-induced impacts may occur are defined as those recreational areas within an approximately 1-hour drivi time of Shreveport, Louisiana, including the Kisatchie National Forest; Lake Bistineau State Park; Black Bayou; Bayou Bodcau; Caddo, Claiborne, Cross, Wallace, and Clear lakes; and the Red River.

4.3.6.2 Existing and Future Baseline Conditions

Biological Habitats. The developed portion of Barksdale AFB is planted in various cultivated grasses, shrubs, and trees. The majority of the base is undeveloped and supports native upland and bottomland forest vegetation (Figure 4.3.6-1). The upland forest is dominated by loblolly and short-leaf pines, and covers 8,300 acres. The bottomland forest supports mixed hardwoods (e.g., Nuttall's oak, overcup oak, water oak, willow oak, cherrybark oak, green ash, hickory, sweetgum, and bald cypress) and covers 8,936 acres. Both forest types are managed by the base and the upland forest is logged. Wetlands occur in much of the bottomland forest onbase. These wetlands were originally seasonal wetlands flooded by the Red River overflow during the spring and winter. Drainage and flood control have altered much of this unique ecosystem. A wetland restoration effort has been in progress since the 1970s, and has restored the original hydrologic conditions in 900 acres of wetlands in the bottomlands along the Red Chute River. In addition to forest and wetlands, there are about 2,500 acres of grassland onbase, including transmitter and receiver sites. On the average, habitat quality is good and supports abundant wildlife. Key wildlife species on Barksdale AFB include deer, wild turkey, quail, squirrel, rabbits, doves, and woodducks. The Flat River and Red Chute Bayou flow through the base and are surrounded by bottomland forest and several oxbow lakes. Flag and Harmon lakes are located in the upland forest and provide recreational opportunities onbase. These lakes and streams support warmwater fisheries including largemouth bass, crappie, bluegill, and catfish. Future baseline conditions onbase are expected to be similar to existing conditions based on current base management plans for the commercial forests on Barksdale AFB.

The remaining ROI includes the City of Shreveport and mixed agricultural and forested lands. There are many recreational opportunities available in the ROI. Aquatic recreational habitats include Bistineau, Bayou Bodcau, Claiborne, Caddo, Cross, and North Toledo Bend lakes; the Flat and Red rivers; and Bayou Bodcau. These habitats support warmwater fisheries and provide areas for other watersports. Upland recreation (e.g., hunting and photography) is also available in state parks, national forests, and private lands. Portions of the Kisatchie National Forest are within short commuting distance from the base. Future baseline conditions in the ROI would be similar to existing conditions based on projections for population increases and increased recreation use in the ROI.

Threatened and Endangered Species. The American alligator occurs onbase as the result of a previous stocking program. This species is relatively abundant in Louisiana, but it is listed as threatened in that state because it is similar in appearance to the endangered crocodile. Taking of alligators is now permitted in some areas as regulated by state and federal wildlife agencies. The endangered red-cockaded woodpecker is found in the region near the base, but has not been observed onbase. Habitat surveys were conducted to determine the presence of suitable habitat for this species. Potential habitat occurs onbase; however, the red-cockaded woodpecker was not observed. The bald eagle has been observed onbase during the winter months. Federally listed, federal-candidate, and state-recognized species in the region are listed in Table 4.3.6-1.

4.3.6.3 Impacts of the Proposed Action

Biological Habitats. Construction of program facilities would result in the disturbance of 362.4 acres of land, 169.6 permanently and 192.8 acres temporarily (Section 4.3, Table 4.3-2). Approximately 98 acres of the total area to be disturbed was disturbed

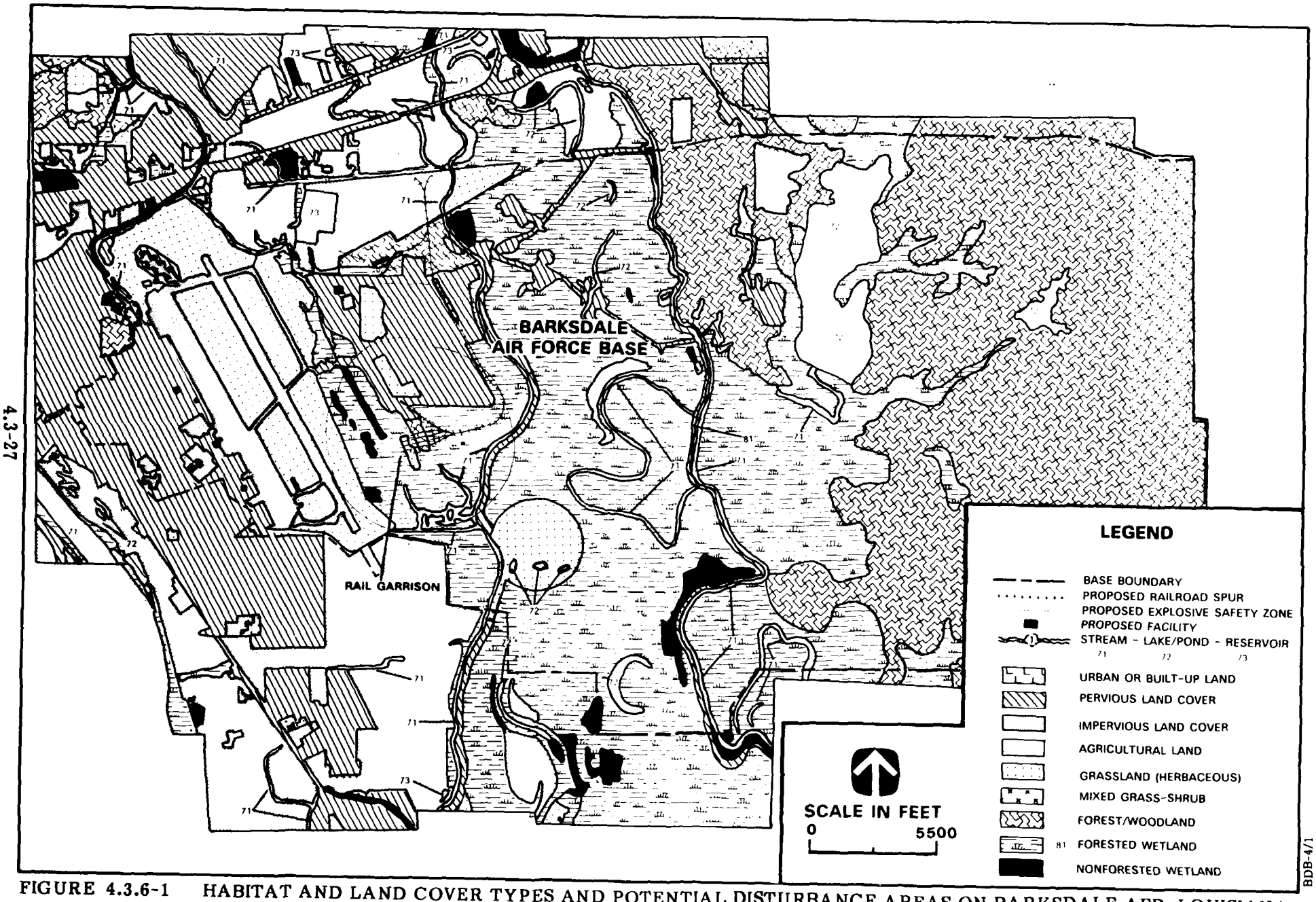


FIGURE 4.3.6-1 HABITAT AND LAND COVER TYPES AND POTENTIAL DISTURBANCE AREAS ON BARKSDALE AFB, LOUISIANA AND IN THE VICINITY

Table 4.3.6-1

Federally Listed, Federal-Candidate, and State-Sensitive Species
Barksdale AFB, Louisiana and Vicinity

Common Name	Scientific Name	Federal Status	State Status	Distribution
American alligator	Alligator mississippiensis	T	--	Aquatic habitats onbase and in the general area
Bald eagle	Haliaeetus leucocephalus	E	--	Occurs onbase during winter months
Flathead snake	Tantilla gracilis	--	S4	Occurs in the area
Red-cockaded woodpecker	Picoides borealis	E	--	Occurs in the area
Western sand darter	Ammocrypta clara	--	S2	Occurs in Red River
White trout-lily	Erythronium albidum	--	S1	Hillside on eastern edge of Flag Lake, Barksdale AFB
Yellow trout-lily	Erythronium rostratum	--	S3	Hillside on eastern edge of Flag Lake, Barksdale AFB

Notes: E = Endangered
T = Threatened by similarity of appearance to American crocodile
S1 = Extremely rare
S2 = Rare
S3 = Uncommon
S4 = Apparently secure in state

Sources: U.S. Fish and Wildlife Service 1984; Louisiana Natural Heritage Program 1988.

during development of other base projects and facilities. Four facilities (the garrison area, a relocated grenade range, the TTS, and the rail spur) are proposed for undeveloped portions of the base. Construction of the rail spur, new roads, garrison and related facilities would fill 188.9 acres of forested wetland habitat (Table 4.3.6-2). The design of the garrison and alignment of the rail spur would minimize the total wetland disturbance at this location within program engineering and safety requirements. Of the 188.9 acres of wetlands affected during program implementation, 13.6 acres of wetlands would be affected by the relocated grenade range. The area of the proposed TTS is bottomland forest supporting primarily sugarberry and does not meet the technical criteria defining a wetland. The habitats in the locations of the other three facilities are highly productive and provide excellent habitat for deer, turkey, small game, birds, reptiles, and amphibians. Wildlife populations would experience increased mortality because of this habitat loss. Forest habitat disturbed during construction would not be allowed to recover to predisturbance conditions because of security constraints, and would therefore be permanently lost.

Table 4.3.6-2

Habitat and Land Cover Types Potentially Disturbed by the Peacekeeper Rail Garrison Program at Barksdale AFB, Louisiana

Habitat Type	Garrison, Support, and Relocated Facilities (acres)	Rail Line (acres)	Total (acres)
Proposed Action			
Forested wetland	186.9	2.0	188.9
Grassland	8.3	0.0	8.3
Forest/woodland	59.9	6.9	66.8
Developed land	81.1	17.3	98.4
TOTAL:	336.2	26.2	362.4
Alternative Action			
Forested wetland	192.3	9.5	201.8
Grassland	1.5	0.0	1.5
Forest/woodland	55.2	6.9	62.1
Developed land	92.4	7.8	100.2
TOTAL:	341.4	24.2	365.6

The construction of facilities in wetlands may alter the hydrologic characteristics of the sites by obstructing surface drainage and causing additional ponding or shorter periods of soil saturation in some areas. Therefore, the total area of wetland affected would likely be greater than the amount filled. Runoff from the proposed garrison area may also result in sedimentation in adjacent wetlands and ultimate loss of wetland habitat. These disturbances are not expected to affect fisheries in the Flat and Red Chute rivers.

In compliance with Executive Order No. 11990 and according to requirements of Section 404 of the Clean Water Act, alternative sites were considered for location of program facilities. In order to collocate facilities of the proposed program with existing facilities and meet engineering and operational constraints, it was determined that there is no practicable alternative to the proposed construction of some facilities in wetlands. Furthermore, site-specific program design and construction techniques would include all practicable measures to minimize harm to wetlands.

Program-induced growth for Bossier Parish is expected to be small. Sufficient recreational opportunities exist in the region to ensure that program-induced growth would have only minor effects on biological resources.

Threatened and Endangered Species. The American alligator may occur in the TAS area in low population densities. Loss of wetland habitats would reduce the habitat available for this species, but is not expected to greatly affect local populations at Barksdale AFB. No impacts on red-cockaded woodpeckers or potential habitat are expected to occur from the Proposed Action.

Summary of Impacts. Recovery from short-duration impacts is expected to occur quickly; therefore, these impacts are expected to be low. Short-duration impacts are not expected to be significant. Long-duration impacts would be high because the program would affect large areas of wetland habitat (188.9 acres), cause associated disturbances in surrounding wetland habitats, affect the American alligator, and result in the degradation of biological communities. Long-duration impacts would be significant because of the ecological importance of the habitat that would be affected.

Mitigation Measures. Implementation of mitigation measures would reduce impacts on biological resources at Barksdale AFB and could, over the long term, help restore the value of habitat onbase to predisturbance conditions. Mitigation measures which could be effective in substantially compensating for significant impacts on wetlands and other sensitive habitats and the agencies responsible for implementation include the following:

- Limit the areal extent of construction disturbance in wetlands and other sensitive habitats to the minimum possible. Operate construction equipment only on roads or within designated disturbance areas (U.S. Air Force and U.S. Army Corps of Engineers [COE]).

- Create new wetlands or enhance existing wetlands to substantially reduce impacts on wetlands onbase. A mitigation plan will be developed which will discuss the methods (e.g., grading, revegetation) to be used in creating new wetlands or enhancing existing wetlands. Development of the mitigation plan will be coordinated with the COE and the U.S. Environmental Protection Agency.

- Implement habitat restoration (other than wetlands) or increase protection of sensitive species or important habitats if offsite mitigation is considered the only feasible means to compensate for impacts on important habitats (U.S. Air Force and COE).

- Build sediment traps where appropriate on drainages flowing away from construction sites to control impacts from increased erosion in the area. A sediment retention basin should be constructed at the garrison to prevent offsite movement of large amounts of eroded soil. Alternately, drainage from the garrison could be routed through the adjacent wetland which would effectively trap much of the sediment prior to reaching the nearby Flat River (U.S. Air Force and COE).

- Build railroad and road embankments at less than the normal angle of repose for the soil type involved. This would minimize long-term erosion and sedimentation (U.S. Corps of Engineers and participating railroad companies).

4.3.6.4 Impacts of the Alternative Action

The Alternative Action would result in the loss of 201.8 acres of wetland habitat onbase because of expanded construction for the TAS. The additional wetland habitat is of higher quality than the forested wetland that would be affected by the Proposed Action because its soils are saturated for longer periods of time, it supports more obligate wetland tree species (e.g., overcup and Nuttall's oaks), and the community structure is more indicative of a forested wetland for this region (i.e., with respect to overstory and understory vegetation and more balanced distribution of young and old wetland indicator species). Impacts for the Alternative Action would be about the same as the Proposed Action: short-duration impacts would be low and not significant; long-duration impacts would be high and significant. The mitigations measures for the Alternative Action would be the same as for the Alternative Action.

4.3.7 WATER RESOURCES

4.3.7.1 Region of Influence

The ROI for Barksdale AFB is located in the Red River Basin. The boundaries of the ROI are the northern limits of Bossier City and Interstate 20 on the north, Clark Bayou on the east, Louisiana State Highways 526 and 527 on the south, and Cross Lake on the west (Figure 4.3.7-1). It includes the base and the support communities of Bossier City and Shreveport. The ROI covers a total of 220 square miles.

4.3.7.2 Existing and Future Baseline Conditions

Major Water Users. Total water use in Caddo and Bossier parishes (excluding water nonconsumptively used for power plant cooling) was 59,000 acre-feet (acre-ft) in 1985. Total municipal use was 50,000 acre-ft or 85 percent of the total. The cities of Shreveport and Bossier City accounted for most of this use (Figure 4.3.7-1). Agricultural and rural domestic uses each accounted for about five percent. Barksdale AFB receives its water from Shreveport. Bossier City has long-range plans to divert water from Cypress Reservoir, ten miles to the north, to meet future water needs. The water supplies in the ROI are adequate to meet future baseline needs.

Surface Water Hydrology and Quality. The principal hydrologic feature in the ROI is the Red River. It flows just west of Barksdale AFB, dividing the cities of Shreveport and Bossier City (Figure 4.3.7-1). East of the Red River, the ROI is drained by the Flat River and Red Chute Bayou. The eastern portion of Barksdale AFB drains into Clarke Bayou. The streams which lie east of the Red River eventually join Loggy Bayou, which empties into the Red River 30 miles southeast of Bossier City. These streams and their tributaries are controlled by an extensive series of impoundments and levees which provide flood protection and water supply to the two cities. Shreveport obtains its water from Cross Lake and Twelve Mile Bayou, located west of the Red River, while Bossier City obtains its water from the Red River, just upstream of the city. During periods of lower flow in both streams, the concentrations of minerals dissolved in the water, such as chloride and sulfate, can exceed U.S. Environmental Protection Agency criteria for maintaining the aesthetics of drinking water supplies. Relatively high turbidity and color are also common water quality problems in many of the streams. Wastewater from Barksdale AFB is treated by the Bossier City treatment plant. Both cities discharge a combined total of 37,000 acre-feet per year (acre-ft/yr) of treated wastewater into the Red River. Most of the base lying between the runway and Red Chute Bayou lies within the 100-year floodplain. Macks and Cooper bayous drain the cantonment area of Barksdale AFB and portions of Bossier City.

Groundwater Hydrology and Quality. Considerable groundwater resources are available in the ROI. The Red River alluvial aquifer covers most of the western half of the ROI and groundwater is generally present within 10 feet to 20 feet of the surface. In the eastern portion of the ROI, the sand and gravel layers of the Terrace Deposits can yield locally large groundwater supplies. Underlying the entire ROI is the Wilcox Group. This aquifer provides water to about half the rural population. Groundwater quality is usually adequate to support potable use. However, excessive mineralization, hardness, and iron concentrations are often encountered. No large-scale declines in groundwater levels have occurred within the ROI in the past several decades.

4.3.7.3 Impacts of the Proposed Action

Major Water Users. Program-related water use in the ROI would peak in 1992 at about 210 acre-ft, declining to about 190 acre-ft/yr through the duration of the operations phase (Table 4.3.7-1). Water use at Barksdale AFB would increase by 40 acre-ft/yr (0.04 million gallon per day [MGD]) or three percent over the baseline use of 1,300 acre-ft/yr (1.2 MGD). The existing water supply agreement between the base and the City of Shreveport provides enough water (up to 1,530 acre-ft/yr) to the base to meet

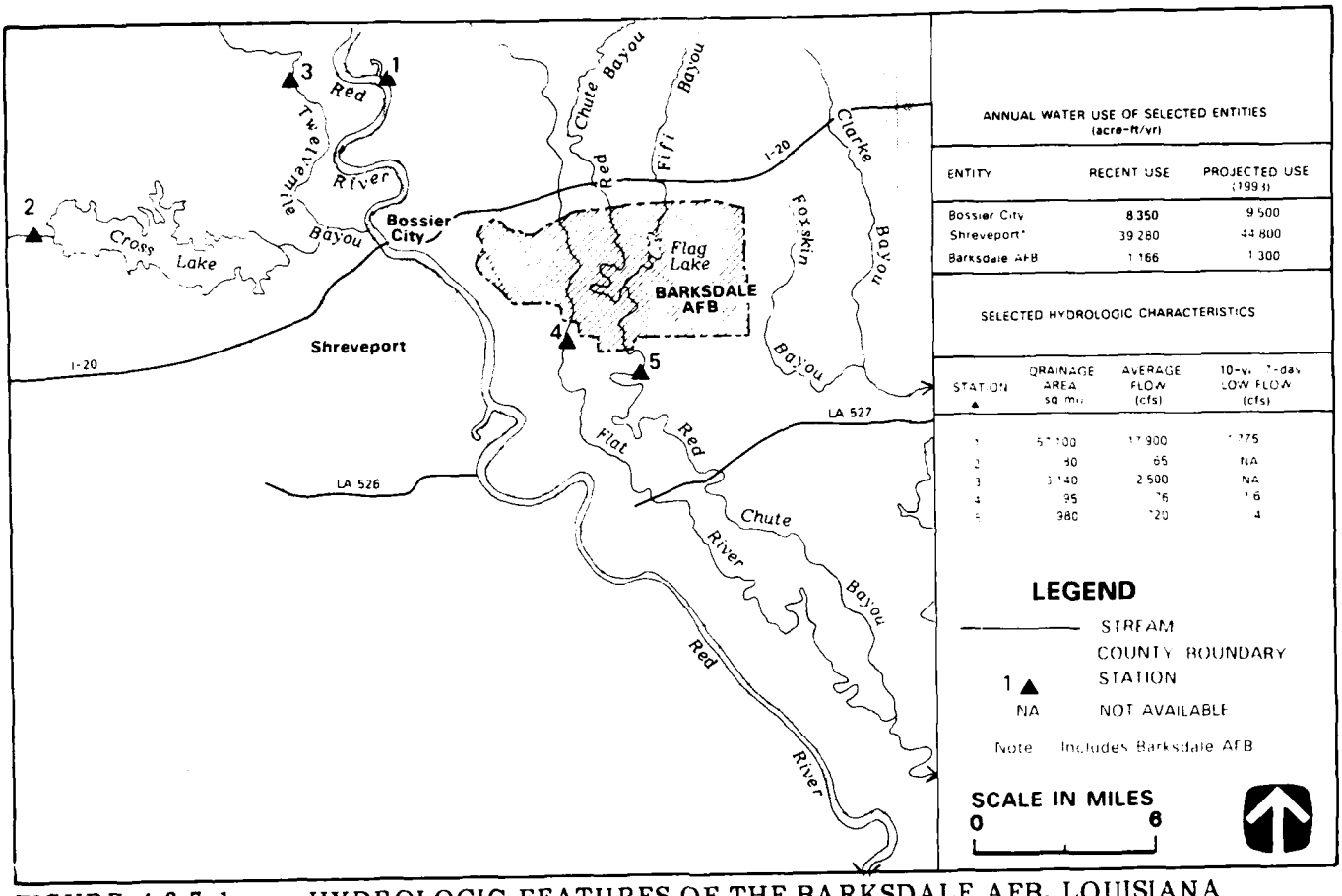


FIGURE 4.3.7-1 HYDROLOGIC FEATURES OF THE BARKSDALE AFB, LOUISIANA REGION OF INFLUENCE

Table 4.3.7-1

Program-Related Water Use
Within the Barksdale AFB Region of Influence
Peacekeeper Rail Garrison Program (Proposed Action)
(values in acre-ft)

	1990	1991	1992	1993 Onwards
Barksdale AFB Construction/Operations	57	50	31	23
Domestic	0	5	17	17
Bossier City Domestic	16	53	110	102
Shreveport Domestic	14	35	56	49
TOTAL:	87	143	214	191

program needs. The remaining 140 acre-ft/yr (0.1 MGD) of program water use, attributable to new inmigrants to the area who would live offbase, would be split between Shreveport and Bossier City. In 1993, municipal water use in Bossier City would increase by one percent over the baseline of 9,500 acre-ft (8.5 MGD). In Shreveport, the baseline water use of 44,800 acre-ft (40.0 MGD) would increase by 0.2 percent. Existing or planned water supply projects will meet each city's water needs through the remainder of this century and can readily meet by program-related water use.

Surface Water Hydrology and Quality. Wastewater leaving Barksdale AFB would increase three percent to four percent. Effluent discharges from the Bossier City wastewater treatment plant, which treats the base's wastewater, would increase by about 120 acre-ft/yr (0.1 MGD), or about one percent over the baseline discharge of about 8,250 acre-ft (7.4 MGD) in 1993. The utilities analysis has shown that there is ample treatment capacity to handle this small increase in wastewater (Section 4.3.2.3). The combined effluent discharges from Shreveport and Bossier City to the Red River would remain about three percent of the river's 10-year, 7-day low flow of 1,275 cubic feet per second, with or without the program. Therefore, program-related wastewater discharges are not expected to affect the baseline water quality of the Red River.

The garrison site would be constructed on 260 acres immediately south of the existing weapons storage area (WSA), between Cooper Bayou and the Flat River (Section 4.3, Figure 4.3-1). This area would be devegetated and extensive construction activities would occur. In addition, a new 3.1-mile rail spur would be constructed, most of which would lie within 0.25 mile of the Flat River. Several local drainages within the garrison site would be altered or eliminated. Most of the garrison site currently drains directly to the Flat River via a natural channel which empties into the river approximately 0.75 mile to the south. The Flat River is classified as suitable for primary contact recreation and for wildlife habitat. During construction of the garrison, there is the potential for large amounts of sediment to be carried to the river (Section 4.3.8.3). The Flat River is a channelized stream with a high degree of existing turbidity. Its quality is inadequate to support at least one of the designated uses: primary contact recreation. The additional sediment reaching the river from the garrison site would further aggravate this situation during the construction phase. Some of the garrison site runoff may be directed to the lower-most section of Cooper Bayou, just upstream of its confluence with the Flat River.

The proposed garrison site lies within the floodplain of the Flat River. Flood insurance maps place the 100-year flood elevation at the site at approximately 158 feet, several feet above the existing ground level. The new rail spur and the garrison facilities would be evaluated on fill constructed to an elevation of approximately five feet above the 100-year flood elevation. Therefore, new structures built as part of the Proposed Action would not be vulnerable to flood damages. Executive Order 11988 on floodplain management requires that federal agencies avoid siting facilities in floodplains unless no practicable alternatives exist. The garrison site would be a high-security area where access would be greatly restricted and a 24-hour guard would be maintained. Because of the cost and manpower required to maintain this very high level of security, the garrison is proposed to be collocated with an existing high-security area, the WSA, which is also located in the floodplain. Therefore, no practicable alternative garrison site exists. The garrison would be located immediately downstream of the existing levee protecting the WSA. The floodplain is several miles in width and construction of the garrison would not substantially alter the flood characteristics of either the Flat River or Cooper Bayou.

Groundwater Hydrology and Quality. No groundwater aquifer would be materially affected by the program.

Summary of Impacts. Adequate water supplies exist to meet proposed program water needs. During construction, substantial sedimentation to the Flat River would result in short-duration, moderate impacts. Stabilization measures following construction are expected to reduce long-duration impacts to low. None of these impacts would be significant.

4.3.7.4 Impacts of the Alternative Action

Major Water Users. Total program-related water use during the operations phase would be 210 acre-ft/yr, an 11-percent increase over the Proposed Action. However, the percentage increase over total baseline water use at Barksdale AFB, Bossier City, and Shreveport would be about the same as the Proposed Action. The available water supply is adequate to meet the water needs of this alternative with no impact on existing major water users.

Surface Water Hydrology and Quality. With six TASs, the disturbed area at the garrison would remain about the same as with the Proposed Action. Sedimentation to the Flat River should also remain about the same and local surface water impacts are not expected to change from the Proposed Action.

Groundwater Hydrology and Quality. No groundwater impacts are expected as a result of this alternative.

Summary of Impacts. Impacts are expected to remain about the same as for the Proposed Action. Short-duration impacts would be moderate, and long-duration impacts would be low. These impacts would not be significant.

4.3.8 GEOLOGY AND SOILS

4.3.8.1 Region of Influence

The ROI at Barksdale AFB for geology and soils includes the installation and associated program-related areas in the immediate vicinity. The land within a 1-mile radius of the installation and a 1,000-foot-wide corridor along the connecting rail spur were characterized for purposes of establishing the local baseline context. In addition, a regional ROI was established for geologic hazards for the purpose of developing a regional framework for seismicity at the installation.

4.3.8.2 Existing and Future Baseline Conditions

Barksdale AFB lies in the Gulf Coastal Plain Physiographic Province. The topography in the western part of the installation is nearly level, while it is gently sloping to steeply rolling in the east. Surficial deposits of Quaternary alluvium in the west are composed of clay, silt, sand, and local accumulations of gravel. To the east, surficial deposits include the Quaternary Prairie Formation, Tertiary Carrizo Formation, and Tertiary Wilcox Group, which are composed of sand, silt, and silty clay. The installation lies in seismic zone 1 (Uniform Building Code 1985) in which a maximum credible earthquake with a magnitude of 6.1 is the largest predicted for the area. Maximum horizontal acceleration in rock is expected to be less than 0.04 g, with a 90-percent probability of not being exceeded in 50 years (Algermissen et al. 1982). Active faults have not been identified in the local ROI and the area is not susceptible to liquefaction. Areas susceptible to landslides or terrain failure were not discovered in the ROI.

Energy and Mineral Resources. Oil and gas resources have been identified in the ROI but only in the East Reservation of Barksdale AFB. No uranium or coal mines/leases, Known Geothermal Resource Areas, or metallic/nonmetallic mineral resource mining operations or leasing activities exist in the ROI.

Soil Resources. A detailed soil survey of Barksdale AFB has not been completed by the U.S. Soil Conservation Service (SCS). The general soils map has identified 11 soil associations in the ROI. Four soil associations occur in areas where program-related facilities may be located. They occur on level to gently sloping surfaces, have a loamy or clayey texture with some occurrences of sandy or silty textured soils, and are poorly to somewhat poorly drained or moderately to well drained. Soil erosion susceptibility

was evaluated for wind and sheet erosion. Wind erosion of unvegetated/disturbed ground in the ROI is not a major concern of the SCS in Louisiana. However, the prevailing southerly wind direction would make north-south elongated tracts of land susceptible to wind erosion. The proposed garrison, rail spur, and other facilities would be located on soils with a moderate susceptibility to both wind and sheet erosion.

4.3.8.3 Impacts of the Proposed Action

Energy and Mineral Resources. Impacts on energy and mineral resources are not expected because the Sligo Oil and Gas Field occurs on the East Reservation, which would not be affected by the proposed program. No other energy or mineral resources have been identified in the ROI.

Soil Resources. Program-related wind erosion at the proposed garrison, other facilities, and the rail spur is primarily projected to occur at rates of less than 0.1 ton per acre per year (T/ac/yr). This is because regional wind velocities are low and do not substantially influence rates of soil erosion. During garrison construction, soil would erode at a rate of 1.2 T/ac/yr for large exposed areas of a soil type. The application of 1 ton per acre (T/ac) of straw mulch would temporarily reduce this rate to less than 0.1 T/ac/yr. Program-induced sheet erosion at the proposed garrison site is projected to occur at rates of 11.2 T/ac/yr to 20 T/ac/yr. Soils along the rail spur are projected to erode at rates of 11.2 T/ac/yr to 31.2 T/ac/yr and at rates of 31.2 T/ac/yr to 33.9 T/ac/yr at the other proposed facility sites. The application of 1 T/ac of straw mulch after construction would temporarily reduce the rates of erosion to 2.2 T/ac/yr to 6.8 T/ac/yr for all soils affected. The range of soil erosion rates identified for the proposed program (11.2 to 35.1 T/ac/yr) are comparable to those determined for general urban development (16 to 156 T/ac/yr) as supplied by the U.S. Department of Housing and Urban Development (1981).

Soil erosion impacts are based on the combined effects of wind and sheet erosion values and how they compare to the maximum tolerable soil loss for each soil type. Soil erosion rates would exceed the maximum tolerable soil loss (5 T/ac/yr) of the affected soil types during construction. Program-induced soil erosion is therefore expected to cause short-duration impacts. Long-duration impacts are not expected because accelerated rates of erosion would occur for only a short period of time prior to mulching and reestablishing a vegetative cover in the disturbed areas.

Summary of Impacts. Overall short-duration impacts of the proposed program on the geology and soils resource are expected to be high because accelerated rates of erosion during program-related construction would exceed the maximum tolerable soil loss of the soils affected. Long-duration impacts are expected to be negligible because accelerated rates of erosion would not continue into the operations phase of the program. Short-duration impacts would not be significant because increased rates of erosion would not result in an appreciable net loss of topsoil over the short period of time under consideration.

4.3.8.4 Impacts of the Alternative Action

The Alternative Action would slightly increase the size of the garrison. Therefore, impacts on the geology and soils resource would be about the same as for the Proposed Action. Consequently, all levels of impact and significance would be the same as for the Proposed Action. Short-duration impacts would be high and not significant and long-duration impacts would be negligible.

4.3.9 AIR QUALITY

4.3.9.1 Region of Influence

The ROI for the air quality resource includes Barksdale AFB, the cities of Bossier City and Shreveport, and the interstate highways and principal arterials in Bossier and Caddo parishes.

4.3.9.2 Existing and Future Baseline Conditions

Barksdale AFB is located within the Shreveport-Texarkana-Tyler Interstate Air Quality Control Region (No. 022). There are no Prevention of Significant Deterioration Class I areas within 50 miles of the base. Ambient air quality at Barksdale AFB has not been monitored. However, ambient concentrations of specific pollutants have been monitored in Shreveport at the Caddo P.H.U. site, a representative station three miles from Barksdale AFB. The air quality measurements in Shreveport indicate that the maximum 24-hour total suspended particulates (TSP) observation was 100 micrograms per cubic meter ($\mu g/m^3$). The highest annual TSP geometric mean was 44 $\mu g/m^3$; both the 24-hour and annual geometric mean were below the standards. The particulate meter (PM_{10}) levels were monitored at the Caddo P.H.U. site in Shreveport. The maximum recorded 24-hour average was 56 $\mu g/m^3$ and the highest annual arithmetic mean was 29 $\mu g/m^3$, both within the standards. Bossier Parish is classified as attainment for all criteria pollutants except for ozone. The ozone standards have not been violated in Shreveport-Bossier Parish within the last four years. The Louisiana State Department of Environmental Quality is in the process of submitting a request for the redesignation to attainment for ozone. Monitored PM_{10} data for the Shreveport area are below the standards, thereby classifying the city into a Group III PM_{10} category, which is, or is presumed to be, in compliance with the standards. Barksdale AFB is in attainment for all criteria pollutants, except for ozone.

Bossier Parish emissions, consisting of TSP, sulfur oxides (SO_x), nitrogen oxides (NO_x), volatile organic compounds (VOC) (a measure of reactive hydrocarbons), and carbon monoxide (CO), are summarized in Table 4.3.9-1. The parish sources data summarized in Table 4.3.9-1 include all significant pollutants, including but not limited to those from domestic heating, industrial processes, fuel storage and transfer operations, motor vehicle operations, and waste disposal.

Future baseline air quality in this region will be good.

4.3.9.3 Impacts of the Proposed Action

Direct air emissions would result from construction of the rail spur and support facilities and operation of the proposed program at Barksdale AFB. Emission sources associated with construction include light-duty vehicle traffic, diesel trucks, offsite heavy-duty vehicles, diesel construction equipment, and fugitive dust from ground disturbance.

The highest monthly fugitive dust emissions from proposed program construction activity are about 20 tons. Fugitive dust calculations assume a 50-percent reduction as a result of watering the construction sites. All of the fugitive dust emissions at Barksdale AFB were conservatively assumed to be within the 10-micrometer particle size and referenced against the PM_{10} standard for impact analysis. It is expected that actual PM_{10} emissions would be smaller than the emissions calculated under the U.S. Environmental Protection Agency guidelines for TSP.

Construction-related impacts were calculated for 24-hour and annual averaging periods. A program-related increase of 2.0 $\mu g/m^3$, which includes particulates from combustion products, would occur, increasing the 24-hour average background concentration to 58.0 $\mu g/m^3$. The predicted 24-hour fugitive dust and background concentration would not equal or exceed the 24-hour National Ambient Air Quality Standard (NAAQS) of

Table 4.3.9-1

Bossier Parish, Louisiana Air Emissions Inventory, 1987
(tons per year)

Emission Source	TSP	SO_x	NO_x	VOC	CO
Fuel Combustion	226	1,111	1,137	374	1,152
Industrial Process	0	0	0	1,520	0
Solid Waste Disposal	190	6	45	282	887
Air/Water Transportation	30	20	172	259	1,472
Land Transportation	1,348	297	3,509	2,410	12,445
Miscellaneous	5,019	0	7	33	232
TOTAL:	6,813	1,434	4,870	4,878	16,188

Source: U.S. Environmental Protection Agency 1988b.

150 $\mu g/m^3$ (PM_{10}). The annual background concentrations would increase to 30 $\mu g/m^3$, which would not equal or exceed the PM_{10} standard of 50 $\mu g/m^3$. Fugitive dust generated at Barksdale AFB for the peak construction year would have negligible impacts on Bossier Parish air quality.

Overall short- and long-duration air quality impacts would be negligible.

4.3.9.4 Impacts of the Alternative Action

The Alternative Action (6 TASs) would cause a 0.1-percent increase in fugitive dust emissions over those of the Proposed Action. This would result in a total increase of 2.1 $\mu g/m^3$ above existing background concentrations, increasing the 24-hour average ambient concentration to 58.1 $\mu g/m^3$. The Alternative Action impacts would be negligible and would not cause any violation of the NAAQS. Overall short- and long-duration air quality impacts would be negligible.

4.3.10 NOISE

4.3.10.1 Region of Influence

The ROI for the noise resource is broadly defined as part of the proposed program area where program-related noise level increases occur. Specifically, the ROI includes Barksdale AFB, the cities of Bossier City and Shreveport, and the interstate highways and principal arterials in Bossier and Caddo parishes.

4.3.10.2 Existing and Future Baseline Conditions

B-52 bombers, KC-135R tankers, and C-130 cargo aircraft are three of the noisiest types of aircraft at Barksdale AFB. Airfield noise contours at Barksdale AFB are typical of an active jet bomber base. The Barksdale Air Installation Compatible Use Zone (AICUZ) affects an area which is approximately 8 miles wide and 25 miles long, located within Bossier Parish. The noise level expressed as day and night equivalent sound level (L_{dn}) varies from 65 decibels on the A-weighted scale (dBA) to 80 dBA in this area. Residential areas on base and in Bossier City experience noise levels of 65 dBA to 70 dBA (L_{dn}). Other towns within the AICUZ are Brownlee, Bodcau, Eastwood, Elm Grove,

Taylortown, and Curtis. There have been some changes in aircraft operations and procedures at Barksdale AFB, and efforts to further reduce the noise impact from Barksdale AFB aircraft are continually being studied at the base.

In addition to aircraft noise, Bossier City and base residential areas experience noise from vehicular traffic along U.S. Highway 71. Noise levels at sensitive receptors within 200 feet of the highway range from 60 dBA to 70 dBA (L_{dn}).

4.3.10.3 Impacts of the Proposed Action

Temporary impacts resulting from construction-related noise would occur within the immediate vicinity of construction sites. The various activities that would take place include construction of industrial structures, rail spur, and roadways (grading, compacting, and paving); landscaping; and cleanup at Barksdale AFB.

Construction of an Operational Support Center and a Communications Maintenance Facility adjacent to the current onbase residential area would increase background noise levels six dBA in the existing residential area. Short-duration impacts on these sensitive receptors would be moderate. However, these impacts would not be significant because they would not exceed the 10-dBA criterion. Noise impacts from construction activities in the TAS area would be negligible because the closest sensitive receptor area (Bossier City residences) is about 7,200 feet from the TAS area. Potential construction-related noise levels of 80 dBA to 85 dBA at 100 feet from the source within the TAS construction site would be reduced to 48 dBA at 7,200 feet. These noise levels would be masked by ambient noise levels of about 60 dBA to 65 dBA (L_{dn}). Noise from rail spur construction would also be negligible because the closest sensitive receptors are over one mile from the rail spur corridor. Once the construction activity ceases, noise levels would return to near ambient conditions.

During the operations phase, noise would be generated from program-related increases in vehicular traffic and training train activities. Traffic-related noise increases would cause approximately a 0.5 dBA (L_{dn}) increase in noise levels at sensitive receptors (residential areas) within 200 feet of U.S. Highway 71. This increase in vehicular noise levels would have a negligible impact on the sensitive receptors. Noise impacts from training train activities onbase would also be negligible because of the distance of the rail spur corridor (over 1 mi) from sensitive receptors.

Offbase training train activities would cause minor, temporary increases in average noise levels on sensitive receptors along the main railroad line.

Overall short-duration impacts would be moderate and not significant, while long-duration impacts would be negligible.

4.3.10.4 Impacts of the Alternative Action

The noise levels resulting from the construction of six TASs at the garrison site would be about the same as the Proposed Program. The short-duration noise impacts at the onbase residential receptors would be moderate. However, these noise impacts would not be significant because they would not exceed the 10-dBA criterion. The long-duration impacts would be negligible.

4.3.11 Impacts of the No Action Alternative

With the No Action Alternative, the Peacekeeper Rail Garrison system would not be deployed. Activities at Barksdale AFB will continue to support other existing or proposed missions. For the host communities in the vicinity of the base, environmental changes would occur as a result of normal community growth. Future baseline conditions reflecting the No Action Alternative were described in earlier portions of this chapter.

4.3.12 Irreversible and Irretrievable Resource Commitments

Deployment of the Peacekeeper Rail Garrison program at Barksdale AFB would result in the irreversible and irretrievable commitments of some human and natural resources. The affected resources are the following:

- The proposed program requires the use of relatively small amounts of labor, materials, energy, and other economic resources during both the construction and operations phases. The local procurement of building materials (such as cement, sand, and gravel) may alter some resource characteristics in the deployment area. Although these economic factors, once used by the proposed program, generally cannot be recovered for other purposes, the extent of their use would be small in comparison to total resource availability.

- Land utilized for the program facilities will be irreversibly committed for the duration of the program. Such use of land would not cause an irretrievable commitment because the land can be reclaimed through removal of program facilities and implementation of necessary soil rehabilitation.

- Both irreversible and irretrievable commitments would occur if National Register of Historic Places (NRHP)-eligible prehistoric sites are destroyed or damaged during construction and operations. While data recovery is possible, avoidance is preferred because future technological advances in the discipline will permit future researchers to make more effective use of these resources.

- Both irreversible and irretrievable commitments would occur if NRHP-eligible historic sites and architectural resources are destroyed during construction and operations.

- Both irreversible and irretrievable commitments could occur if sacred or ceremonial areas are destroyed during construction and operations. Any impact may destroy the importance of a sacred area.

- Disturbed biological communities, given sufficient time, can recover to a state approximating predisturbance conditions once the disturbance ends. However, much of the disturbed area will be permanently altered from its present status as forest or wetland habitat. This represents irreversible and irretrievable loss of habitat for all practical purposes. Restoration or creation of wetlands will not fully compensate the loss of these habitats because created habitats are unlikely to have the same ecological value as the habitat lost. In addition, some of the expected impacts on vegetation and wildlife habitats would be of such long duration that they would represent irreversible and irretrievable commitments of biological resources for all practical purposes.

- Soils would be permanently disturbed at construction and related sites (e.g., borrow pits, roads, buildings, and rail spur) and may be irreparably damaged during the life of the program if disturbed areas are not mulched or revegetated, especially at the garrison location. Aggregate resources would be used for construction of buildings, roads, and rail spurs.

4.3.13 Relationship Between the Local Short-Term Use of Man's Environment and the Maintenance and Enhancement of Long-Term Productivity

Deployment of the Peacekeeper Rail Garrison program at Barksdale AFB would result in the short-term use of some human and natural resources that may affect the maintenance and enhancement of long-term productivity. The affected resources are the following:

- Short-term program-generated disruptions and delays of traffic would result in a decrease in the comfort, convenience, and safety afforded users of primary roads leading to the base. No effect on long-term productivity is expected.

- Additional information gained during program-related surveys of archaeological and historic resources may contribute to the data base and improve man's knowledge of the area's history. This would enhance the management of remaining cultural resources in the region.

- Areas temporarily disturbed by the construction activities would result in short-term losses of biological habitats. However, recovery rates are expected to be relatively fast and no effect on long-term productivity is expected.

- Soil erosion during construction would increase sedimentation to local streams resulting in a short-term deterioration of surface water quality. However, the additional loss of soil would not affect soil productivity or the long-term quality of streams.

- Reductions in air quality levels would result from fugitive dust during construction. However, no long-term reduction of air quality is expected.

4.3.14 Environmental Concerns Associated With a Possible Future Second Rail Connector

A second rail egress from Barksdale AFB could be achieved by providing a southeasterly rail connector to the main line of the Kansas City Southern Railroad (Figure 4.3.14-1). This spur would require the acquisition of about 40 acres of land and the construction of 3.6 miles of new track. Additionally, a 150-foot bridge would be needed to cross Cooper Bayou and up to ten culverts would be required for stream crossings.

Construction costs for this second rail connector would be approximately $5.1 million (1986 dollars) and would require approximately 40 direct construction workers and 50 secondary workers over a 1-year period. Most of these workers would be from the local area including Bossier and Caddo parishes. Because inmigration of labor for this construction would be minimal, there would be no major concerns for the socioeconomics, utilities, and transportation resources.

There are several potential land use concerns. Onbase, the rail connector right-of-way (ROW) would use approximately 10 acres of commercial forest, and offbase, the ROW and the wye would require approximately 40 acres of mixed open space and pasture land. At the southern end of the ROW, the rail connector would pass within 400 feet of two residential subdivisions. Two inhabited buildings are located within 100 feet of the ROW.

The potential for the disturbance of prehistoric sites within the area would be a concern. The rail spur would affect approximately five miles of lowland alluvial deposits south of the base, including natural levees associated with Cooper Bayou and the Flat River. Such topographic settings were favored locations for prehistoric settlements, and the potential for encountering prehistoric sites is high. The cultural resources ROI is known to contain Paleoindian and archaic sites which, because of their age, can be deeply buried when they occur in alluvial settings. Additionally, the ROI was occupied by the Caddoan people, who constructed complex villages containing mounds and other forms of public architecture. Numerous Caddo sites have been recorded in the region, often along old bayous and stream channels. Construction disturbance of important prehistoric sites would reduce their future research potential.

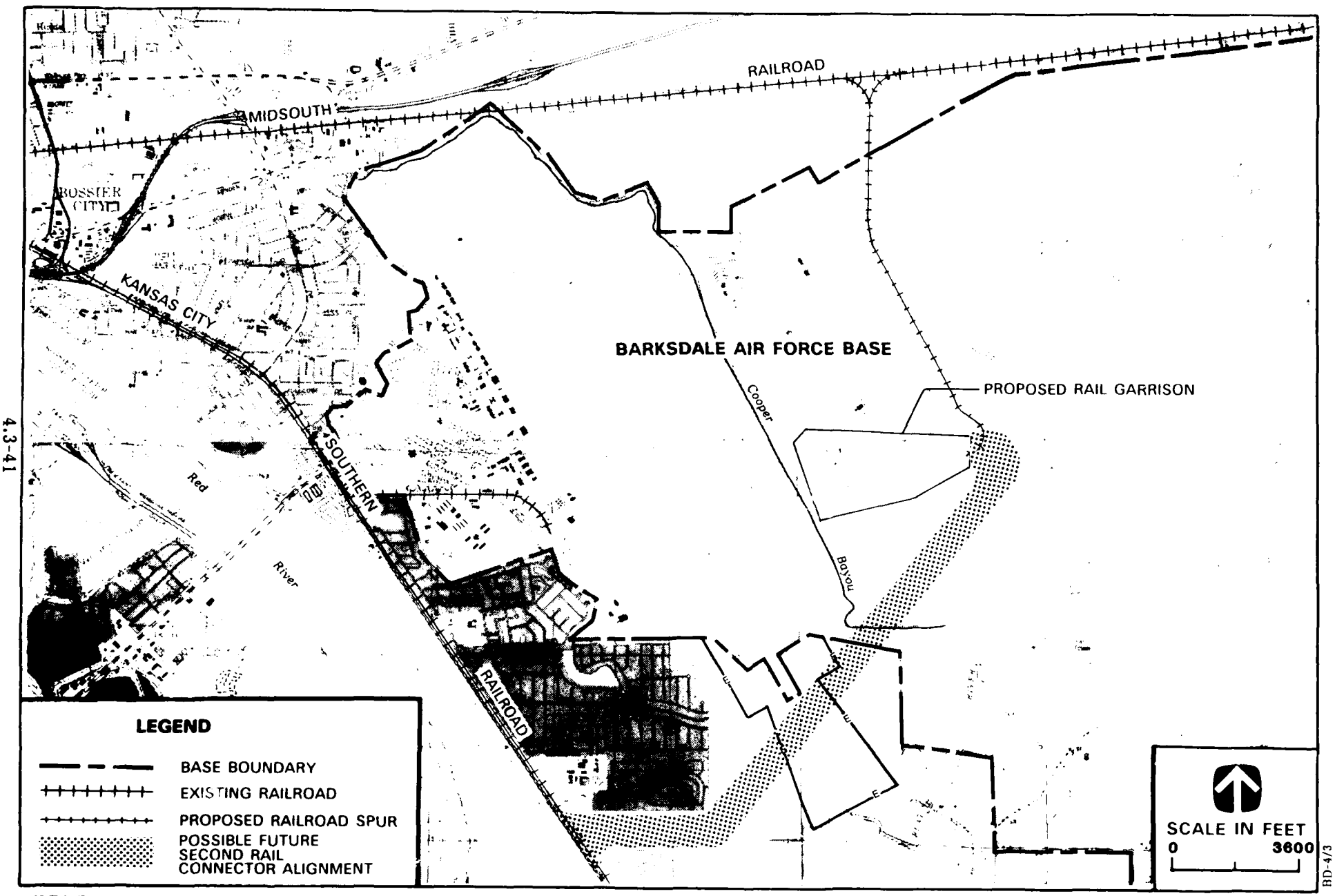


FIGURE 4.3.14-1 CONCEPTUAL ALIGNMENT OF A POSSIBLE FUTURE SECOND RAIL CONNECTOR FOR BARKSDALE AFB, LOUISIANA

Construction of the 3.6-mile rail connector would disturb critical habitats both onbase and offbase. Areas of forested wetlands would be drained and filled, resulting in potential impacts on alligators (threatened species on federal list) and other wildlife. Construction of a 150-foot bridge across Cooper Bayou and in the proximity of Flat River would adversely affect habitats along those water bodies.

The northern half of the connector alignment lies within the 100-year floodplain of the Flat River and up to 11 other local drainages could be crossed. Four of these channels appear to be in their natural condition while the remainder are dredged. By far the largest channel crossed is Cooper Bayou, a dredged perennial stream which drains runoff from Barksdale AFB and a portion of Bossier City. All of these channels empty to the Flat River, located within one mile of the rail connector. Additionally, approximately one mile of the connector route runs parallel and in close proximity to the Flat River. Therefore, substantial, short-term water quality effects upon the Flat River could be expected. Flat River suffers from degraded water quality because of drainage from large areas of farmland and recent dredging of its channel. The incremental effects of the second rail connector, while of concern, are not expected to be a major water quality problem.

The existing air quality in the Shreveport-Bossier Parish area is good. The area is classified as in attainment for all criteria pollutants except ozone. However, the ozone standards have not been violated in the past four years and the Louisiana Control Commission is in the process of submitting a request to the U.S. Environmental Protection Agency for the redesignation to attainment for ozone. Construction of the second rail connector would cause local increases in fugitive dust and gaseous pollutant emissions. These emissions should not cause any violations of the National Ambient Air Quality Standards.

Existing noise levels in the vicinity of the rail connector corridor range from 65 dBA to 75 dBA (L_{dn}). These noise levels are the result of base aircraft operations. Temporary increases in noise levels would result from construction activities in the vicinity of sensitive noise receptors in Bossier City residential areas and trailer parks south of the corridor.

4.4 DYESS AIR FORCE BASE, TEXAS

Dyess Air Force Base (AFB), with an area of 5,368 acres, is located in Taylor County in north-central Texas. The host unit at this Strategic Air Command base is the 96th Bombardment Wing, with B-1B bomber and KC-135A tanker aircraft. The major tenant organization is the 463rd Tactical Airlift Wing, a Military Airlift Command unit. Dyess AFB employed 5,523 military personnel (851 officers and 4,672 enlisted), 455 appropriated fund civilian personnel, and 568 other civilian personnel at the end of fiscal year 1987. Approximately 40 percent of the military personnel live on Dyess AFB and 60 percent live in communities near the base.

The City of Abilene, located east of the base, is the host community for Dyess AFB (Figure 4.4-1). Most of the personnel living offbase reside in Abilene, but some personnel live in other communities near the base, such as the City of Tye. Less than two percent of the base personnel live outside of Taylor County. Abilene, located in the center of an agricultural and oil industry region, had an estimated 1985 population of 107,224, including Dyess AFB. Taylor County had an estimated 1985 population of 126,467.

The following sections provide a description of activities associated with the deployment of the Peacekeeper Rail Garrison program at Dyess AFB for the Proposed Action (4 Train Alert Shelters [TASs]) and the Alternative Action (6 TASs).

Proposed Action. For the Proposed Action at Dyess AFB, the Air Force would construct garrison facilities and provide personnel necessary for the deployment and operation of up to four Peacekeeper missile trains. Approximately $63.5 million (in 1986 dollars) of construction would occur at the base for the Proposed Action. Construction activities for the purpose of analysis are assumed to begin in 1990 and be completed in 1992, with full operations beginning in 1993. Direct employment requirements would be 198 in 1990, peak at 533 in 1992, and stabilize at 418 during the full operations phase. Peak construction employment of 324 would occur in 1991. Annual direct employment requirements for the Proposed Action are presented in Table 4.4-1 for site activation, construction, assembly and checkout, and operations activities.

The garrison would be located in the southeastern portion of the base (Figure 4.4-1). Acquisition of restrictive easements on 733 acres adjacent to the southeastern boundary of the base would be required to accommodate the explosive safety zone for the garrison (Table 4.4-2). Seven buildings (including the 4 TASs), roads, utilities, parking, and approximately 1.5 miles of track would be constructed within the garrison. Construction of the garrison would permanently disturb approximately 54 acres and temporarily disturb 101 acres (Table 4.4-3).

The rail spur connecting the garrison to the Union Pacific main line north of the base would use 2 miles of an existing spur (0.7 mi onbase and 1.3 mi offbase) and require the construction of 1.9 miles of track outside the garrison (1.5 mi onbase and 0.4 mi offbase) (Figure 4.4-1). The two miles of existing track would require upgrading. Onbase track construction would consist of a 1.3-mile segment connecting the garrison with the existing spur and a 0.2-mile segment required for realignment of the existing spur. Offbase track construction would consist of converting the single turnout at the main line to a wye, requiring 0.4 mile of track. Approximately eight acres would be acquired for the offbase portion of the rail spur (Table 4.4-2). Approximately 10 acres would be disturbed permanently and 17 acres temporarily outside the garrison for the connector spur and wye (Table 4.4-3).

The Proposed Action would require the construction of support facilities with a total floor space of approximately 73,000 square feet. To provide access to the Training Train Shelter, an 0.1-mile rail spur would be constructed from the connector rail spur (Figure 4.4-1). Construction of the support facilities, utilities, roads, and parking would permanently disturb approximately 9 acres and temporarily disturb 11 acres (Table 4.4-3).

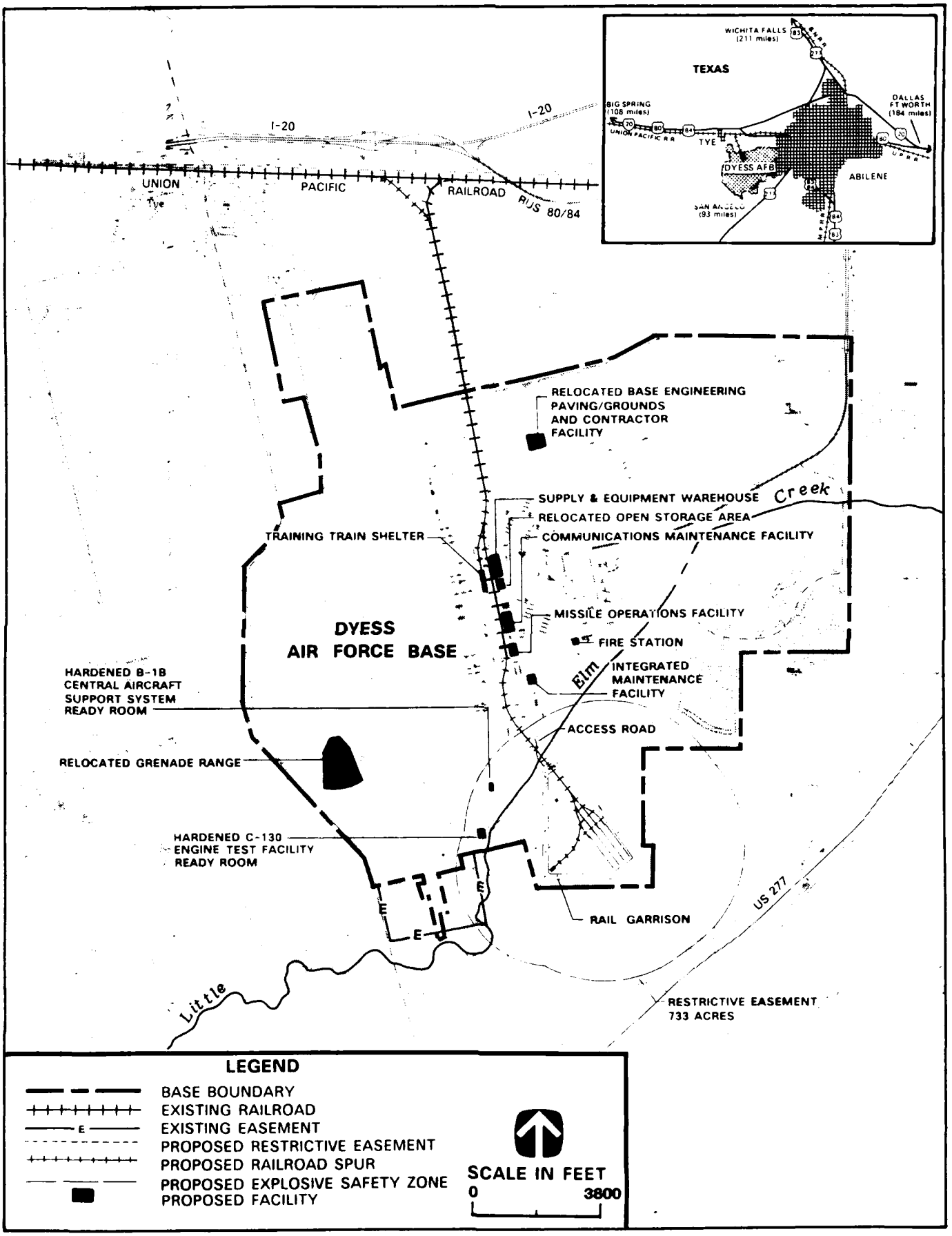


FIGURE 4.4-1 PROPOSED PEACEKEEPER RAIL GARRISON FACILITIES AT DYESS AFB, TEXAS

Table 4.4-1

**Annual Direct Employment (Military and Civilian)
for the Peacekeeper Rail Garrison Program
in the Dyess AFB Area by Calendar Year
(Full-Time Equivalent Jobs)**

	1989	1990	1991	1992	1993[1]
Proposed Action					
Site Activation	1	15	24	11	0
Construction	0	182	324	103	0
Assembly & Checkout	0	1	18	1	0
Operations	0	0	123	418	418
TOTAL:	1	198	489	533	418
Alternative Action					
Site Activation	1	15	24	11	0
Construction	0	200	338	103	0
Assembly & Checkout	0	2	27	2	0
Operations	0	0	135	460	460
TOTAL:	1	217	524	576	460

Note: [1]Employment would continue at these levels for the life of the program.

Table 4.4-2

**Offbase Land Acquisition and Easement Requirements
Peacekeeper Rail Garrison Program
Dyess AFB, Texas
(acres)**

	Proposed Action	Alternative Action
Land Acquisition		
Garrison Area	0	0
Rail Spur	8	8
Housing Area	0	0
Relocated Facilities	0	0
TOTAL:	8	8
Restrictive Easements	733	785

Table 4.4-3

Summary of Area Disturbed by the Peacekeeper Rail Garrison Program
Dyess AFB, Texas
(Proposed and Alternative Actions)

Facility Group	Area Disturbed (acres)		
	Permanent	Temporary	Total
Proposed Action			
Garrison Facilities	53.6	101.4	155.0
Rail Spur	10.4	16.5	26.9
Support Facilities	8.8	10.7	19.5
Relocated Facilities	8.5	10.5	19.0
TOTAL:	81.3	139.1	220.4
Alternative Action			
Garrison Facilities	60.3	124.7	185.0
Rail Spur	10.4	16.5	26.9
Support Facilities	8.8	10.7	19.5
Relocated Facilities	8.5	10.5	19.0
TOTAL:	88.0	162.4	250.4

The Proposed Action would also require the relocation of several existing base facilities, including some roads and utilities, to new locations (Figure 4.4-1). Relocation of these facilities would permanently disturb approximately 9 acres and temporarily disturb 11 acres (Table 4.4-3). Two facilities, the B-1B Central Aircraft Support System facility ready room and a C-130 engine test facility ready room, located within the explosive safety zone, would be structurally reinforced (hardened).

Alternative Action. For the Alternative Action, the Air Force would construct garrison facilities and provide personnel for the deployment and operation of up to six Peacekeeper missile trains. Approximately $75.9 million (in 1986 dollars) of construction would occur at Dyess AFB for the Alternative Action. Construction and operations activities are assumed to occur in the same time frame as the Proposed Action. Annual direct employment requirements for the Alternative Action are presented in Table 4.4-1.

The garrison would contain six TASs (instead of 4) and would be constructed in approximately the same location as the Proposed Action (Figure 4.4-2). Nine buildings (including the 6 TASs), roads, utilities, parking, and approximately 1.9 miles of track would be constructed within the garrison. The Alternative Action would require the acquisition of restrictive easements on an additional 55 acres (785 acres total) to accommodate the explosive safety zone for the garrison (Table 4.4-2). Construction of the six-TAS garrison would disturb approximately 7 additional acres permanently (60.3 acres total) and 23 acres temporarily (124.7 acres total) (Table 4.4-3).

For the Alternative Action, technical and personnel support facility requirements, the rail spur connecting the garrison to the Union Pacific main line, and the relocation of existing facilities would be similar to the Proposed Action.

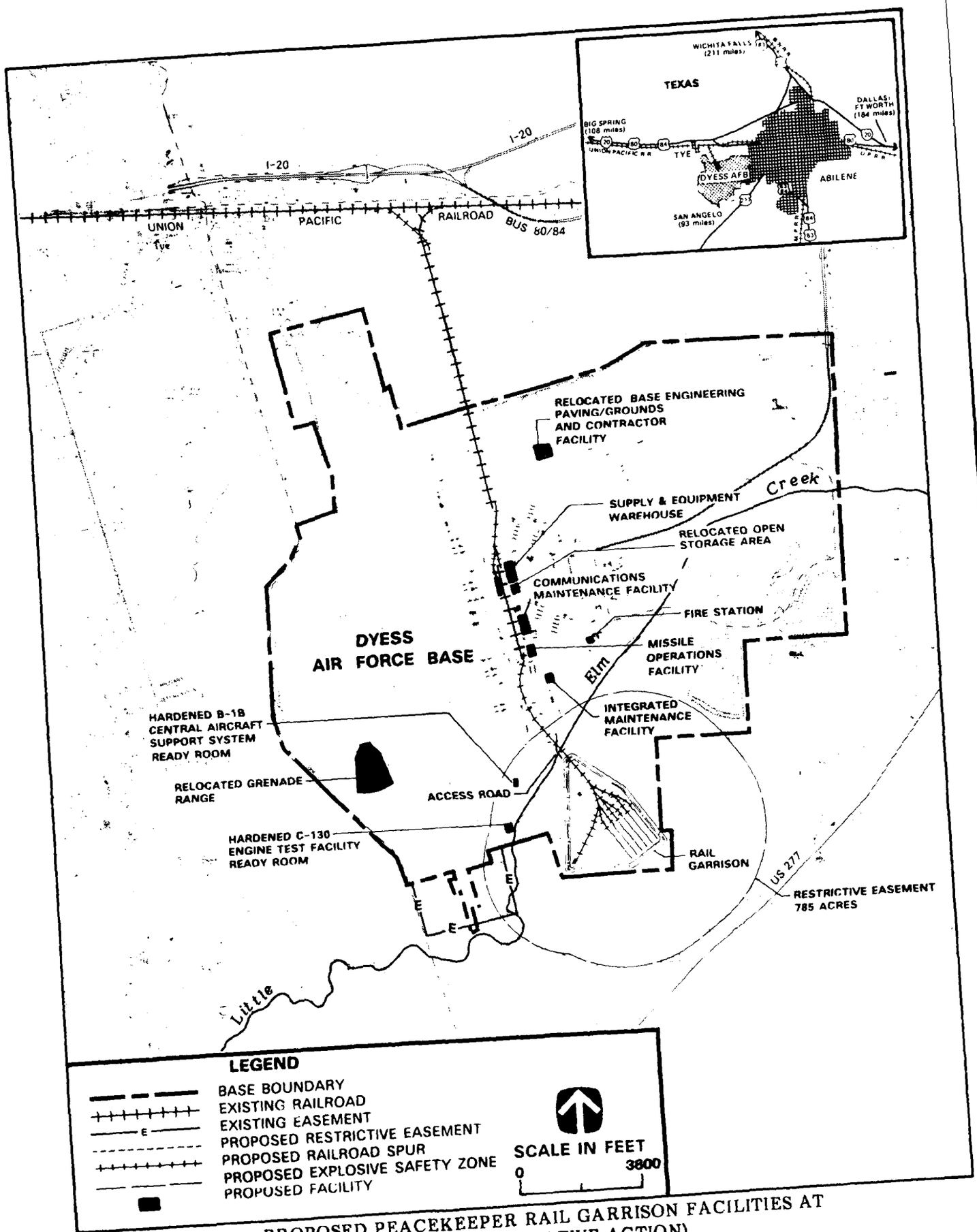


FIGURE 4.4-2 PROPOSED PEACEKEEPER RAIL GARRISON FACILITIES AT DYESS AFB, TEXAS (ALTERNATIVE ACTION)

Summary of Program Impacts. The Proposed Action at Dyess AFB would not result in significant impacts for any resource.

The Alternative Action at Dyess AFB would not alter the significance rating for any resource.

Both short- and long-duration beneficial socioeconomic effects would be generated by the Proposed and Alternative Actions, including increases in employment and income and greater utilization of temporary and permanent housing.

4.4.1 SOCIOECONOMICS

4.4.1.1 Region of Influence

The Dyess AFB Region of Influence (ROI) for the employment and income element consists of Callahan, Jones, Nolan, Runnels, and Taylor counties in Texas. The ROI for housing is limited to the City of Abilene, the host community for Dyess AFB, and for the remaining elements consists of Taylor County and the City of Abilene.

4.4.1.2 Existing and Future Baseline Conditions

Employment and Income. Between 1980 and 1984, total employment in the ROI increased 10.4 percent, from 89,622 to 98,978. Preliminary data indicate that the level of total employment has declined since 1984, mainly due to a downturn in the oil and gas industries. The finance, insurance, and real estate sector had the largest gain in employment. The services and construction sectors were the other two leaders in employment growth. The services, government, and retail trade sectors accounted for 55 percent of the total employment in 1984. Only the farm sector lost jobs between 1980 and 1984.

Total employment in the ROI is projected to reach 99,385 in 1990 and 109,020 in 1995. The ROI unemployment rate is projected to decline from 12.4 percent in 1984 to 11.9 percent in 1990, and then increase to 12.4 percent in 1995.

Total employment in Taylor County, the location of Dyess AFB, was 73,285 in 1984, a 13.3-percent increase from the 1980 employment level of 64,704. Preliminary data indicate that the level of total employment has declined since 1984. All sectors, except the farm sector, had gains in employment between 1980 and 1984. The services, government, and retail trade sectors were the top three employers in the county, accounting for approximately 59 percent of the total employment in both 1980 and 1984.

From 1980 to 1984, total earnings (in current dollars) in the ROI increased from $1.1 billion to $1.5 billion and in Taylor County from $0.8 billion to $1.1 billion. Discounting for inflation, these increases in total earnings represented, respectively, 7.9 percent and 10.4 percent growth over the 1980 to 1984 period. Per capita personal income in the ROI increased from $9,099 in 1980 to $11,815 in 1984 and in Taylor County from $9,398 in 1980 to $12,175 in 1984.

Total earnings (in 1986 dollars) in the ROI are projected to increase to $1.65 billion in 1990 and to $1.82 billion in 1995. Corresponding annual per capita personal income is projected at $11,992 for 1990 and $12,399 for 1995. The projected per capita personal income for Taylor County is $12,254 for 1990 and $12,645 for 1995.

Population and Demographics. The population of Taylor County was estimated at 126,467 in 1985, an increase of 15,535 persons or 14 percent over the 1980 population. The county's population is projected to increase to 134,832 by 1990 and 144,008 by 1995. Abilene had a 1987 population of 111,000, an increase of 12,685 since 1980. Military personnel and their dependents accounted for 12 percent of

the estimated 111,000 population in Abilene in 1987. Abilene's population is projected at 115,956 for 1990 and 123,847 for 1995.

Housing. The stock of permanent year-round housing units in Abilene in 1980 was estimated to be 36,284 units. Of these, 1,462 or 4.0 percent of the total were vacant and available. In July 1987, the City of Abilene Planning and Development Department estimated the year-round housing stock to be 44,500 units. Total vacancies were estimated to be 4,036 units. Of these, 2,953 (6.6% of the total) were estimated as available.

Onbase housing available to accompanied military personnel at Dyess AFB consists of 266 two-bedroom, 665 three-bedroom, and 68 four-bedroom units. As of August 1987, 421 personnel were on a waiting list for housing. The waiting time varies from immediate occupancy for three-bedroom company and field grade officers quarters to 1.5 to 2 years for four-bedroom junior enlisted quarters. Onbase unaccompanied enlisted personnel housing consists of 2,042 permanent party enlisted quarters. Of these, 1,796 are usable enlisted spaces. As of March 1987, 709 (26%) enlisted spaces were vacant. No permanent party unaccompanied personnel housing facilities for officers were reported. Transient housing units for 306 enlisted personnel were 82 percent occupied in March 1987. Of the 91 transient units designated for officers, 64 percent were occupied as of March 1987.

Temporary housing facilities in Abilene consist primarily of motel rooms. Approximately 2,300 motel rooms exist in the city and vacancy rates average between 60 percent and 65 percent. Even during peak occupancy periods, over 200 rooms are normally available in the city. No new facilities are currently planned.

By 1990, the year-round housing stock in Abilene is projected to have increased to over 45,200 units and available vacancies are expected to have declined to about 1,800 (4.0%). In 1995, the year-round housing stock will have grown to almost 48,500 units and available vacancies will number 1,950 (4.0%).

Education. The Abilene Independent School District had an enrollment of 18,202 in the 1987-88 school year. The district operates 17 elementary schools, 5 middle schools, and 2 high schools. Approximately 18 percent of the district's enrollment consists of dependents of federal employees. Currently, the district has an overall pupil-to-teacher ratio of 21.1-to-1 at the elementary level, below the weighted average state standard of 23.4-to-1. Enrollment is expected to grow to 18,800 by 1990 and to 20,100 by 1995, and staffing is expected to increase to maintain existing pupil-to-teacher ratios.

Public Services. The City of Abilene had 1,050 personnel in 11 departments in fiscal year (FY) 1987-88. The staffing level has decreased by about 60 personnel since FY 1985-86. The Abilene Police Department has 159 sworn officers and 35 civilian personnel, and the Abilene Fire Department employs 171 firefighters located at eight stations. Taylor County employs approximately 315 personnel. The city and county employ 9.5 personnel and 2.4 personnel, respectively, per 1,000 population. To maintain current service levels, city staffing would have to increase from 1,050 to 1,102 by 1990 and to 1,177 by 1995. Without these additional hires, the number of city personnel per 1,000 population would drop to 9.1 and 8.5, respectively, in those years. Similarly, the county's staffing level would have to increase from 315 to 324 by 1990 and to 346 by 1995 or the number of personnel per 1,000 population would drop to 2.3 and 2.2, respectively, in those years. Because of recent reductions in municipal employment, future increases in government employment will probably lag behind population growth.

Public Finance. Services provided by the City of Abilene are funded principally through the general fund. Expenditures from this fund totaled $33.4 million in FY 1986. Budgeted expenditures for FY 1988 are slightly lower at $31.6 million. General fund revenues were $33.6 million in FY 1986 and are budgeted at $31.3 million in FY 1988.

Property valuations totaled $2.7 billion in 1987, down slightly from peak valuations of $2.8 billion in 1984. Tax revenue (property and sales taxes) account for almost three-quarters of all revenues. Over the 1990 to 1995 period, revenues and expenditures are projected to grow from $35.5 million to $37.9 million.

The 1988 Abilene Independent School District budget is approximately $60 million, an increase from $48 million in 1986 and $50.2 million in 1987. State entitlement monies and property taxes are the principal revenue sources of the district. The ratio of net bonded debt to assessed value is less than 1 percent. The year-end balance of the district's general fund was $12.1 million in FY 1987, representing approximately 20 percent of general fund expenditures in that year. Revenues and expenditures are projected to stabilize in the $52.6-million to $55.5-million range over the 1990 to 1995 period.

Taylor County revenues and expenditures were approximately $10.1 million in FY 1986. Reserve funding levels were $6.3 million, representing approximately 63 percent of operating expenses in that year. Revenue and expenditures are projected to grow from $10.7 million to $11.2 million over the 1990 to 1995 period.

4.4.1.3 Impacts of the Proposed Action

For the Proposed Action, a brief summary of the program-related effects on key socioeconomic indicators is presented in Table 4.4.1-1.

Employment and Income. The Proposed Action would create both direct and secondary jobs in the ROI. Total program-related jobs would range from 464 in 1990 to 1,175 in 1991, and stabilize at 555 in 1993 and thereafter. During the construction phase (1990 to 1992), direct jobs would range from 198 to 533, and secondary jobs from 266 to 686. All direct jobs and the majority of secondary employment would occur in Taylor County. The number of local hires would vary from 395 to 928 for this period. During the operations phase (beginning in 1993), direct jobs would be 418 (355 military and 63 civilian) and secondary jobs would number 137. The number of local hires would stabilize at 155. Total program-related jobs during the operations phase, primarily in Taylor County, would account for 0.5 percent of the total baseline jobs in the ROI.

The effect of the Proposed Action on personal income (in 1986 dollars) would range from $10.6 million in 1990 to $26.4 million in 1991, and stabilize at $10.5 million in 1993 and thereafter in the ROI. Taylor County's share of that income would vary from $8.8 million in 1990 to $22.0 million in 1991, and stabilize at $10.1 million in 1993 and thereafter. Program-related spending including program procurement and personal consumption expenditures would range from $10.7 million in 1990 to $27.1 million in 1991, and stabilize at $6.7 million in 1993 and thereafter.

Population and Demographics. Population inmigration resulting from the Proposed Action would occur primarily in Taylor County. Of the total inmigrating population in the ROI (ranging from 169 in 1990 to 1,141 in 1992), Taylor County's share would range from 163 in 1990 to 1,131 in 1992. At its peak during construction, total inmigration would represent 0.8 percent of the county's population. During the operations phase, 1,034 of the 1,039 inmigrants would move into Taylor County. As a result, inmigrants would account for about 0.7 percent of the county's total baseline population in 1993 and thereafter. The number of weekly commuters would be less than 25 during the construction phase and drop to zero during the operations phase.

Of the total 1,034 inmigrants to the county during the operations phase, 106 are expected to live onbase and the remaining 928 in the City of Abilene. Military personnel and their dependents would account for 12 percent of the population in Abilene in 1993.

Table 4.4.1-1

Selected Socioeconomic Indicators, Peacekeeper Rail Garrison Program
Dyess AFB, Texas 1990-1993
Proposed Action

	1990	1991	1992	1993[1]
Region of Influence				
Employment (Jobs)				
Total Program-Related Jobs	464	1,175	850	555
Direct Jobs	198	489	533	418
Civilian	192	378	176	63
Military	6	111	357	355
Secondary Jobs	266	686	317	137
Local Hires	395	928	410	155
Program-Related Spending (000s 86$)	$10,740	$27,142	$13,794	$6,719
Personal Income (000s 86$)				
Direct	$ 4,350	$10,400	$10,227	$ 7,690
Secondary	6,230	15,953	6,983	2,788
Total Personal Income	$10,580	$26,353	$17,209	$10,478
Abilene				
Population				
Baseline Population	115,956	117,535	119,113	120,696
Program-Related Change	163	608	1,131	1,034
Change as Percent of Baseline	0.1	0.5	0.9	0.9
Offbase Housing Demand				
Temporary Units	18	36	24	14
Permanent Units	46	169	307	280
Total Units	64	205	331	294
School District Enrollment				
Elementary	12	48	98	91
Secondary	9	40	80	74
Total Enrollment	21	88	178	165

Note: [1]Program-related effects would continue at these levels throughout the life of the program.

The increases in population as measured against the baseline population of Abilene (within whose boundaries the base is located) would be 0.9 percent in both the peak inmigration year and during operations. The percentage increase in just the offbase population as measured against the offbase total population would also be about 0.9 percent.

Housing. Most program-related households would be housed in privately owned permanent housing units and temporary facilities in Abilene. The remaining individuals (106 noncommissioned officers and airmen) would be housed onbase in existing unaccompanied enlisted personnel housing facilities.

The offbase program-related demand for housing is expected to begin in 1990, when 45 permanent units (2.5% of available vacancies) and 20 temporary facilities (less

than 10% of available vacancies) would be required. The peak demand for temporary facilities would occur in 1991. The short-duration demand would be for 35 facilities (17.5% of available vacancies) in that year, and decline to the long-duration demand of 15 facilities (7.5% of available vacancies) by 1993. The peak demand for permanent units would be experienced in 1992. The short-duration demand would be for 305 units (16.5% of available vacancies) and would decline to the long-duration demand of 280 units (14.7% of available vacancies) by the following year. The long duration available vacancy rate would decline from 4.0 percent to 3.4 percent beginning in 1992 for the Proposed Action.

The short- and long-duration demand for temporary facilities would not cause a shortage even during periods of peak baseline occupancy. These demands would be beneficial effects of the program. Similarly, the short- and long-duration demands for permanent units would be beneficial because they would remove 280 to 305 units from the projected vacancies of over 1,800 units.

Education. Program-related enrollment increases of approximately 165 students are projected for the Abilene Independent School District. These students are expected to be dispersed throughout the district, so instances of localized overcrowding are not expected. The enrollment increases would be less than one percent of baseline enrollment levels. The addition of these students to the Abilene Independent School District is expected to increase elementary level pupil-to-teacher ratios from 21.1-to-1 to 21.3-to-1 during the operations phase. This ratio is still below the weighted average state standard of 22.4-to-1. These increases in class size are not expected to have a measurable effect on educational service levels in the area.

Public Services. Program-related increases in population would lead to increases in demands for public services provided by the City of Abilene of 0.9 percent over baseline levels in 1993. The increased service demands would be experienced by a majority of the departments now providing service to area residents. To maintain the current service level of 9.5 personnel per 1,000 population, the city would need 10 additional personnel by 1993, increasing city employment from a baseline level of 1,147 to 1,157. Most of the additional staffing would be needed in the Police, Fire, and Public Works departments. If no additional personnel were hired, the number of personnel per 1,000 population would drop from 9.5 to 9.4. This reduction in the number of personnel per 1,000 population would not result in an appreciable deterioration from the community's current level of public service provision.

Program-related increases in population would lead to increases in demands for public services provided by Taylor County of 0.7 percent over baseline levels in 1993. To maintain existing service levels, the county would need to hire two additional personnel by 1993, increasing county staffing from a baseline level of 337 to 339. Even without additional staffing, however, the number of county personnel per 1,000 population would remain at 2.4. This level of population increase should not affect the county's ability to deliver public services at current levels.

Public Finance. Program-related increases in expenditures of the city and county would be limited to outlays for additional personnel as required. Because little or no increases in personnel would be required, expenditure impacts in the city and county would be negligible.

Based on an average per pupil cost of $2,800, program-related school district expenditure increases would be approximately $500,000 in 1992 and $460,000 during operations. These increases would be approximately a 1-percent increase over projected baseline levels in 1992 and less than 1 percent during operations. Entitlements from P.L. 81-874 programs would be limited to payments for the "B" students who reside in the community (less than $10,000 during operations). Temporary revenue shortfalls (approximately $140,000 in 1992) could occur as state foundation program monies lag behind the

additional enrollment. Reserve funding levels of approximately $12.1 million would be adequate to cover potential shortfalls.

Summary of Impacts. For the Proposed Action, short- and long-duration socioeconomic impacts would be negligible because inmigration would cause population in the Abilene area to increase by 0.9 percent over baseline forecasts during both the peak inmigration year (1992) and program operations (beginning in 1993). This level of program-induced population growth would result in negligible impacts on housing, education, public services, and public finance within the Abilene area for both the peak and succeeding years. Increases in demand for housing would be met by available vacancies, existing educational facilities would absorb program-related enrollment increases, no new public service facilities would need to be constructed, and existing revenue sources of the jurisdictions would be adequate to meet program-related expenditures.

Both short- and long-duration beneficial effects would result from the Proposed Action, including increases in employment and income in the ROI and greater utilization of temporary and permanent housing vacancies within the Dyess AFB area.

4.4.1.4 Impacts of the Alternative Action

For the Alternative Action, a brief summary of the program-related effects on key socioeconomic indicators is presented in Table 4.4.1-2.

Employment and Income. Impacts of the Alternative Action on employment and income in the ROI would be slightly higher than impacts of the Proposed Action. During the construction phase (1990-1992), the Alternative Action would create new jobs ranging from 498 to 1,229, which is 34 to 54 more jobs than those created by the Proposed Action. Of the 1,229 new jobs during the peak construction year (1991), 524 would be direct (403 civilian and 121 military) and 705 would be secondary. The number of local hires would be 960, which is 32 more than for the Proposed Action. During the operations phase, total new jobs created by the Alternative Action would number 611, which is 56 more than those created by the Proposed Action. Of these 611 new jobs, 460 would be direct (69 civilian and 391 military) and 151 would be secondary. Local hires would number 171 or 16 more than local hires for the Proposed Action.

During the construction phase, the Alternative Action would generate personal income (in 1986 dollars) ranging from $11.3 million in 1990 to $27.5 million in 1991 in the ROI, $0.7 million to $1.2 million more than generated by the Proposed Action. Taylor County's share of that personal income would range from $9.5 million in 1990 to $23.1 million in 1991. During operations, the Alternative Action would generate $11.5 million personal income for the ROI, $11.1 million of which would go to Taylor County. In the ROI, the program-related spending would range from $11.4 million in 1990 to $28.0 million in 1991, and then stabilize at $7.4 million during the operations phase.

Population and Demographics. The population increase associated with the Alternative Action would range from 184 in 1990 to 1,247 in 1992 in the ROI, which is 15 to 106 more persons than those for the Proposed Action. During the operations phase, total inmigrants to the ROI would number 1,144, which is 105 more than the Proposed Action. During the construction phase, Taylor County's share of the inmigration would range from 177 in 1990 to 1,237 in 1992. Of the 1,144 total inmigrants during operations, 1,138 would move to Taylor County. As a result, the county's population would increase 0.1 percentage point over levels identified under the Proposed Action during the peak inmigration year.

Of the 1,138 inmigrants to Taylor County during the operations phase, 118 would live onbase and 1,020 would live offbase in Abilene. This would increase Abilene's population by 92 over that of the Proposed Action. Military personnel and their dependents would

Table 4.4.1-2

Selected Socioeconomic Indicators, Peacekeeper Rail Garrison Program
Dyess AFB, Texas 1990-1993
Alternative Action

	1990	1991	1992	1993[1]
Region of Influence				
Employment (Jobs)				
Total Program-Related Jobs	498	1,229	908	611
Direct Jobs	217	524	576	460
Civilian	211	403	183	69
Military	6	121	393	391
Secondary Jobs	281	705	332	151
Local Hires	423	960	426	171
Program-Related Spending (000s 86$)	$11,380	$28,007	$14,488	$7,394
Personal Income (000s 86$)				
Direct	$ 4,766	$11,183	$11,026	$ 8,461
Secondary	6,566	16,358	7,270	3,068
Total	$11,332	$27,541	$18,296	$11,529
Population				
Baseline Population	115,956	117,535	119,113	120,696
Program-Related Change	177	660	1,237	1,138
Change as Percent of Baseline	0.2	0.6	1.0	0.9
Housing Demand				
Temporary Units	20	38	25	15
Permanent Units	49	184	335	307
Total Units	69	222	360	322
School District Enrollment				
Elementary	13	53	107	100
Secondary	10	43	88	82
Total Enrollment	23	96	195	182

Note: [1]Program-related effects would continue at these levels throughout the life of the program.

account for 12 percent of the community's population in 1993. The Alternative Action-induced inmigration would increase the baseline population of Abilene by 1.0 percent in 1992 and by 0.9 percent in 1993 and thereafter.

Housing. The Alternative Action would not change the expected program-related occupancy patterns onbase. An additional 11 unaccompanied military personnel would live in existing unaccompanied enlisted personnel housing facilities onbase.

The initial demand for housing in Abilene would increase by five permanent units in 1990. The additional construction workers would not change demand for temporary facilities appreciably, but operations personnel would require an additional 30 permanent units in 1992, reducing available vacancies by a total of 17.9 percent. The operational demand for permanent units would increase by 25 units, reducing available vacancies by a total of 16.3 percent beginning in 1993. The long-duration available vacancy rate would

be reduced from 4.0 to 3.4 percent as a result of the Alternative Action. The additional demand for permanent units could be easily met by the projected vacancies. Therefore, both the temporary and permanent housing markets in Abilene would receive beneficial effects.

Education. An additional 17 students over those levels identified for the Proposed Action would be added to the Abilene Independent School District enrollment during the operations phase. Because these students are expected to be dispersed throughout the Abilene area, the likelihood of overcrowding at selected schools would be reduced. Pupil-to-teacher ratios would remain at levels identified for the Proposed Action. Existing facilities would be adequate to accommodate program-related enrollment increases.

Public Services. The slightly higher population inmigration for this alternative would result in slightly higher service demands. The increase would not result in a measurable increase in city or county personnel levels over what is projected for the Proposed Action. The number of personnel per 1,000 population for the city and the county would not differ from levels identified for the Proposed Action.

Public Finance. Because staffing levels in the local governments would remain essentially unchanged from those estimated for the Proposed Action, expenditure increases would not vary from those estimated for the Proposed Action.

Summary of Impacts. For the Alternative Action, short-duration socioeconomic impacts would be low because inmigration would cause population in the Abilene area to increase by one percent over baseline forecasts during the peak inmigration year (1992). Long-duration impacts would be negligible because the population change during the operations phase (beginning 1993) would be less than one percent. This level of program-induced population growth would result in low impacts on housing, education, public services, and public finance within the Abilene area for the peak construction year. Impacts would not be significant because the increase in demand for housing would be met by available vacancies, existing educational facilities would absorb program-related enrollment increases, no new public service facilities would need to be constructed, and existing revenue sources of the jurisdictions would be adequate to meet program-related expenditures.

Both short- and long-duration beneficial effects would result from the Alternative Action, including increases in employment and income in the ROI, and greater utilization of temporary and permanent housing vacancies within the Dyess AFB area.

4.4.2 UTILITIES

4.4.2.1 Region of Influence

The utilities ROI for Dyess AFB includes the host community of Abilene and the base.

4.4.2.2 Existing and Future Baseline Conditions

Potable Water Treatment and Distribution. The City of Abilene supplies potable water to its residents and Dyess AFB. The raw water is derived from Lake Fort Phantom Hill and Abilene and Hubbard Creek lakes. The Hubbard Creek Lake water permit is expected to be almost doubled by the end of 1988 and the city is involved in plans to help build Stacy Reservoir for water requirements beyond the year 2000. In 1987, the average daily potable water demand was 18.3 million gallons per day (MGD). The collective daily capacity of the city's three water treatment plants is 52 MGD. The city's potable water storage is 14.5 million gallons (MG) and is adequate to supply current summer demands. Average daily potable water demands are projected to be 20.8 MGD in 1990 and 24.4 MGD in 1994. An additional 25 MG of storage, and other pumping and infrastructure improvements, are projected for construction by 1990.

Average daily potable water use at Dyess AFB was 1.02 MGD in 1987. The base does not have a formal contract for potable water with the City of Abilene; it is considered a commercial customer. The base has 1.1 MG of potable water storage. The average daily water demand onbase without the program is expected to remain constant.

Wastewater. Wastewater from the City of Abilene and Dyess AFB is processed by an activated sludge treatment plant, with a 13.4-MGD capacity, owned and operated by the city. In 1987, the treatment facility processed an average flow of 13.5 MGD. Plans have been made to expand treatment capacity to 18 MGD by 1990 and to 21 MGD in the late 1990s. The wastewater flows for 1990 and 1994 are estimated to be 14.4 MGD and 15.9 MGD, respectively. Wastewater flows from Dyess AFB without the program are estimated at 60 percent of water use or 0.61 MGD in FY 1987.

Solid and Hazardous Waste. The City of Abilene collects solid waste from its residents. Solid waste at Dyess AFB was 13.9 tons per day (T/day) in 1987 and is collected by a private contractor. Solid waste from the city and the base is disposed of at a private landfill site at an estimated rate of 500 T/day. Solid waste generation for the City of Abilene is estimated to increase to 510 T/day in 1990 and to 538 T/day in 1994. The existing landfill site is estimated to have a lifespan of 115 years which is adequate to dispose of existing and future waste flows.

Onbase hazardous wastes are managed by Dyess AFB; the Defense Reutilization and Marketing Office (DRMO) is responsible for the proper handling of the wastes and arranging for transport to treatment and disposal facilities. The base stores the wastes in a conforming storage facility located adjacent to the DRMO. The wastes include oils, paints, thinners, solvents, and other regulated materials.

Energy Utilities. Electrical power is provided to Dyess AFB and Abilene by the West Texas Utilities Company. Peak demands reached 1,064 megawatts (MW) in 1987 with system capacity equaling 1,434 MW. Total sales of electricity have decreased since 1985 as economic conditions in the region declined, particularly for the petroleum industry. Sales are anticipated to return to past levels once the price of oil stabilizes and the economy improves. Peak demands are estimated to be 1,215 MW in 1990 and 1,352 MW in 1994. West Texas Utilities has already contracted for purchases of additional electricity to meet this increased demand. Peak demand at Dyess AFB was 13.8 MW in 1987. Three existing substations, with a total capacity of 30 megavolt-amperes, have sufficient capacity to meet existing demands.

Natural gas is supplied to the base and Abilene by the Lone Star Gas Company. While increasing their customer base by 5 percent since 1981, sales of natural gas have fallen from 527 billion cubic feet in 1981 to 241 billion cubic feet in 1986. The company continues to maintain the infrastructure necessary to provide additional supplies. Dyess AFB consumed 226,450 thousand cubic feet in fiscal year 1987 and receives their supply through a 10-inch main.

Diesel fuel consumption in 1987 was 464,500 gallons and onbase storage is 27,000 gallons. Fuel oil for Dyess AFB is delivered by truck, while JP-4 fuel is delivered by pipeline from Abilene. Bulk storage for fuel oil is provided by ten tanks with a total capacity of 145,000 gallons.

4.4.2.3 Impacts of the Proposed Action

Potable Water Treatment and Distribution. Program-related requirements of 0.30 MGD, including onbase flows, would increase average daily demands in the City of Abilene by less than one percent from baseline levels of 22.4 MGD to 22.7 MGD in 1992. The city's treatment facilities, with a 52-MGD capacity, would be operating at 44 percent and storage would be adequate to meet summer demands. Daily requirements at Dyess AFB would increase by 0.04 MGD or four percent in the same year. Average daily demands

would increase from a baseline level of 1.02 MGD to 1.06 MGD and would be met through the interconnection with the city.

Wastewater. Average daily flows for the City of Abilene would peak at 15.2 MGD in 1992 because of a 0.1-MGD or less than 1-percent program-related increase. The expanded treatment plant, with a 18-MGD capacity, would be operating at 84 percent and would be able to adequately treat the increased flows. Wastewater flows onbase would increase from a baseline level of 0.61 MGD by 0.03 MGD or 4.6 percent in 1992. The existing sewer from the base has adequate capacity to handle the increased flow.

Solid and Hazardous Waste. Solid waste generation would increase by five T/day, or less than one percent in the City of Abilene in 1992. Solid waste generation at Dyess AFB would increase by 0.5 T/day in 1992 (the peak year). With the city and private haulers already adequately disposing of 524 T/day, the program-related increase would not require additional equipment or personnel. Existing landfills have projected lifespans of 115 years, and would be able to handle the increased flow without a discernible effect on their lifespan. Program-related hazardous waste generation onbase would be incorporated into the existing management system, stored onbase, and then transported to treatment and disposal facilities. The proposed garrison location is in an area that contains various rubble disposal sites, a landfill that received domestic and industrial wastes, and an explosive ordnance disposal burial site. Any disturbance on or adjacent to those sites should take into consideration the nature of the wastes. Wastes excavated from the garrison may require disposal in an appropriate landfill.

Energy Utilities. Program-related electricity demands would peak in 1992 with an increase of 3.36 MW. This demand would increase the projected peak demand of 1,318 MW for the West Texas Utilities system by less than one percent. This system has adequate power supplies to meet this increase. Electrical requirements at Dyess AFB would be 2.74 MW. Adequate capacity is available from the substations onbase to meet the demands. Natural gas consumption would increase by 69.8 million cubic feet (MMcf). Lone Star Gas Company has an adequate infrastructure and reserves to meet the new demand. Natural gas use onbase would increase from a projected demand of 226 MMcf to 237 MMcf, or by 4.8 percent. Lone Star Gas Company has adequate capacity to supply the base. Diesel fuel consumption at Dyess AFB would increase as a result of the program. Supplies would continue to be filled by the Defense Fuel Supply Center through contracts with local and regional suppliers.

Summary of Impacts. Utility requirements associated with the Proposed Action would increase demands on the City of Abilene utility systems by less than one percent in 1992 (the peak year) and throughout the operations phase. Both peak year and operations requirements on energy utilities would also be less than one percent. Because the peak year requirements would not be substantially greater than the impacts associated with the operations requirements, all utility impacts would be of long duration. These impacts would be negligible because the increases are less than one percent.

4.4.2.4 Impacts of the Alternative Action

Potable Water Treatment and Distribution. With the additional construction associated with six Train Alert Shelters (TASs) and the operations personnel to support the program, potable water requirements would equal 0.30 MGD, which is 0.02 MGD greater than the Proposed Action. Adequate capacity is available in the City of Abilene treatment and distribution system to process the additional demand.

Wastewater. Average daily flows to the City of Abilene treatment plant would peak in 1992 at 0.14 MGD, which is 0.01 MGD greater than the flows identified for the Proposed Action. The City of Abilene has adequate capacity to treat the additional flows and the sewer from the base can transmit the new onbase flows.

Solid and Hazardous Waste. Solid waste generation from the increased construction and operations activities of the Alternative Action are slightly greater than the Proposed Action. Solid waste generation for both the city and the base would be 0.46 T/day greater during the construction and operations phases. These increases would not adversely affect the city or private haulers. Adequate landfill space would continue to be available. The proposed garrison location is in an area that contains various rubble disposal sites, a landfill that received domestic and industrial wastes, and an explosive ordnance disposal burial site. Any disturbance on or adjacent to those sites should take into consideration the nature of these wastes. Wastes excavated from the garrison may require disposal in an appropriate landfill. Hazardous waste generation would be slightly greater than the Proposed Action as a result of the maintenance activities associated with the additional trains. These wastes would be incorporated into the existing management system and transported to treatment and disposal facilities.

Energy Utilities. Demands for electricity would be 0.67 MW greater for the Alternative Action than the Proposed Action. West Texas Utilities current generation and transmission system has adequate capacity to meet the increased demands. Demands for natural gas are 6.2 MMcf greater for the Alternative Action than the Proposed Action. Lone Star Gas has an adequate infrastructure and reserves to meet these increased demands. Diesel fuel consumption would be greater than the Proposed Action. Supplies would continue to be filled by the Defense Fuel Supply Center through contracts with local and regional suppliers.

Summary of Impacts. Utility requirements associated with the Alternative Action would be slightly greater than those identified for the Proposed Action. Because the peak year requirements would not be substantially greater than the impacts associated with the operations requirements, all utility impacts would be of long duration. These impacts would be rated negligible because the increases are less than one percent.

4.4.3 TRANSPORTATION

4.4.3.1 Region of Influence

The ROI for transportation includes the principal city streets within Abilene, Texas and the primary highways leading to Dyess AFB.

4.4.3.2 Existing and Future Baseline Conditions

The principal roads in Abilene consist of segments of the primary highways that pass through the city. Business Route U.S. 80, which is South 1st Street within the central business district, had segments with an average annual daily traffic (AADT) ranging between 12,300 and 21,000 in 1987. Business Route U.S. 83, named Treadway Boulevard, had an AADT of 9,000 to 18,000. Sections of Interstate 20, U.S. 83/84, and Texas State Highway 322 constitute a circumferential access road in the outskirts of the city. Interstate 20, which bypasses Business Route U.S. 80, had an AADT of 14,800 to 19,300. U.S. 83/84, on the west and southwest sectors of the city, had an AADT of 12,000 to 41,000. Texas State Highway 322, on the east and southeast sectors of the city, had an AADT of 3,700 to 6,000 in 1987.

Current level of service (LOS) ratings at these principal city streets vary from free-flowing to stable flow conditions. Sections of South 1st Street were rated at LOS B and C during the peak hours in 1987. (Refer to Section 3.4.4 and Table 3.4.4-1 for descriptions of LOS letter scores.) Sections of Treadway Boulevard and Interstate 20 were rated at LOS A and B during the peak hours in 1987. Along sections of U.S. 83/84, the LOS varies from A to C. Texas State Highway 322 provided service at LOS A. Based on population projections for the city, traffic volumes on these principal streets are only expected to increase slightly and the resulting LOS ratings would at most drop by one level by 1994.

Primary access to the base is provided by Business Route U.S. 80 and Texas Farm to Market (FM) Road 3438, named Arnold Boulevard/Dub Wright Boulevard. The main gate is located at Arnold Boulevard, which enters at the northeast corner of the base from Texas FM Road 3438 and Hartford Street. A second gate, located at Texas Drive, enters the base in the family housing area near the southeast corner of the installation. This gate, however, is currently closed to vehicular traffic. A third gate (north gate) enters the base from Military Drive, which traverses the north boundary of Dyess AFB. Texas FM Road 3438 had an AADT of 8,500 to 10,000 in 1986. Arnold Boulevard through the main gate had an AADT of 18,100 in 1986. Traffic flow through Arnold Boulevard was rated at LOS B.

4.4.3.3 Impacts of the Proposed Action

During the construction phase, an increase in incoming vehicular traffic would occur as a result of the movement of construction workers, materials, and equipment. Construction activities would require an estimated 533 program-related personnel during the peak employment year (1992). Of these, 335 program-related employees would reside in the City of Abilene and commute daily to the base. They would generate an additional 305 passenger vehicle trips to the base during the peak hours. This increase in vehicular traffic would add to delays and queues at the main gate to Dyess AFB. Additional heavy-vehicle trips to the base would also increase traffic at the gate. However, these movements could occur during off-peak hours and would not cause additional delays at the main gate during the rush hours. Program-related commuters would cause additional delays and congestion along Texas FM Road 3438 and Arnold Boulevard. The LOS rating along Texas FM Road 3438 would drop from A to B, but would remain at LOS C along Arnold Boulevard through the main gate. A slight increase in queues and waiting times at the gate would also occur.

During the operations phase, an estimated 293 out of 418 program-related employees would reside in the City of Abilene. They are expected to add 266 passenger vehicle trips to the base and would slightly increase congestion and delays along Texas FM Road 3438 and Arnold Boulevard, causing the LOS to drop from A to B, and remain at C along these roads, respectively. Increased queues and waiting times would also occur at the entrance gate. In addition, occasional program-related deliveries of supplies and equipment could also increase traffic at the gates. However, deliveries are expected to occur during off-peak hours and could use other access routes to the base.

Interruptions to vehicular flow at public roads/railroad crossings along the main rail line and the proposed connector spur would also occur. The trains would only move out of the garrison when either major maintenance or repair necessitates that they be transported to the Main Operating Base or depot facilities, or when directed to disperse during times of national need. In addition, a training train would travel periodically to the garrison installation to accomplish operations, security, and maintenance training. These train interruptions at railroad/road crossings would not cause substantial delays to vehicular traffic. Moreover, these train interruptions would only occur occasionally.

Both short- and long-duration impacts on transportation would be low because of the reduction in LOS rating from A to B along Texas FM Road 3438. Slight increases in queues and waiting times at the main gate would also occur but without causing a change in the LOS rating along Arnold Boulevard leading to the main gate. Employees commuting from the City of Abilene would not reduce the LOS ratings along the principal city streets. Impacts would not be significant.

4.4.3.4 Impacts of the Alternative Action

Compared to the Proposed Action (4 TASs), the Alternative Action (6 TASs) would require an increase in program-related personnel. During the construction phase, an estimated 576 program-related personnel would be required in 1992. Of these employees,

364 are expected to reside in the City of Abilene. They are estimated to add 331 passenger vehicle trips to the base during the peak hours. They would also increase delays and queues at the entrance gate as with the Proposed Action. Increases in congestion and delays along Arnold Boulevard would occur, and the LOS rating along Texas FM Road 3438 would be reduced from A to B.

During the operations phase, an estimated 322 out of 460 program-related personnel would reside in the City of Abilene. They are expected to generate 293 vehicle trips (27 more than for the Proposed Action) to the base during the peak hours, and would cause additional vehicular traffic along Arnold Boulevard but without reducing the LOS rating of C. The LOS rating along Texas FM Road 3438 would be reduced from A to B. Peacekeeper and training train impacts on vehicular traffic at road crossings would be about the same as for the Proposed Action.

Commuting associated with the Alternative Action would be slightly greater than with the Proposed Action. However, both short- and long-duration impacts on transportation would still be low because of the reduction in LOS rating from A to B along Texas FM Road 3438. The LOS ratings along the principal city streets in Abilene and along Arnold Boulevard through the main gate would not change. Impacts would not be significant.

4.4.4 LAND USE

4.4.4.1 Region of Influence

The land use ROI includes Dyess AFB, adjacent private lands located south and southeast of the affected areas of the base, and a connector rail spur corridor approximately 0.4 mile long (offbase). The connector spur corridor would be located on private land and extends northward to the main line of the Union Pacific Railroad.

4.4.4.2 Existing and Future Baseline Conditions

Dyess AFB is included within the corporate limits of the City of Abilene and is adjacent to the southern limits of the City of Tye. The lands located west and south of the base boundary are part of the unincorporated areas of Taylor County, Texas. The comprehensive plan for the City of Abilene indicates industrial uses north of the base. Zoning also permits agricultural and open space uses. The area to the south of the base is designated for residential, industrial, commercial, and open space uses (riparian strips) in the city comprehensive plan. Zoning is for agricultural and open space. The unincorporated areas of Taylor County remain unzoned. The area of the proposed connector spur and wye in the City of Tye is zoned for mobile home, industrial, and agricultural uses.

Figure 4.4.4-1 presents a generalized overview of land use onbase and in the surrounding areas. The primary land uses are military (Dyess AFB), agricultural, industrial, and residential. The cultivation of wheat, cotton, and grain sorghum in crop rotation and hay on nonirrigated cropland constitutes the primary agricultural activity The soils on and around the base are generally designated as prime farmland, but not unique farmland.

Livestock, primarily cattle and some sheep, are grazed on mixed open-space land north of the base. Vegetation consists of mesquite/grassland of various densities. The U.S. 277 traffic corridor, south of the base, is characterized as rural with a mixture of low-density commercial, industrial, residential, and agricultural land uses. Interstate 20, U.S. 80/84, and Texas State Highway 320 are located within a large east-west trending traffic corridor north of the base. The land use here is also characterized as rural with a mixture of large commercial and industrial facilities together with some residential land uses. An abandoned mobile home park with one inhabited structure and a few industrial facilities located in the vicinity of the terminus of the existing Air Force spur at the main line of the Union Pacific Railroad north of the base. There is a mobile home subdivision located on Airbase Road, north of the base, adjacent to the connector spur corridor.

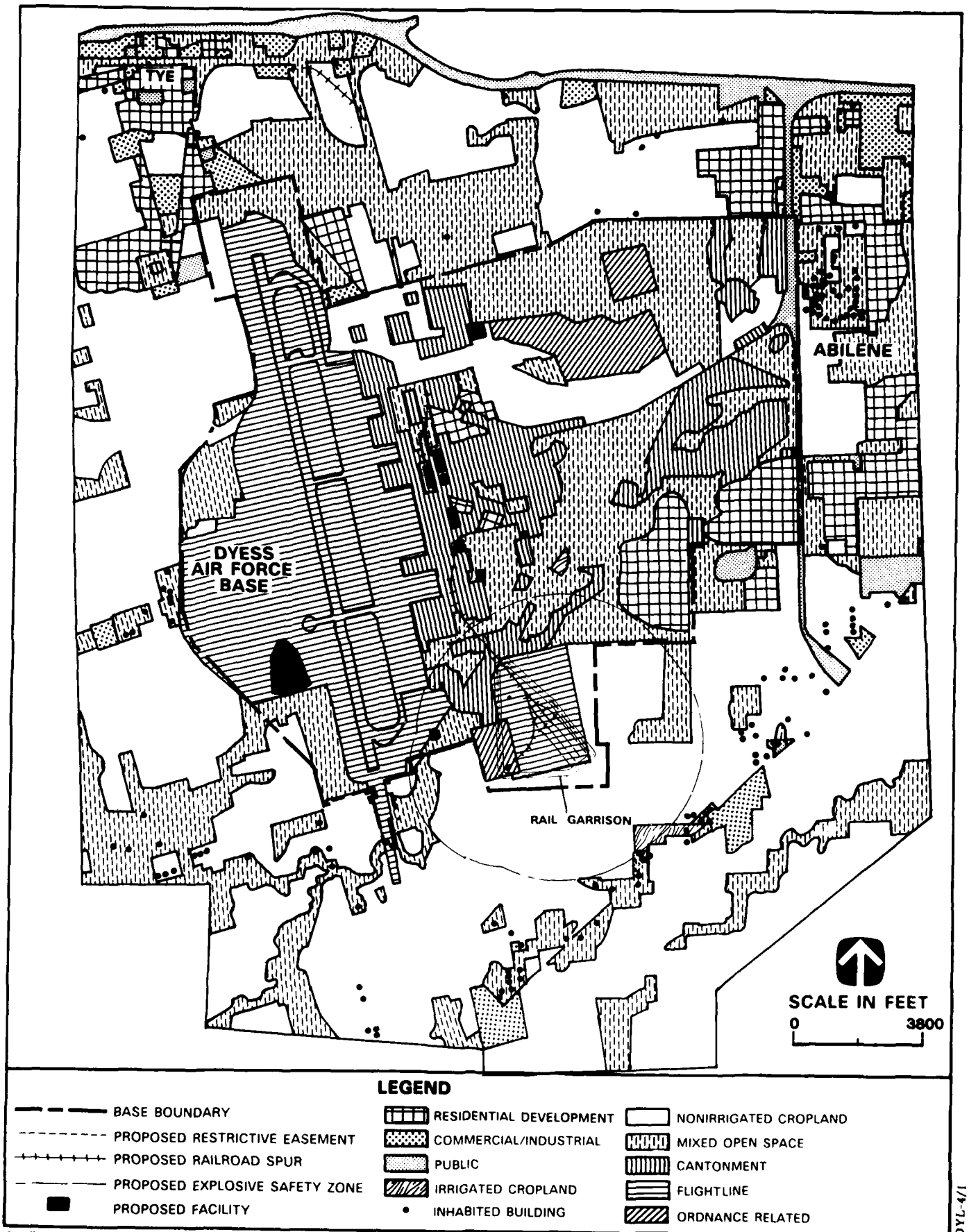


FIGURE 4.4.4-1 LAND USE AT DYESS AFB, TEXAS AND VICINITY

The infrastructure south of the base includes an oil pipeline and two county roads which provide local access to several private roads with locked gates at their entrances. The public infrastructure north of the base consists of three low-voltage electrical distribution lines, two oil pipelines (presently inactive), and Military Drive, a county road which parallels the northern base boundary (Figure 4.4.4-1).

The visual attributes of the ROI are typical of the Central Lowlands Physiographic Province. The area is flat to gently rolling and is vegetated with arid grassland species and a few shrubs and trees. Cropland and pasture now dominate the area. Landscape forms are flat to gently rounded and colors are green to gold. Textures are smooth to medium and well ordered. Existing onbase structures are low on the horizon when viewed from the key observation points along U.S. 277 (AADT 3,500) southeast of the base. A few residences are found along this highway near the base. Only the base runway and flightline facilities are visible from Texas State Highway 707 (AADT 850) west of the base.

4.4.4.3 Impacts of the Proposed Action

The garrison facilities would be located entirely onbase; therefore no acquisition of land would be required. The program would, however, require the acquisition of approximately 730 acres of restrictive easement south and southeast of the base. An additional 27 acres within the explosive safety zone is already in an existing flight clear zone easement. This land is presently in nonirrigated cropland and mixed open space. It contains no inhabited buildings. Agricultural uses could continue within the easement area, but no inhabited buildings would be permitted to be built during the life of the project. Construction of the Rail Garrison at the proposed site would require relocation of the existing base engineer's equipment storage area and the grenade range.

The connector spur would require the acquisition of approximately 12 acres of prime farmland north of the base. This is equal to only 0.005 percent of the prime farmland in Taylor County. Most of this land is nonirrigated cropland and is zoned for industrial and agricultural uses by the City of Tye. A small portion of the land required for the program has been zoned R-1A (mobile home), and is the site of a mobile home park no longer in use. The permanent residence located on the former mobile home park site would not be affected by the connector spur. The connector spur would be compatible with the industrial zoning in the area.

Two existing low-voltage electrical distribution lines and an oil pipeline are located in the explosive safety zone (Figure 4.4.4-1); these may require relocation.

The proposed TAS would be located about 4,000 feet from the nearest major highway, U.S. 277, the key observation point for the base. At this distance, the TAS would appear so low on the horizon that it would not be noticeable to highway users. Furthermore, it would not be an obvious intrusion on the landscape to persons living in the few houses along the highway. The proposed new spur construction north of the base would be about 1,000 feet from Interstate 20 and would not be noticeable to highway users.

Summary of Impacts. Only 12 acres of land for connector spur acquisition would be necessary at Dyess AFB. No inhabited buildings would be located within the restrictive easement. Because the TASs would be located about 4,000 feet from U.S. 277, they would not be noticeable or objectionable to highway users. With these conditions, the short- and long-duration impacts of the program on land use would be negligible.

4.4.4.4 Impacts of the Alternative Action

The Alternative Action at Dyess AFB would the require restrictive safety easement of about 785 acres, 175 acres of which is within an existing flight easement. Since no land acquisition is required and no inhabited buildings would be affected, the short- and long-duration impacts of the Alternative Action on land use would be negligible.

4.4.5 CULTURAL RESOURCES

4.4.5.1 Region of Influence

The ROI for Dyess AFB is entirely within the Lower Plains section of the Central Lowlands Physiographic Province. Present knowledge indicates that historic resources occur predominantly along drainages. The ROI contains the entire range of resources which could occur on or near Dyess AFB.

4.4.5.2 Existing and Future Baseline Conditions

Prehistoric Resources. A site file search was made at the Texas Historical Commission for a 3-mile buffer zone around Dyess AFB and 23 prehistoric sites have been recorded, consisting of three types: quarries, camps, and camps with hearths. Cultural materials include lithic scatters (cores, bifaces, and scrapers), burned bone, projectile points, and, infrequently, ceramic sherds. All of the sites are located on drainages. Site density is undoubtedly higher than seems apparent from the number recorded; very little survey work has been done in this area, but archaeologists familiar with the area report that similar sites may be found everywhere. Prehistoric peoples in this region have been described as being of the Prehorse Plains Culture through the seventeenth century. They were hunters and gatherers who left little evidence of their presence. Comanches were known to be in this region during the nineteenth century; they were nomadic hunting people, and their sites are similar to those of their predecessors. A survey of proposed impact areas at Dyess AFB has been initiated, but no cultural resources have yet been found.

Eight foundations of buildings associated with Tye Army Airfield are located west of the airstrip. Tye Airfield was constructed in the early days of World War II and served as a training base for pilots. The airfield was closed when the war ended, but the building foundations and remnants of the original Tye airstrips remain. The Peacekeeper Rail Garrison program would not affect this area of the base.

Native American Resources. Few Native Americans reside in Texas, but the Abilene area was frequented by the Comanche, who now live in Oklahoma. No sacred or traditional use areas are known. It is not considered likely that such areas will be identified because of the ephemeral nature of sites where traditional use was by nomadic people who remained only briefly.

Paleontological Resources. Paleontological resources are Pliocene in age and would be deeply buried in the Ogallala Formation. Vertebrate fauna such as camel, horses, elephants, sabre tooth tigers, and late megafauna could be found in playa lakes, but they are so deeply buried that the possibility of encountering them is negligible.

4.4.5.3 Impacts of the Proposed Action

The program impact areas consist of 220.4 acres for the garrison, its support facilities, and relocated facilities. Approximately 1.5 miles of new rail line onbase from the garrison to the connection with the Missouri Pacific main line would be required. Offbase, 0.4 mile of connector from the existing line would be required in the wye. New road construction of approximately 1.29 miles in the garrison and 0.53 mile outside the garrison would be necessary.

Prehistoric Resources. Prehistoric sites onbase are expected to be similar to those previously described: small camps, lithic scatters, and hearths. This type of site is less important than much larger, similar sites located near creeks and drainages.

Historic, Native American, and Paleontological Resources. No important or sensitive resources are likely to be affected by the Proposed Action.

Summary of Impacts. Long-duration impacts of the Proposed Action at Dyess AFB for cultural resources would be negligible because no important or sensitive resources are likely to be affected. No short-duration impacts would result from the Proposed Action.

4.4.5.4 Impacts of the Alternative Action

Approximately 30 additional acres of ground disturbance would result if the Alternative Action is selected. This acreage would be an expansion of the garrison area identified for the Proposed Action. Other impacts associated with the alternative would be the same as for the Proposed Action.

Long-duration impacts of the Alternative Action at Dyess AFB on cultural resources would be negligible because no important or sensitive resources are likely to be affected. No short-duration impacts would occur.

4.4.6 BIOLOGICAL RESOURCES

4.4.6.1 Region of Influence

The ROI for biological resources at Dyess AFB is defined as those areas where these resources would be directly affected by the construction of new facilities onbase and 1.7 miles of new rail spur and upgrades offbase (Section 4.4, Figure 4.4-1). Areas of indirect disturbance in the ROI where program-induced impacts may occur are defined as those recreational areas within an approximately 1-hour driving time of Abilene, Texas, including Abilene State Recreational Area, Lake Brownwood State Park, Hubbard Creek Lake, Lake Fort Phantom Hill, Lake Stamford, and the Colorado River.

4.4.6.2 Existing and Future Baseline Conditions

Biological Habitats. *Dyess AFB lies within the Osage Plains region. Native species that* occur in undeveloped areas onbase and in the surrounding area include bluestem, buffalograss, blue grama, western ragweed, broomweed, and mesquite. The developed areas on Dyess AFB have been seeded with introduced grass species. Tree species such as elm, willow, and oak have also been used for landscaping onbase. The area within a 1-mile radius of the base is used primarily for farming and ranching (Figure 4.4.6-1). The habitats that occur onbase and in the immediate vicinity do not support diverse wildlife species because of the existing level of disturbance, poor cover, and minimal forage available in these habitats. A few wildlife species, such as the black-tailed jackrabbit, eastern cottontail rabbit, striped skunk, coyote, Mexican ground squirrel, turkey, bobwhite quail, and various other species of birds, occur on Dyess AFB and are common to the area. Several reptile and amphibian species also occur onbase. An 8-acre pond located onbase provides some opportunity for recreational fishing. Six miles of intermittent and channelized streams also occur onbase. Future baseline conditions onbase are expected to be similar to existing conditions based on current base management plans.

The remaining ROI includes agricultural lands and grasslands. The main aquatic habitats in the ROI are Lake Fort Phantom Hill, Lake Brownwood, Lake Stamford, Hubbard Creek Lake, the Clear Fork of the Brazos River, and the Colorado River. These areas support warmwater sport fisheries and are important recreational areas. Riparian habitats that occur along the streams, rivers, and lakes in the ROI are valued habitats that are given special consideration by natural resource managers. Future baseline conditions would be similar to existing conditions based on projections for population increases and increased recreational use in the ROI.

Threatened and Endangered Species. No threatened or endangered species are known to exist in any of the habitats on Dyess AFB. Several federal threatened and endangered, federal-candidate, and state-recognized species occur in the ROI (Table 4.4.6-1). No suitable habitats for these species occur in or near potential program facilities.

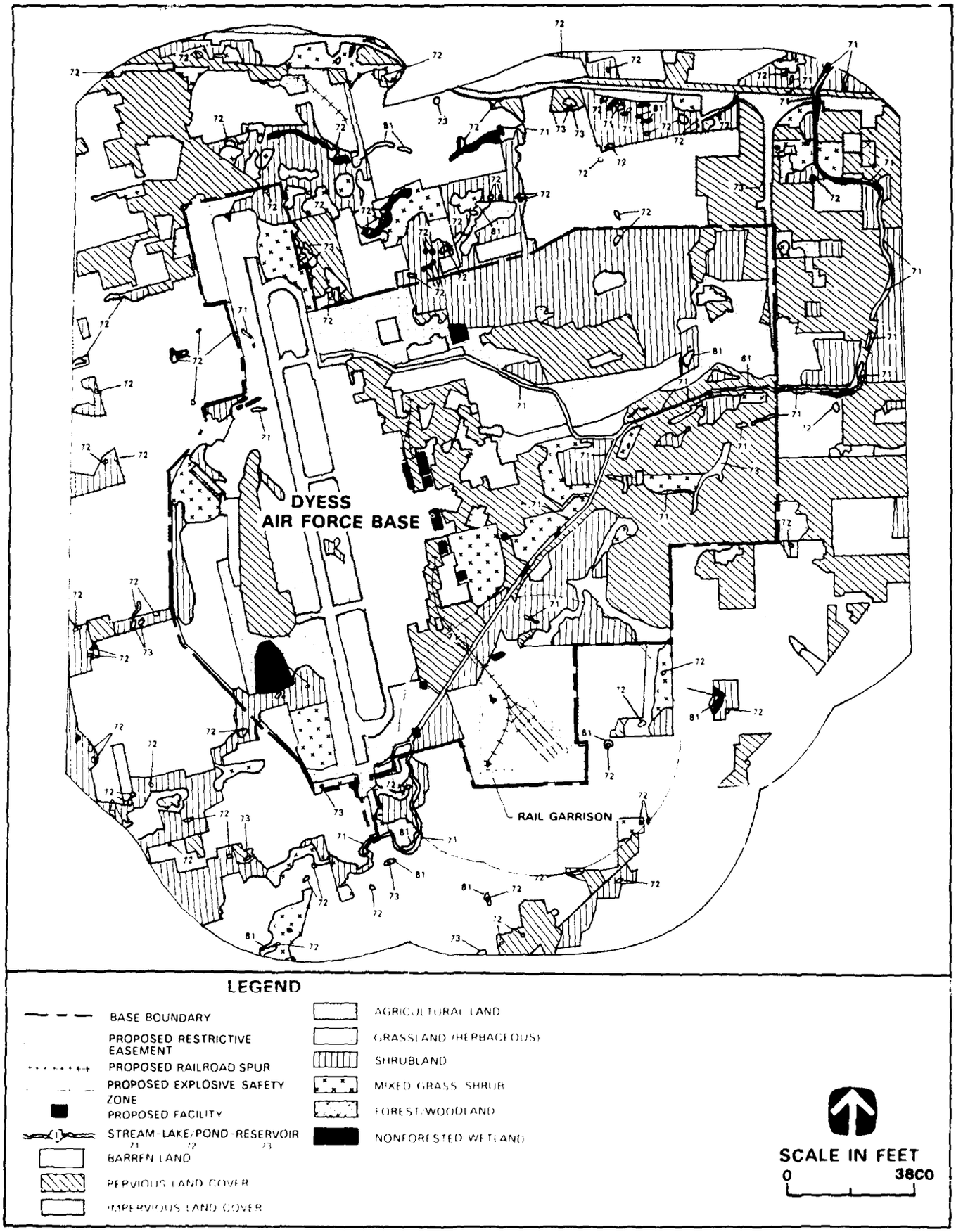


FIGURE 4.4.6-1 HABITAT AND LAND COVER TYPES AND POTENTIAL DISTURBANCE AREAS ON DYESS AFB, TEXAS AND IN THE VICINITY

Table 4.4.6-1

Federally Listed, Federal-Candidate, and State-Sensitive Species
Dyess AFB, Texas and Vicinity

Common Name	Scientific Name	Federal Status	State Status	Distribution
American peregrine falcon	Falco peregrinus anatum	E	E	May occur in region as migrant
Arctic peregrine falcon	Falco peregrinus tundrius	T	T	May occur in region as migrant
Bald eagle	Haliaeetus leucocephalus	E	E	May occur in region as migrant
Black-capped vireo	Vireo atricapillus	E	E	May occur in region
Brazos water snake	Nerodia harteri harteri	3C	T	May occur in region
Central plains milk snake	Lampropeltis triangulum gentilis	-	T	May occur in region
Concho water snake	Nerodia harteri paucimaculata	T	-	May occur in region
Interior least tern	Sterna antillarum athalassos	E	E	May occur in region as migrant
Mexican milk snake	Lampropeltis triangulum annulata	-	T	May occur in region
Osprey	Pandion haliaetus	-	T	May occur in region
Texas horned lizard	Phrynosoma cornutum	-	T	Occurs in region
White-faced ibis	Plegadis chihi	2	T	Occurs in region
White-tailed hawk	Buteo albicaudatus	-	T	May occur in region
Wild mercury	Argythamnia aphoroides	2	T	May occur in region
Wood stork	Mycteria americana	E	T	May occur in region as migrant
Zone-tailed hawk	Buteo albonotatus	-	T	Occurs in region

Notes: E = Endangered
T = Threatened
2 = Federal candidate, Category 2
3C = Federal candidate, Category 3C

Sources: U.S. Fish and Wildlife Service 1984; U.S. Air Force 1987.

4.4.6.3 Impacts of the Proposed Action

Biological Habitats. Construction of garrison facilities, roads, and rail lines at Dyess AFB would permanently disturb 81.3 acres of land and temporarily disturb 139.1 acres (Section 4.4, Table 4.4-3). Some of the area (47 acres) has been previously disturbed during construction of facilities for onbase programs; however, the majority of the area to be disturbed is dominated by grassland (Table 4.4.6-2). Other habitats in the potential disturbance areas include 13.1 acres of shrubland, 1.8 acres of mixed-grass shrub, 0.3 acre of channelized stream, 0.7 acre of nonforested wetlands, and 0.4 acre of reservoirs (Table 4.4.6-2). In compliance with Executive Order No. 11990 and in accordance with requirements of Section 404 of the Clean Water Act, alternative sites were considered for location of program facilities. In order to collocate facilities of the

Table 4.4.6-2

Habitat and Land Cover Types Potentially Disturbed by the Peacekeeper Rail Garrison Program at Dyess AFB, Texas

Habitat Type	Garrison, Support, and Relocated Facilities (acres)	Rail Line (acres)	Total (acres)
Proposed Action			
Grassland	153.0	4.1	157.1
Shrubland	13.1	0.0	13.1
Mixed grass-shrub	1.8	0.0	1.8
Nonforested wetland	0.4	0.3	0.7
Streams	0.1	0.2	0.3
Reservoirs	0.4	0.0	0.4
Developed land	24.7	22.3	47.0
TOTAL:	193.5	26.9	220.4
Alternative Action			
Grassland	156.0	4.1	160.1
Shrubland	2.3	0.4	2.7
Mixed grass-shrub	1.8	0.0	1.8
Nonforested wetland	0.4	0.3	0.7
Streams	0.1	0.2	0.3
Reservoirs	0.4	0.0	0.4
Developed land	62.5	21.9	84.4
TOTAL:	223.5	26.9	250.4

proposed program with existing facilities, keep as much of the program within existing base boundaries as possible, and meet engineering and operational constraints, it was determined that there is no practicable alternative to the proposed construction of some facilities in wetlands. Furthermore, site-specific program design and construction techniques would include all practicable measures to minimize harm to wetlands.

Some wildlife species (e.g., ground squirrels) in the potential disturbance areas would experience an increase in mortality, whereas, more mobile species (e.g., coyotes and rabbits) would be displaced to surrounding habitats. Construction activities would occur primarily in habitats (e.g., grassland) which provide minimal cover and forage for wildlife; therefore, long- and short-duration impacts would be minor.

The Peacekeeper Rail Garrison program would cause a small increase in the regional population and would cause a slight increase in use of recreational resources in the ROI. Areas which may experience an increase in use include the regional lakes (Lake Fort Phantom Hill, Lake Brownwood, Stamford Lake, and Hubbard Creek Lake), the Colorado River, and Abilene State Recreational Area. The biological resources in these areas are managed and protected by natural resource management agencies, therefore, biological resources would not be affected.

Threatened and Endangered Species. No impacts on threatened and endangered species are expected to occur as a result of the program.

Summary of Impacts. Implementation of the program would generate some minor impacts on biological resources onbase. The program would affect 220.4 acres of land, which would not impact wildlife populations to any great extent onbase or in the region because the habitats that would be affected support small populations because of minimal cover and low availability of forage. Program-induced increases in recreation would not have an impact on biological resources because the additional program-induced use would be small and distributed among many potential resources. Therefore, both short- and long-duration program impacts would be low. These impacts would not be significant.

4.4.6.4 Impacts of the Alternative Action

The Alternative Action would result in the loss of 250.4 acres of land (Table 4.4.6-2). Habitats that would be affected are similar to those that would be disturbed by the Proposed Action and represent poor quality wildlife habitat (Table 4.4.6-2). Therefore, short- and long-duration impacts on biological resources from this alternative would be similar to the Proposed Action, and are expected to be low. These impacts would not be significant.

4.4.7 WATER RESOURCES

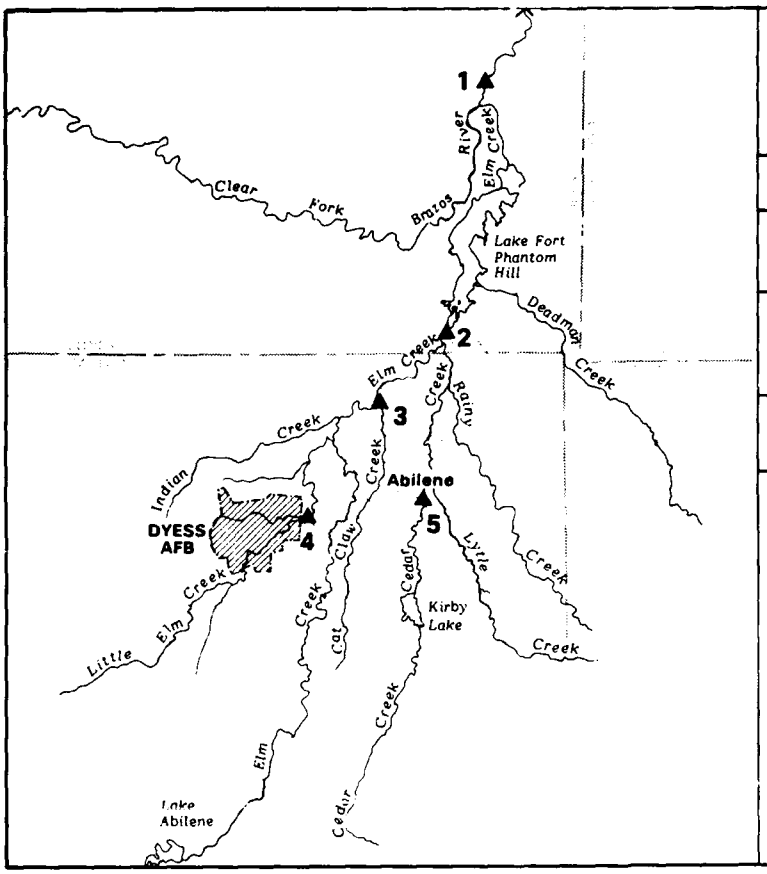
4.4.7.1 Region of Influence

The water resources ROI for Dyess AFB consists of the middle and lower drainage area of Elm Creek, downstream to the creek's junction with the Clear Fork of the Brazos River, 15 miles north of Abilene (Figure 4.4.7-1). The ROI includes the base and its support community, Abilene, and covers an area of 130 square miles.

4.4.7.2 Existing and Future Baseline Conditions

Major Water Users. Total water use in Taylor County in 1985 was just under 25,000 acre-feet (acre-ft). Municipal use, primarily in the City of Abilene, accounted for 76 percent while agricultural use was another 15 percent of the total. Data on water use in Abilene and at Dyess AFB are shown in Figure 4.4.7-1. Dyess AFB receives its water from Abilene. The city has water rights or agreements from several surface sources for up to 70,000 acre-ft in a year with high water runoff. However, dependable water supplies total about 45,000 acre-feet per year (acre-ft/yr). The city is a participant in the proposed Stacy Reservoir which, when built, will supply the city with up to an additional 15,000 acre-ft/yr. Abilene has also adopted an active water conservation and wastewater reuse strategy which should assure adequate supplies well into the next century.

Surface Water Hydrology and Quality. The ROI has a moderately moist climate which supports a number of small, perennial streams. Two such creeks are Cedar and Elm, which flow through Abilene. Little Elm Creek is an intermittent creek which flows in a channelized section through the southern portion of Dyess AFB, receiving all drainage from the base. This stream has no state-designated uses. In general, the 100-year flood zones on the base remain within well-defined channels except on the southeastern side. In the past, high flows have caused little damage. The entire ROI drains to Lake Fort Phantom Hill, located on Elm Creek about ten miles north of Abilene. The designated uses of this lake are primary contact recreation, municipal supply, and aquatic habitat. In addition to natural drainage, this reservoir receives water imported from several out-of-basin streams and serves as Abilene's principal water supply. Two other smaller reservoirs also supply water to Abilene. Wastewater from Dyess AFB is treated by Abilene which discharges a total of 15,600 acre-ft/yr (13.9 million gallons per day [MGD]) to Deadman Creek.



ANNUAL WATER USE OF SELECTED ENTITIES
(acre-ft/yr)

ENTITY	RECENT USE	PROJECTED USE (1993)
Abilene*	20,510	26,000
Dyess AFB	1,300	1,400

SELECTED HYDROLOGIC CHARACTERISTICS

STATION ▲	DRAINAGE AREA (sq mi)	AVERAGE FLOW (cfs)	10-yr 7-day LOW FLOW (cfs)
1	2,200	80	0
2	422	19	0
3	13	2.5	0
4	29	2.1	0
5	119	7.1	0

LEGEND

STREAM

COUNTY BOUNDARY

1 ▲ STATION

Note: *Includes Dyess AFB

SCALE IN MILES
0 7

DYW-4/1

FIGURE 4.4.7-1 HYDROLOGIC FEATURES OF THE DYESS AFB, TEXAS REGION OF INFLUENCE

Table 4.4.7-1

Program-Related Water Use
Within the Dyess AFB Region of Influence
Peacekeeper Rail Garrison Program (Proposed Action)
(values in acre-ft)

	1990	1991	1992	1993 Onwards
Dyess AFB				
Construction/Operations	36	43	34	23
Domestic	0	5	18	18
Abilene Domestic	42	149	264	239
TOTAL:	78	197	316	280

Groundwater Hydrology and Quality. Relatively meager groundwater resources exist in the area and wells frequently have small yields and/or poor water quality. A shallow, alluvial aquifer underlies much of the base and water can be found in sand and gravel strata within 20 feet of the surface. A bedrock aquifer known as the Vale Formation lies at fairly shallow depth on the western side of the base. Wells penetrating the top of this unit will usually produce low yields (less than 100 gallons per minute) of water with highly variable quality. In general, groundwater is pumped primarily to meet limited rural water needs.

4.4.7.3 Impacts of the Proposed Action

Major Water Users. Program-induced water use in the Abilene area would increase to a maximum of about 320 acre-ft/yr (0.3 MGD) by 1992, then decline to about 280 acre-ft/yr during the operations phase (Table 4.4.7-1). This water would be supplied entirely by Abilene and would result in a 1-percent increase in baseline water use. Total baseline-plus-program water use in 1993 would be about 26,300 acre-ft (23.5 MGD), which is about 60 percent of the firm annual supply. Therefore, the city has adequate water supplies to meet program needs. Program-related water use at Dyess AFB during the operations phase would be about 40 acre-ft/yr (0.04 MGD), a 3-percent increase over the baseline use of 1,400 acre-ft/yr (1.2 MGD). The base has no contractual limits on water supply from Abilene and its current supply can easily meet this small increase. Program-related water use at Dyess AFB during the operations phase would be about 40 acre-ft/yr (0.4 MGD), a 3-percent increase over the baseline use of 1,400 acre-ft/yr (1.2 MGD). The base has no contractual limitations on water supply from Abilene and its current supply can easily meet this small increase. The water supplies to other major water users in the ROI would not be adversely affected by the Proposed Action.

Surface Water Hydrology and Quality. The program would also result in a small increase (1%) over baseline wastewater discharge of 17,400 acre-ft (15.5 MGD) to Deadman Creek in 1994. The city's wastewater treatment plant is currently operating at capacity. A 33-percent expansion of the plant will be completed in 1990, resulting in adequate treatment capacity to treat the additional 140 acre-ft/yr (0.1 MGD) of program-related wastewater. Program-induced increases in discharge to Deadman Creek should not substantially change baseline water quality in the creek.

Approximately 155 acres of site disturbance in the southeastern corner of the base would result from garrison construction. The northern edge of the garrison site would lie near the southeastern bank of Little Elm Creek and its 100-year flood zone. The flood zone along this stretch of the creek is confined almost entirely within the channel. The site itself is relatively level and would require only minor grading. Although the sheet erosion potential of the site is substantial, Elm Creek is an intermittent stream. Therefore, the potential for water quality degradation due to erosion and sedimentation is low except during periods of heavy runoff. A railroad bridge across Little Elm Creek and 2.0 miles of new track must be built to connect the garrison site north to the existing base rail spur. Assuming that this bridge is designed to adequately pass flood flows, the garrison site should not affect local stream hydraulics if grading activities occur no closer than 50 to 100 feet from the existing edge of the channel. Short-term water quality degradation could occur until revegetation measures along the spur and around other new program facilities were completed. Minor, long-term water-quality degradation due to the garrison is expected.

Groundwater Hydrology and Quality. The western half of the garrison site would overlie an old sanitary landfill used by the base from 1955 to 1972. The waste is covered with four feet to five feet of soil and no substantial, additional groundwater effects are likely to result from the Proposed Action, assuming the land-filled waste not physically disturbed.

Summary of Impacts. Available water supplies are adequate to meet program needs. Surface water impacts would be limited to minor sedimentation which would occur during infrequent periods of stormwater runoff to an adjacent intermittent stream. Short- and long-duration impacts would be low. These impacts would not be significant.

4.4.7.4 Impacts of the Alternative Action

Major Water Users. Total program-related water use during the operations phase would be 310 acre-ft/yr, a 10-percent increase over the Proposed Action. Compared to the Proposed Action, baseline-plus-program water use at Dyess AFB would increase by less than one percent to a total of 1,450 acre-ft/yr (1.3 MGD). The comparable increase in the Abilene water system would also be minor. The available water supply is adequate to meet the water needs of this alternative with no effects on existing major water users.

Surface Water Hydrology and Quality. With six TASs, the disturbed area at the garrison would increase by 19 percent to 185 acres. Sedimentation to Little Elm Creek could be expected to increase by a similar percentage. As with the Proposed Action, water quality impacts on this intermittent stream would be limited to infrequent periods of stormwater runoff.

Groundwater Hydrology and Quality. No substantial groundwater effects are expected as a result of this alternative.

Summary of Impacts. Short- and long-duration impacts on water resources are expected to remain essentially the same as the Proposed Action: low. These impacts would not be significant.

4.4.8 GEOLOGY AND SOILS

4.4.8.1 Region of Influence

The ROI at Dyess AFB for geology and soils includes the installation and associated program-related areas in the immediate vicinity. The land within a 1-mile radius of the installation and a 1,000-foot-wide corridor along the connecting rail spur was characterized for purposes of establishing the local baseline context. In addition, a regional ROI was established for geologic hazards for the purpose of developing a regional tectonic framework for seismicity at the installation.

4.4.8.2 Existing and Future Baseline Conditions

Dyess AFB lies in the Osage Plains subdivision of the Central Lowland Physiographic Province. The area is characterized by nearly level to gently rolling hills and broad flat plains. Surficial deposits of the Upper Permian Vale Formation and Quaternary alluvium occur onbase. The Vale Formation is composed of shales, sandstones, and dolomite. The alluvium consists of sand, silt, clay, and gravel. The installation lies in seismic zone 1 (Uniform Building Code 1985) in which a maximum credible earthquake with a magnitude of 6.1 is the largest predicted for the area. Maximum horizontal acceleration in rock is expected to be less than 0.04 g, with a 90-percent probability of not being exceeded in 50 years (Algermissen et al. 1982). Active faults have not been identified in the local ROI and the area is not susceptible to liquefaction. Areas susceptible to landslides or terrain failure were not discovered in the ROI.

Energy and Mineral Resources. Oil and gas resources have been identified south and southwest of the installation in the ROI. No uranium or coal mines/leases, Known Geothermal Resource Areas, or metallic/nonmetallic mineral resource mining operations or leasing activities exist in the ROI.

Soil Resources. The U.S. Soil Conservation Service (SCS) has mapped 32 soil types in the ROI. Fifteen of these soil types occur in areas where program-related facilities may be located. They occur on nearly level to gently sloping surfaces with some surface areas identified as strongly sloping. The soils have a loamy or clayey texture and are moderately to well drained. Soil erosion susceptibility was evaluated for wind and sheet erosion. Wind erosion of unvegetated/disturbed ground in the ROI is a major concern of the SCS in Texas but has not been identified as a major problem for soils affected by the

proposed program. The prevailing southerly wind direction would make north-south elongated tracts of land susceptible to wind erosion. The proposed garrison, rail spur, and other facilities would all be located on soils with a low to moderate susceptibility to wind erosion and a moderate susceptibility to sheet erosion.

4.4.8.3 Impacts of the Proposed Action

Energy and Mineral Resources. Impacts on energy and mineral resources are not expected because oil and gas fields/leases occur south of the installation and would not be affected by the proposed program. In addition, no other energy or mineral resources have been identified in the ROI.

Soil Resources. Program-related wind erosion at the proposed garrison, other facilities, and the rail spur is projected to occur at rates of 0.8 ton per acre per year (T/ac/yr) to 3.1 T/ac/yr. The application of one ton per acre (T/ac) of straw mulch would temporarily reduce the rates of erosion for all soils affected to less than 0.1 T/ac/yr. During garrison construction, soil would also erode at rates of 3.6 T/ac/yr to 9.7 T/ac/yr for large exposed areas of a soil type. The application of one T/ac of straw mulch would temporarily reduce the rates to less than 0.1 T/ac/yr. Program-related sheet erosion at the proposed garrison site is projected to occur at rates of 6 to 6.9 T/ac/yr. Soils along the rail spur are projected to erode at rates of 5.2 T/ac/yr to 13.5 T/ac/yr and at rates of 6 to 19.3 T/ac/yr at the other proposed facility sites. The application of one T/ac of straw mulch after construction would temporarily reduce the rates of erosion to 1 T/ac/yr to 3.9 T/ac/yr for all soils affected. The range of soil erosion rates identified for the proposed program (6 to 29.4 T/ac/yr) are comparable to those determined for general urban development (16 to 156 T/ac/yr) as supplied by the U.S. Department of Housing and Urban Development (1981).

Soil erosion impacts are based on the combined effects of wind and sheet erosion values and how they compare to the maximum tolerable soil loss for each soil type. Soil erosion rates would exceed the maximum tolerable soil loss (4-5 T/ac/yr) of the affected soil types during construction. Program-related soil erosion is therefore expected to cause short-duration impacts. Long-duration impacts are not expected because accelerated rates of erosion would occur for only a short period of time prior to mulching and reestablishing a vegetative cover in the disturbed areas.

Summary of Impacts. Overall short-duration impacts of the proposed program on the geology and soils resource are expected to be high because accelerated rates of erosion during program-related construction would exceed the maximum tolerable loss of the soils affected. Long-duration impacts are expected to be negligible because accelerated erosion rates would not continue into the operations phase of the program. Short-duration impacts would not be significant because increased rates of erosion would not result in an appreciable net loss of topsoil over the short period of time under consideration.

4.4.8.4 Impacts of the Alternative Action

The Alternative Action would slightly increase the size of the garrison. Therefore, impacts on the geology and soils resource would be about the same as for the Proposed Action. Consequently, all levels of impact and significance would remain the same as for the Proposed Action. Short-duration impacts would be high and not significant while long-duration impacts would be negligible.

4.4.9 AIR QUALITY

4.4.9.1 Region of Influence

The ROI for the air quality resource includes Dyess AFB, the City of Abilene, and the interstate highways and principal arterials in Taylor County.

4.4.9.2 Existing and Future Baseline Conditions

Dyess AFB is located in the Abilene-Wichita Falls Air Quality Control Region (No. 210). There are no Prevention of Significant Deterioration Class I areas within 50 miles of the base. The region is now in compliance with all existing primary air quality standards and is not designated as an air quality maintenance area (i.e., the area is not likely to exceed the primary standards in the foreseeable future in the Texas).

There are no ambient air quality measurements reported for Dyess AFB. The nearest representative total suspended particulate (TSP) monitoring station to Dyess AFB is Abilene State Park, located 15 miles south of the base. The 3-year (1981-1983) 24-hour and annual average values from this station were 84 micrograms per cubic meter ($\mu g/m^3$) and 37 $\mu g/m^3$, respectively. Both of these concentrations were below the National Ambient Air Quality Standards (NAAQS) for TSP. Dry-farming regions in northwest Texas and the Edwards Plateau can be major sources of fugitive dust.

Taylor County emissions, including carbon monoxide (CO), hydrocarbons, nitrogen oxides (NO_x), particulate matter (PM_{10}), sulfur oxides (SO_x), and volatile organic compounds (VOC, a measure of reactive hydrocarbons), are presented in Table 4.4.9-1. Sources of pollutants include fixed sources (fossil fuel combustion and fuel or solvent evaporation), construction activities, and mobile sources (both ground and aircraft).

Future air quality at the base and Taylor County will remain good because only light commercial construction is planned.

4.4.9.3 Impacts of the Proposed Action

Direct air emissions would result from construction of the rail spur line and support facilities and operation of the proposed program at Dyess AFB. Emission sources associated with construction include light-duty vehicle traffic, diesel trucks, offsite heavy-duty vehicles, diesel construction equipment, and fugitive dust from ground disturbance.

Table 4.4.9-1

Taylor County, Texas Air Emissions Inventory, 1987
(tons per year)

Emission Source	TSP	SO_x	NO_x	VOC	CO
Fuel Combustion	107	445	12,865	433	2,148
Industrial Process	0	0	0	2,671	0
Solid Waste Disposal	119	4	26	196	604
Air/Water Transportation	438	35	286	592	1,710
nd Transportation	2,673	530	5,988	4,140	24,710
Miscellaneous	60,461	0	3	22	119
Dyess AFB	37	34	280	525	1,261
TOTAL:	63,835	1,048	19,448	8,579	30,552

Source: U.S. Environmental Protection Agency 1988b.

The highest monthly fugitive dust emissions from proposed program construction activity would be about 17 tons. Fugitive dust calculations assume a 50-percent reduction due to watering of the construction sites. All of the fugitive dust emissions at Dyess AFB were conservatively assumed to be within the 10-micrometer particle size and referenced against the PM_{10} standard for impact analysis. It is expected that actual PM_{10} emissions would be smaller than the emissions calculated under the U.S. Environmental Protection Agency (EPA) guidelines for TSP.

Construction-related impacts were calculated for 24-hour and annual averaging periods. A program-related increase of 0.3 $\mu g/m^3$, which includes particulates from combustion products, would occur, increasing the 24-hour average background concentration to 84.3 $\mu g/m^3$. The predicted 24-hour background concentration would not equal or exceed the 24-hour NAAQS of 150 $\mu g/m^3$ (PM_{10}). The annual background concentration would increase to 37.1 $\mu g/m^3$, which would not equal or exceed the PM_{10} standards of 50 $\mu g/m^3$. Fugitive dust generated at Dyess AFB for the peak construction year would have negligible impacts on regional air quality. The EPA-minimum threshold levels for fugitive dust would not be exceeded, and no violation of NAAQS would occur.

Overall short- and long-duration air quality impacts would be negligible.

4.4.9.4 Impacts of the Alternative Action

The Alternative Action (6 TASs) would cause a 0.1-percent increase in fugitive dust emissions over the Proposed Action. This would result in a total increase of 0.4 $\mu g/m^3$ above existing background concentrations, increasing the 24-hour average ambient concentration to 84.4 $\mu g/m^3$. Overall short- and long-duration air quality impacts would be negligible and would not cause any violation of the NAAQS.

4.4.10 NOISE

4.4.10.1 Region of Influence

The ROI for the noise resource is broadly defined as the area where program-related noise level increases occur. Specifically, the ROI includes Dyess AFB, the City of Abilene, and the interstate highways and principal arterials in Taylor County.

4.4.10.2 Existing and Future Baseline Conditions

There are three major noise sources in the City of Abilene and in the vicinity of Dyess AFB: road and air traffic, and railroad noise.

The major locations of motor vehicle-related noise at Dyess AFB are Business Route U.S. 80 and Arnold Boulevard, both primary accesses to the base. Sensitive receptors (residential areas within 200 ft of the highway) experience noise levels of 60 decibels on the A-weighted scale (dBA) to 65 dBA (L_{dn}).

Flight operations of the B-1 bomber wing at Dyess AFB cause noise levels ranging from 57 dBA expressed as day-night equivalent sound level (L_{dn}) in Hodges, Texas to 75 dBA (L_{dn}) in Tye, Texas.

The principal railroad noise is generated by the Union Pacific Railroad which runs through the community of Tye. The noise levels range from 65 dBA to 70 dBA (L_{dn}) from this activity. Background noise levels at the offbase trailer park near the railroad line are about 65 dBA (L_{dn}).

4.4.10.3 Impacts of the Proposed Action

Temporary impacts resulting from construction-related noise would occur within the immediate vicinity of construction sites. The various activities that would take place include construction of industrial structures, the rail spur line, and roadways (grading, compacting, and paving); landscaping; and cleanup at Dyess AFB.

Construction-related noise at Dyess AFB is anticipated to affect offbase residential areas for very short periods during rail spur construction. The estimated construction noise in the offbase trailer park, about 200 feet from the proposed spur line, would be 74 dBA, causing an increase of 4 dBA above background levels. The short-duration noise impacts at these sensitive residential receptors would be low. However, these impacts would not be significant because they would not exceed the 10-dBA criterion. Once the construction activity ceases, noise levels would return to near ambient conditions. The short-duration noise impacts from all other construction activities would be negligible because the predicted increases in noise levels at the sensitive receptors (onbase housing) located about 5,300 feet from the TAS would be 51 dBA, which would be masked by existing ambient noise levels of 70 dBA.

During the operations phase, noise would be generated by vehicular and railroad traffic. Additional vehicular traffic due to the proposed program would cause an approximately 0.2-dBA (L_{dn}) increase in noise levels at the sensitive receptors (residential areas) within 200 feet of Business Route U.S. 80 and Arnold Boulevard. This increase in vehicular noise levels would have negligible impact on the sensitive receptors.

Operational railroad activities for the proposed program include training train operations. These activities would generate some additional train movement on the main line. The increase in noise levels at the sensitive receptors along the main line would be negligible.

Overall, the short-duration noise impacts would be low and not significant while the long-duration impacts would be negligible.

4.4.10.4 Impacts of the Alternative Action

The noise levels resulting from the construction (6 TASs) at the garrison site would be about the same as the proposed program. The short-duration impacts resulting from rail spur construction would be low on an offbase trailer park. However, these impacts would not be significant because they would not exceed the 10-dBA criterion. The long-duration (operational) impacts would be negligible.

4.4.11 Impacts of the No Action Alternative

With the No Action Alternative, the Peacekeeper Rail Garrison system would not be deployed. Activities at Dyess AFB will continue to support other existing or proposed missions. For the host communities in the vicinity of the base, environmental changes would occur as a result of normal community growth. Future baseline conditions reflecting the No Action Alternative were described in earlier portions of this chapter.

4.4.12 Irreversible and Irretrievable Resource Commitments

Deployment of the Peacekeeper Rail Garrison program at Dyess AFB would result in the irreversible and irretrievable commitments of some human and natural resources. The affected resources are the following:

> The proposed program requires the use of relatively small amounts of labor, materials, energy, and other economic resources during both the construction and operations phases. The local procurement of building materials (such as

cement, sand, and gravel) may alter some resource characteristics in the deployment area. Although these economic factors, once used by the proposed program, generally cannot be recovered for other purposes, the extent of their use would be small in comparison to total resource availability.

- Lands utilized for the program facilities will be irreversibly committed for the duration of the program. Such use of land would not cause an irretrievable commitment because the land can be reclaimed through removal of program facilities and implementation of necessary soil rehabilitation.

- Both irreversible and irretrievable commitments would occur if NRHP-eligible prehistoric sites are destroyed or damaged during construction and operations. While data recovery is possible, avoidance is preferred because technological advances in the discipline will permit future researchers to make more effective use of the resources.

- Both irreversible and irretrievable commitments would occur if National Register of Historic Places (NRHP)-eligible historic sites and architectural resources are destroyed during construction and operations.

- Disturbed biological communities, given sufficient time, can recover to a state approximating predisturbance conditions once the disturbance ends. Therefore, few of the biological impacts due to temporary disturbance expected from the proposed program would be irreversible and irretrievable. Permanent disturbance will result in, for all practicable purposes, an irreversible and irretrievable loss of some grassland and wetland habitat.

- Soils would be permanently disturbed at construction and related sites (e.g., borrow pits, roads, buildings, and rail spur) and may be irreparably damaged during the life of the program if disturbed areas are not mulched or revegetated, especially at the garrison location. Aggregate resources would be used for construction of buildings, roads, and rail spurs.

4.4.13 Relationship Between the Local Short-Term Use of Man's Environment and the Maintenance and Enhancement of Long-Term Productivity

Deployment of the Peacekeeper Rail Garrison program at Dyess AFB would result in the short-term use of some human and natural resources that may affect the maintenance and enhancement of long-term productivity. The affected resources are the following:

- Short-term program-generated disruptions and delays of traffic would result in a decrease in the comfort, convenience, and safety afforded users of primary roads leading to the base. No effect on long-term productivity is expected.

- Additional information gained during program-related surveys of archaeological and historic resources may contribute to the data base and improve man's knowledge of the area's history. This would enhance the management of remaining cultural resources in the region.

- Areas temporarily disturbed by the construction activities would result in short-term losses of biological habitats. However, recovery rates are expected to be relatively fast and no effect on long-term productivity is expected.

- Soil erosion during construction would increase sedimentation to local streams resulting in a short-term deterioration of surface water quality. However, the additional loss of soil would not affect soil productivity or the long-term quality of streams.

- Reduction in air quality levels would result from fugitive dust during construction. However, no long-term reduction in air quality is expected.

4.4.14 Environmental Concerns Associated With a Possible Future Second Rail Connector

A second rail egress from Dyess AFB could be achieved by providing a southerly rail connector to the main line of the Atchison, Topeka and Santa Fe Railway Company (Figure 4.4.14-1). This connector would require the acquisition of approximately 77 acres of land and the construction of 6 miles of new track. Additionally, two 75-foot bridges would be required for stream crossings.

Construction costs for this second rail connector would be approximately $7.1 million (1986 dollars) and would require approximately 50 direct construction workers and 90 secondary workers over a 1-year period. Most of these workers would be from the local area, including Callahan, Jones, Nolan, Runnels, and Taylor counties in Texas. Because inmigration of labor for this construction would be minimal, there would be no major concerns for the socioeconomics, utilities, and transportation resources.

The rail connector right-of-way (ROW) would pass through mostly nonirrigated cropland, some mixed open space, and scattered farmhouses and ranch houses. The ROW could be sited to avoid farmhouses along the route.

Approximately four miles of the six miles of new track construction would be near Little Elm Creek and its tributary. Prehistoric sites (burned rock middens and lithic scatters) occur along the stream in the area and numerous sites could be affected by construction. The second rail connector would traverse some floodplain and intermittent drainages of the Little Elm Creek, requiring removal of riparian vegetation in those areas. Local wildlife populations and threatened and endangered species in the general area would experience some temporary disturbance as a result of the construction activities. Additionally, minor short-term water quality degradation could result.

Oil and gas production/leases would need to be investigated to determine any offbase conflicts. The route traverses through agricultural lands and areas where soils are frequently flooded. Soils that have a high shrink-swell potential and develop large cracks are also encountered. Increases in soil erosion during construction would result in minor increases in sedimentation to several drainages.

The Abilene-Wichita Falls Air Quality Control Region is now in compliance with all existing air quality standards. Construction of the second rail connector would cause temporary, local increases in fugitive dust and gaseous pollutant emissions. These emissions should not cause any violations of the National Ambient Air Quality Standards.

Existing noise levels along the second rail connector vary from 62 dBA to 75 dBA (L_{dn}). These noise levels are the result of base aircraft operations. Temporary increases in noise levels would result from rail construction activities in the vicinity of sensitive noise receptors in the community of View, Texas.

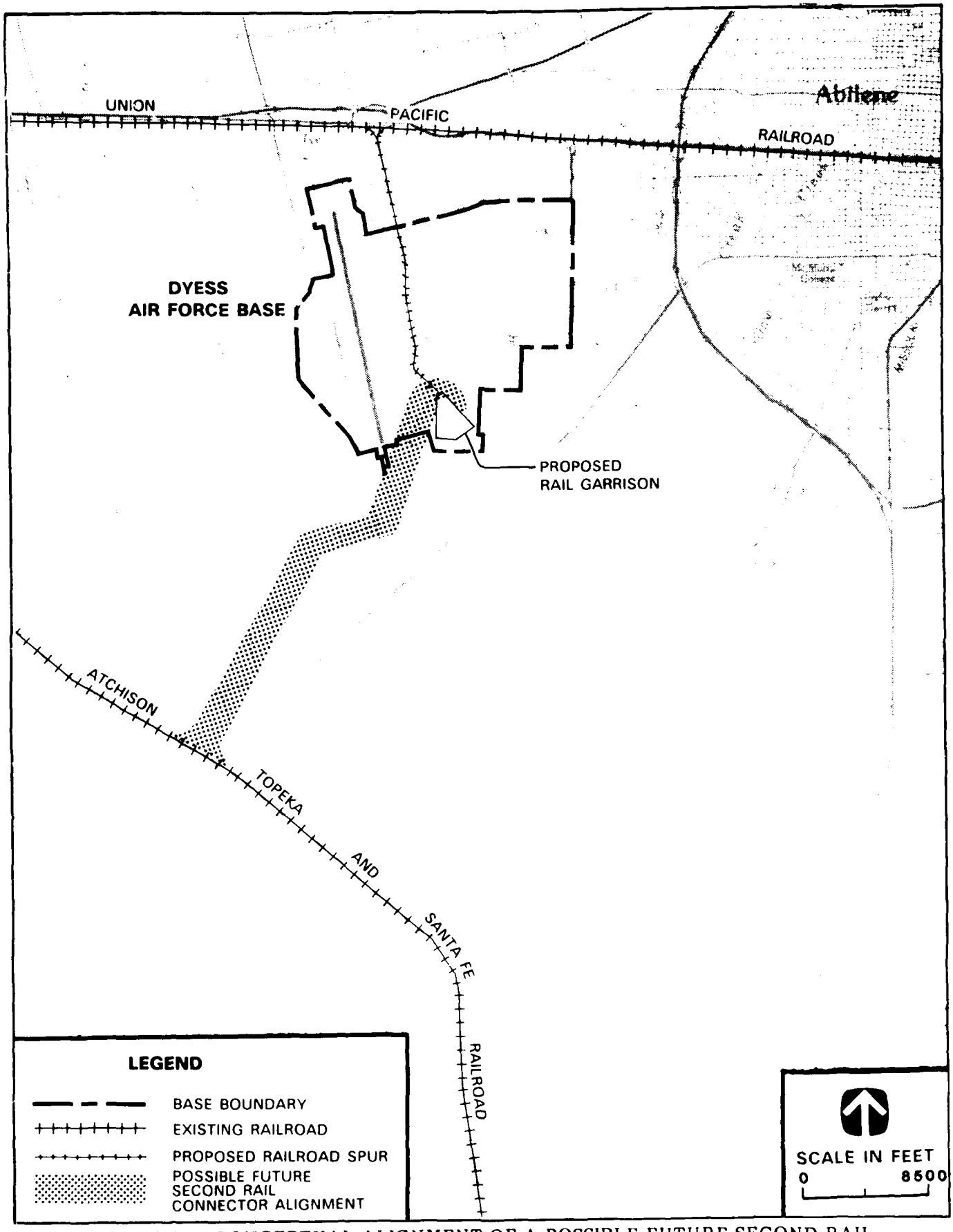


FIGURE 4.4.14-1 CONCEPTUAL ALIGNMENT OF A POSSIBLE FUTURE SECOND RAIL CONNECTOR FOR DYESS AFB, TEXAS

4.5 EAKER AIR FORCE BASE, ARKANSAS

Eaker Air Force Base (AFB) (formerly Blytheville AFB), with an area of 3,286 acres, is located in Mississippi County in northeastern Arkansas. The host organization for this Strategic Air Command base is the 97th Bombardment Wing, with B-52G bomber and KC-135A tanker aircraft. Eaker AFB employed a total of 3,290 military personnel (461 officer and 2,829 enlisted), 408 appropriated fund civilian personnel, and 256 other civilian personnel at the end of fiscal year 1987. Approximately 51 percent of the military personnel live on Eaker AFB and 49 percent live in communities near the base.

The City of Blytheville, located southeast of the base, is the host community for Eaker AFB. Approximately 60 percent of the personnel living offbase reside in Blytheville. Most of the remaining personnel live in the City of Gosnell, though some personnel live in other small communities near the base. Blytheville, located in a predominantly agricultural region, had an estimated 1985 population of 24,129, including Eaker AFB. Mississippi County had an estimated 1985 population of 58,800. The region's economy is based primarily on the agriculture, manufacturing, retail trade, government, and service sectors. Memphis, Tennessee, approximately 70 miles to the south, serves as the major commercial, trade, and transportation center in the region.

The following sections provide a description of activities associated with the deployment of the Peacekeeper Rail Garrison program at Eaker AFB for the Proposed Action (4 Train Alert Shelters [TASs]) and the Alternative Action (6 TASs).

Proposed Action. For the Proposed Action at Eaker AFB, the Air Force would construct garrison facilities and provide personnel necessary for the deployment and operation of up to four Peacekeeper missile trains. Approximately $57.3 million (in 1986 dollars) of construction would occur onbase for the Proposed Action. For the purpose of analysis, construction activities are assumed to begin in 1990 and be completed in 1992, with full operations beginning in 1993. Direct employment requirements would be 112 in 1990, peak at 476 in 1991, and stabilize at 400 during the full operations phase. Peak construction employment of 178 would occur in 1991. Annual direct employment requirements for the Proposed Action are presented in Table 4.5-1 for site activation, construction, assembly and checkout, and operations activities.

For the Proposed Action, two subalternatives would be considered. For the purpose of clarity, these are referred to as the onbase option and offbase option. The garrison for the onbase option would be located in the eastern portion of the base and collocated with the existing weapons storage area (Figure 4.5-1). Acquisition of restrictive easements on 274 acres adjacent to the northeastern boundary of the base would be required to accommodate the explosive safety zone (Table 4.5-2). Seven buildings (including the 4 TASs), roads, utilities, parking, and approximately 1.4 miles of track would be constructed within the garrison. Construction of the garrison would disturb approximately 67 acres permanently and 141 acres temporarily (Table 4.5-3).

The rail spur connecting the garrison to the Burlington Northern (BN) main line east of the base for the onbase option would require the construction of two miles of new track (0.2 mi onbase and 1.8 mi offbase) outside the garrison to the main line (Figure 4.5-1). Approximately 26 acres would be acquired for the offbase portion of the rail spur and a wye connection where the spur would join the main line (Table 4.5-3). Approximately 11 acres would be disturbed permanently and 8.5 acres temporarily outside the garrison for the connecting spur and wye (Table 4.5-2).

The onbase option would require the construction of support facilities with a total floor space of approximately 69,600 square feet. To provide access to the Training Train Shelter, a 0.7-mile spur would be constructed from the connector spur (Figure 4.5-1). Construction of the support facilities, utilities, roads, and parking would permanently disturb approximately 30 acres and temporarily disturb 30 acres (Table 4.5-3).

Table 4.5-1

**Annual Direct Employment (Military and Civilian)
for the Peacekeeper Rail Garrison Program
in the Eaker AFB Area by Calendar Year
(Full-Time Equivalent Jobs)**

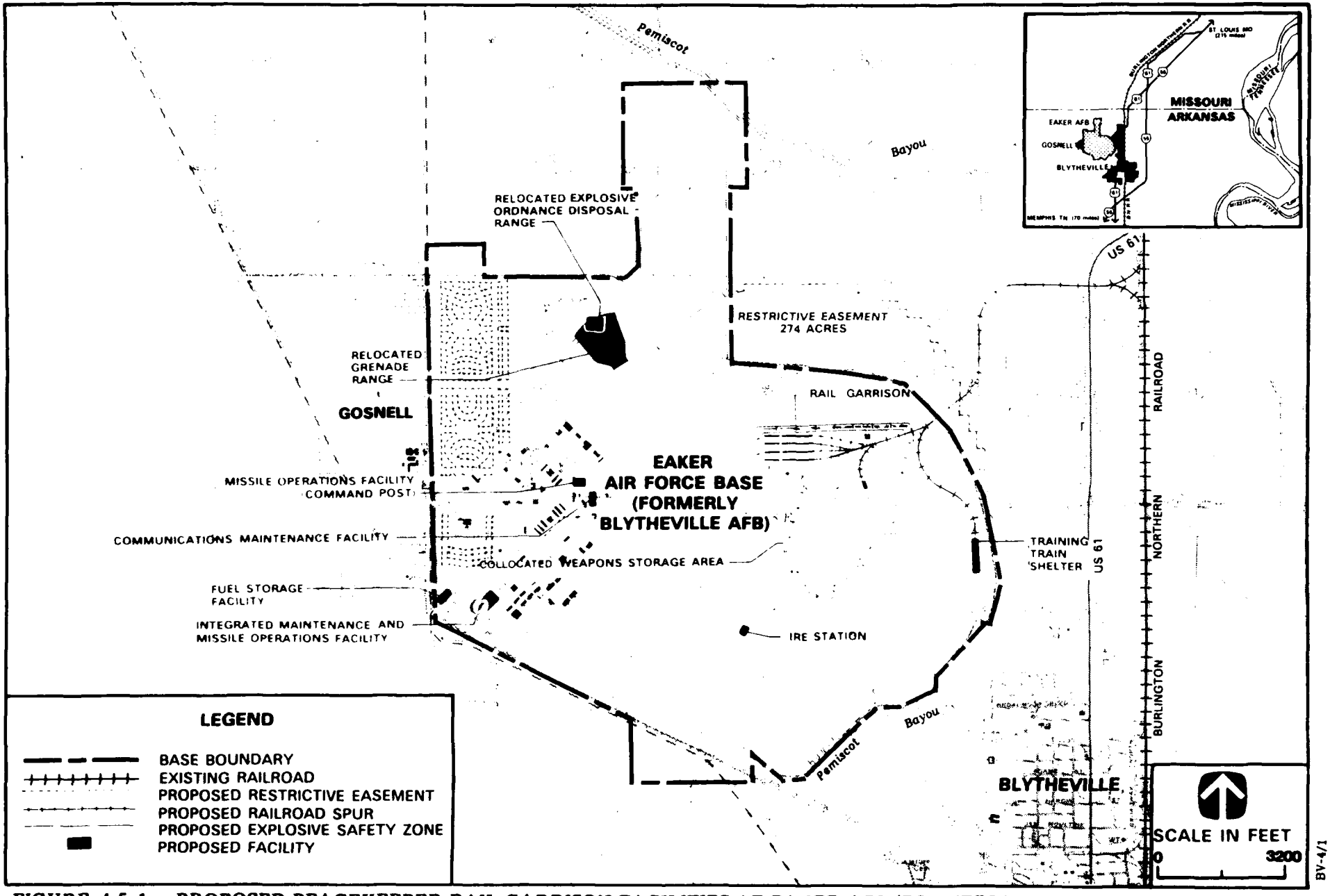
	1989	1990	1991	1992	1993[1]
Proposed Action					
Site Activation	1	15	24	11	0
Construction	0	96	178	64	0
Assembly & Checkout	0	1	18	1	0
Operations	0	0	117	400	400
TOTAL:	1	112	337	476	400
Alternative Action					
Site Activation	1	15	24	11	0
Construction	0	114	192	64	0
Assembly & Checkout	0	2	27	2	0
Operations	0	0	129	439	439
TOTAL:	1	131	372	516	439

Note: [1]Employment would continue at these levels for the life of the program.

Table 4.5-2

**Offbase Land Acquisition and Easement Requirements
Peacekeeper Rail Garrison Program
Eaker AFB, Arkansas (Onbase Option)
(acres)**

	Proposed Action	Alternative Action
Land Acquisition		
Garrison Area	0	0
Rail Spur	26	26
Housing Area	0	0
Relocated Facilities	0	0
TOTAL:	26	26
Restrictive Easements	274	282



4.5-3

FIGURE 4.5-1 PROPOSED PEACEKEEPER RAIL GARRISON FACILITIES AT EAKER AFB (FORMERLY BLYTHEVILLE AFB), ARKANSAS (ONBASE OPTION)

Table 4.5-3

**Summary of Area Disturbed by the Peacekeeper Rail Garrison Program
Eaker AFB, Arkansas (Onbase Option)
(Proposed and Alternative Actions)**

Facility Group	Area Disturbed (acres)		
	Permanent	Temporary	Total
Proposed Action			
Garrison Facilities	67.1	140.7	207.8
Rail Spur	10.9	8.5	19.4
Support Facilities	29.7	30.1	59.8
Relocated Facilities	6.2	1.0	7.2
TOTAL:	113.9	180.3	294.2
Alternative Action			
Garrison Facilities	72.7	147.9	220.6
Rail Spur	10.9	8.5	19.4
Support Facilities	29.7	30.1	59.8
Relocated Facilities	6.2	1.0	7.2
TOTAL:	119.5	187.5	307.0

The onbase option would also require the relocation of the base explosive ordnance disposal and grenade ranges to new locations. Relocation of these facilities, in addition to some base roads and utilities, would permanently disturb approximately six acres and temporarily disturb one acre (Table 4.5-3).

The garrison for the offbase option would be located north of the existing base boundary in the northeastern portion of the base (Figure 4.5-2). To accommodate the garrison, acquisition of 371 acres would be acquired adjacent to the base boundary. Acquisition of restrictive easements on 333 acres adjacent to the expanded base boundary would be required to accommodate the explosive safety zone (Table 4.5-4). One inhabited building would be located within the explosive safety zone. Seven buildings (including the 4 TASs), roads, utilities, parking, and approximately 1.3 miles of track would be constructed within the garrison. Construction of the garrison would disturb approximately 50 acres permanently and 52 acres temporarily (Table 4.5-5).

The rail spur connecting the garrison to the main line east of the base for the offbase option would require the construction of 1.5 miles of new track (0.3 mi within the expanded base boundary and 1.2 mi offbase) outside the garrison to the main line (Figure 4.5-2). Approximately 19 acres would be acquired for the offbase portion of the rail spur and a wye connection where the spur would join the main line. Approximately 8 acres would be disturbed permanently and 6.5 acres temporarily outside the garrison for the connecting spur and wye (Table 4.5-5).

Technical and personnel support facilities requirements for the offbase option would be similar to the onbase option. To provide access to the Training Train Shelter, a 0.5-mile rail spur would be constructed from the connector spur (Figure 4.5-2). In addition, approximately 2.3 miles of new base boundary fencing would be required. Construction

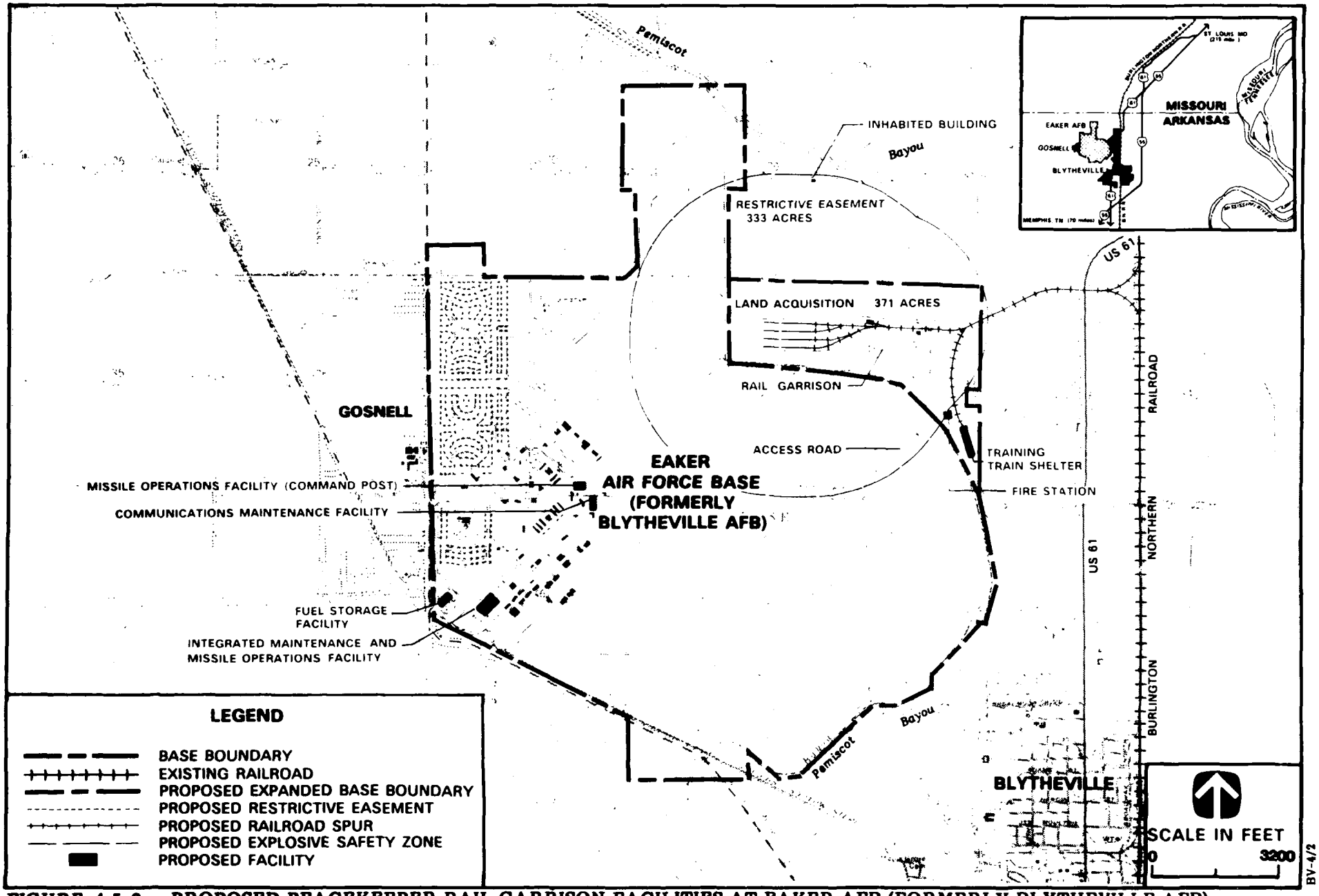


FIGURE 4.5-2 PROPOSED PEACEKEEPER RAIL GARRISON FACILITIES AT EAKER AFB (FORMERLY BLYTHEVILLE AFB), ARKANSAS (OFFBASE OPTION)

Table 4.5-4

Offbase Land Acquisition and Easement Requirements
Peacekeeper Rail Garrison Program
Eaker AFB, Arkansas (Offbase Option)
(acres)

	Proposed Action	Alternative Action
Land Acquisition		
Garrison Area	371	371
Rail Spur	19	19
Housing Area	0	0
Relocated Facilities	0	0
TOTAL:	390	390
Restrictive Easements	333	382

Table 4.5-5

Summary of Area Disturbed by the Peacekeeper Rail Garrison Program
Eaker AFB, Arkansas (Offbase Option)
(Proposed and Alternative Actions)

Facility Group	Area Disturbed (acres)		
	Permanent	Temporary	Total
Proposed Action			
Garrison Facilities	50.0	52.0	102.0
Rail Spur	8.2	6.4	14.6
Support Facilities	29.3	32.6	61.9
Relocated Facilities	0.0	0.0	0.0
TOTAL:	87.5	91.0	178.5
Alternative Action			
Garrison Facilities	54.9	68.1	123.0
Rail Spur	8.2	6.4	14.6
Support Facilities	29.3	32.6	61.9
Relocated Facilities	0.0	0.0	0.0
TOTAL:	92.4	107.1	199.5

of the support facilities, fencing, utilities, roads, and parking would permanently disturb about 29 acres and temporarily disturb 33 acres. For the offbase option, no base facilities would require relocation.

Alternative Action. For the Alternative Action, the Air Force would construct garrison facilities and provide personnel for the deployment and operation of up to six Peacekeeper missile trains. Approximately $69.1 million (in 1986 dollars) of construction would occur onbase for the Alternative Action. Construction and operations activities are assumed to occur in the same time frame as the Proposed Action. Annual direct employment requirements for the Alternative Action are presented in Table 4.5-1.

The garrison for both the onbase and offbase options would contain six TASs (instead of 4) and would be constructed in approximately the same location as the Proposed Action (Figures 4.5-3 and 4.5-4). Nine buildings (including the 6 TASs), roads, utilities, and parking would be constructed within the garrison for each option. Approximately 1.9 miles of track would be constructed within the garrison for the onbase option and 1.7 miles for the offbase option. Technical and personnel support facility requirements for each option would be similar to the Proposed Action.

For the onbase option, acquisition of restrictive easements on an additional 8 acres (total of 282 acres) would be required to accommodate the explosive safety zone for the garrison (Table 4.5-2). Construction of the six-TAS garrison would disturb an additional six acres permanently (72.7 acres total) and seven acres temporarily (147.9 acres total) (Table 4.5-3). The rail spur connecting the garrison to the BN main line for the onbase option would be the same as the Proposed Action.

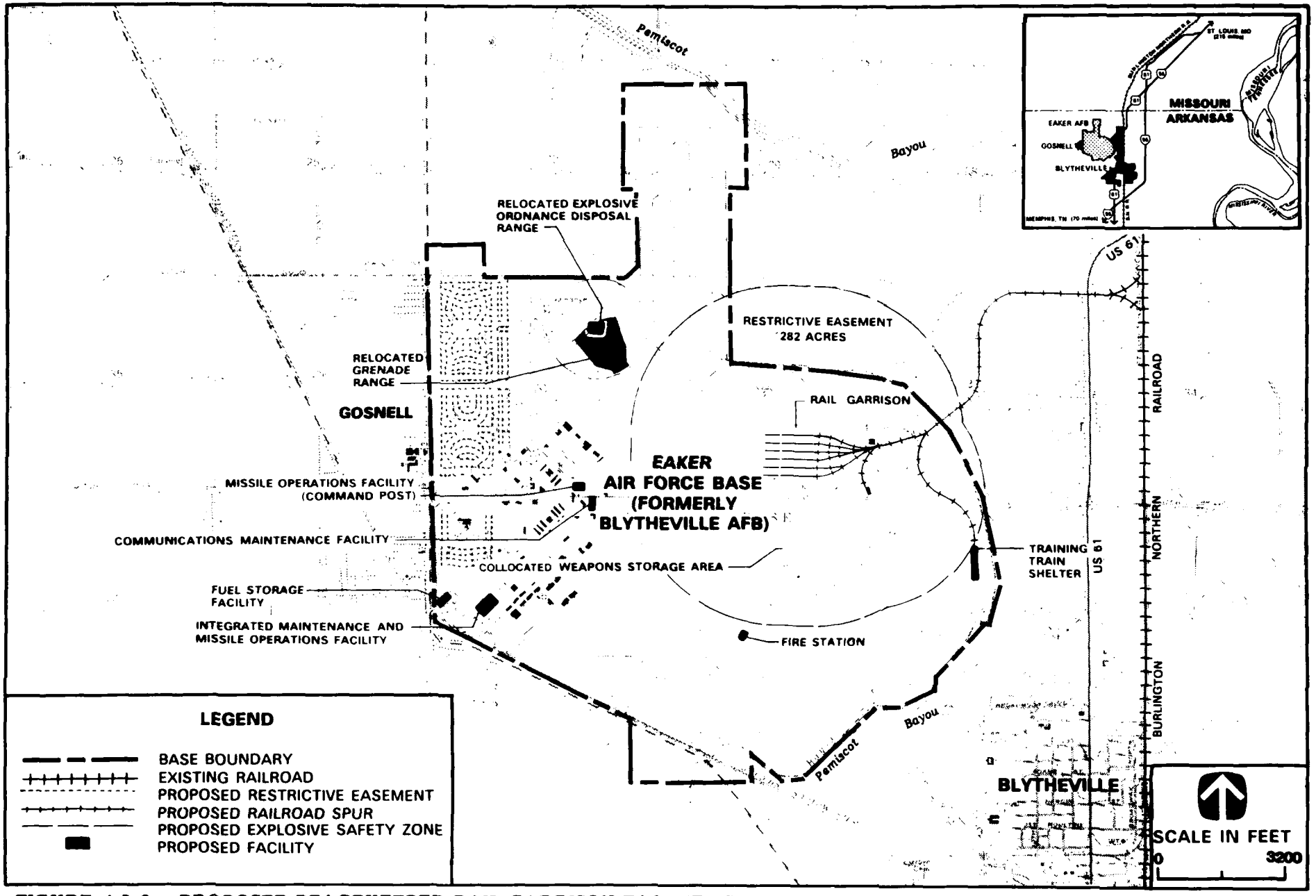
For the offbase option, acquisition of 371 acres would be required adjacent to the base boundary to accommodate the garrison. Acquisition of restrictive easements on an additional 49 acres (total of 382 acres) would be required to accommodate the explosive safety zone (Figure 4.5-4; Table 4.5-4). Three inhabited buildings would be located within the explosive safety zone. Construction of the six-TAS garrison would disturb an additional 5 acres permanently (54.9 acres total) and 16 acres temporarily (68.1 acres total) (Table 4.5-5). The rail spur connecting the garrison to the BN main line for the offbase option would be the same as the Proposed Action.

Summary of Program Impacts. At Eaker AFB, two possible siting options (onbase and offbase) are being considered. The Proposed Action at Eaker AFB (onbase option) would result in significant impacts on cultural resources. Long-duration impacts on cultural resources would be high because construction would destroy large portions of two sites, including a major prehistoric archaeological site, one of the most important of its kind in the region. These impacts would be significant because of the loss of its considerable research potential, reflected in its eligibility for the National Register of Historic Places.

Impacts on all other onbase option resources would not be significant.

The Proposed Action at Eaker AFB (offbase option) would result in significant impacts on two resources: land use and cultural resources. Short- and long-duration impacts on land use would be low because it may be necessary to relocate one inhabited building from the proposed explosive safety zones or from land acquired. These impacts would be significant because one inhabited building may require relocation. Long-duration impacts on cultural resources would be low because two prehistoric sites of a type more common in the region would be disturbed. These impacts would be significant because of the sites' research potential.

Impacts on all other offbase option resources would not be significant.



4.5-8

FIGURE 4.5-3 PROPOSED PEACEKEEPER RAIL GARRISON FACILITIES AT EAKER AFB (FORMERLY BLYTHEVILLE AFB), ARKANSAS (ONBASE OPTION) (ALTERNATIVE ACTION)

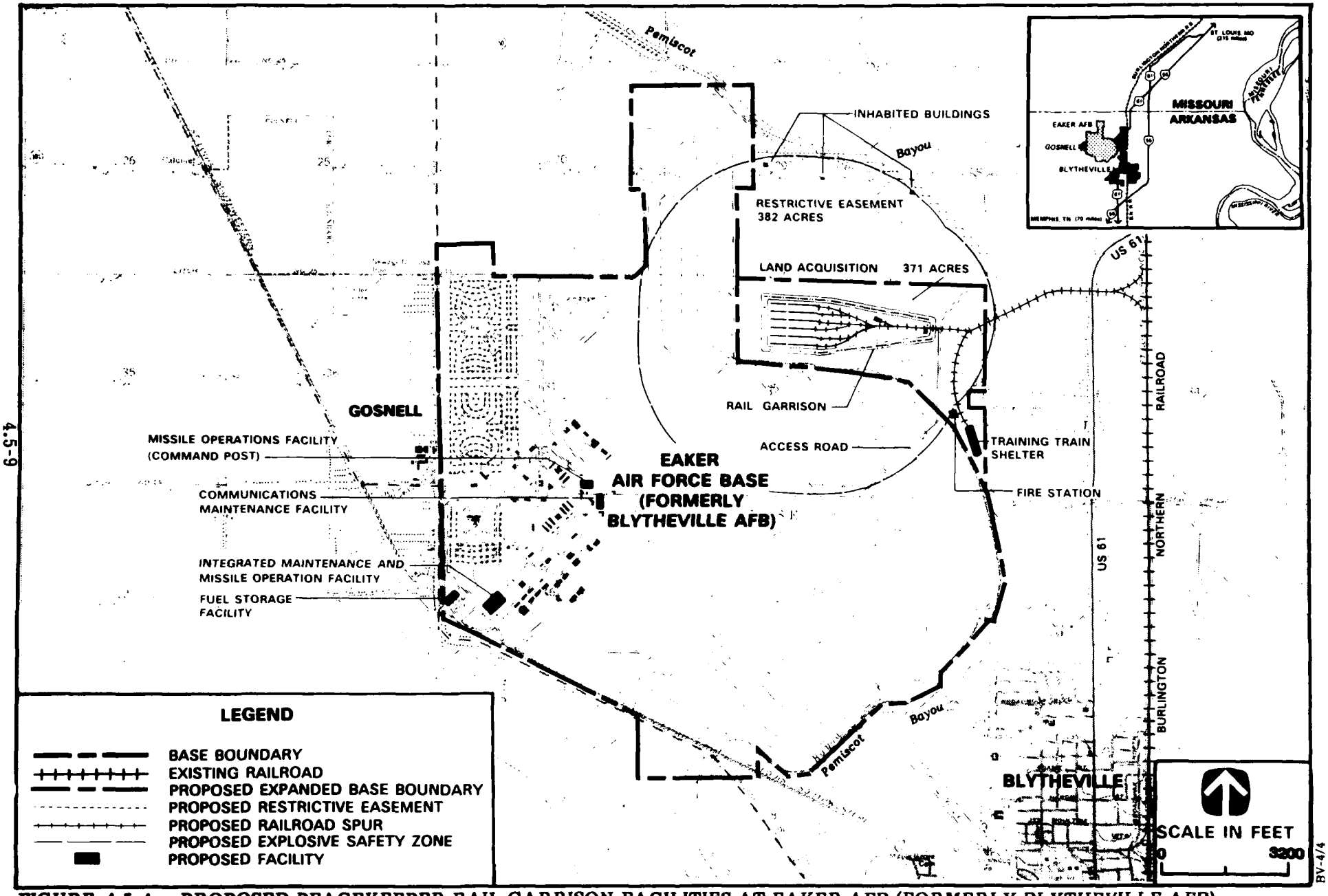


FIGURE 4.5-4 PROPOSED PEACEKEEPER RAIL GARRISON FACILITIES AT EAKER AFB (FORMERLY BLYTHEVILLE AFB), ARKANSAS (OFFBASE OPTION) (ALTERNATIVE ACTION)

The Alternative Action at Eaker AFB (both onbase and offbase options) would not alter the level of impact or significance ratings for any resource.

Both short- and long-duration beneficial socioeconomic effects would be generated by the Proposed and Alternative Actions, including increases in employment and income, and greater utilization of temporary and permanent housing.

4.5.1 SOCIOECONOMICS

4.5.1.1 Region of Influence

The Eaker AFB Region of Influence (ROI) for the employment and income element consists of the counties of Crittenden and Mississippi in Arkansas, Dunklin and Pemiscot in Missouri, and Dyer and Shelby in Tennessee. The ROI for housing consists of Blytheville and Gosnell and for the remaining elements includes Mississippi County and the cities of Blytheville and Gosnell.

4.5.1.2 Existing and Future Baseline Conditions

Employment and Income. Total employment in the ROI increased 2.4 percent, from 508,865 in 1980 to 521,223 in 1984. In the ROI, the services sector, with a 24.3 percent share, was the leading employer in 1984, followed by the government, retail trade, and manufacturing sectors. The manufacturing sector lost approximately 13 percent in jobs from 1980 to 1984, followed by the farm and government sectors with losses of 10 and 3 percent, respectively. Construction employment was 23,412 in 1984, up slightly from 1980 levels of 22,790 workers.

Total employment in Mississippi County was 28,437 in 1984, a decrease of 133 from the 1980 employment level of 28,570. The manufacturing (primarily light industry) sector is the leading employer, followed by the government, services, retail trade, and farm sectors. Together, manufacturing and government accounted for more than half the total employment in the county in 1984.

Total employment in the ROI is projected to increase to 595,760 in 1990 and 636,294 in 1995. The ROI unemployment rate is projected to decline from 8 percent in 1984 to 7 percent in 1990, and 6.5 percent in 1995.

From 1980 to 1984, total earnings (in current dollars) in the ROI increased from $6.8 to $9.1 billion and in Mississippi County from $292 million to $395 million. Discounting for inflation, these increases in total earnings represented, respectively, 6.1 percent and 8 percent growth over the 1980 to 1984 period. Per capita personal income in the ROI increased from $8,430 in 1980 to $11,283 in 1984 and in Mississippi County from $6,601 in 1980 to $9,857 in 1984.

The projected total earnings (in 1986 dollars) in the ROI are $11 billion in 1990 and $11.8 billion in 1995. The corresponding per capita personal income is projected at $12,461 in 1990 and $13,069 in 1995. The projected per capita personal income in Mississippi County is $10,028 in 1990 and $10,528 in 1995.

Population and Demographics. In 1985, the population of Mississippi County was estimated at 58,800, a decrease of 717 from the 1980 population. It is projected to increase to 59,889 by 1990 and 60,693 by 1995. Blytheville's population was 23,844 in 1980 and increased to 24,129 in 1985. Gosnell's population was 3,215 in 1980. It decreased to approximately 2,938 in 1985. Blytheville's population is projected at 24,554 in 1990 and 24,884 in 1995. Gosnell's population is projected at 3,769 in 1990 and 3,819 in 1995.

In 1987, military personnel and their dependents accounted for 28 percent of the area's estimated 27,884 population (base residents, Blytheville and Gosnell).

Housing. The permanent year-round housing stock in the City of Blytheville was approximately 8,462 units in 1980. Of these, 478 units (5.6%) were vacant and 282 (3.3%) were available. The permanent year-round housing stock in the City of Gosnell was approximately 1,111 units in 1980. Of these, 78 (7.0%) were vacant and 73 (6.6%) were available. In April 1987, the available offbase housing units in Blytheville and Gosnell listed with the Eaker AFB Housing Office consisted of 16 one-bedroom, 77 two-bedroom, 30 three-bedroom, and 3 four-bedroom units. Temporary facilities in the area consist of about 650 hotel/motel rooms. During periods of peak occupancy (the summer months), an estimated 250-plus rooms are available. No plans exist for expansion of these facilities.

By 1990, an estimated 10,016 year-round housing units will exist in Blytheville (8,714) and Gosnell (1,302). Of these, 376 (3.8%) will be available, 290 in Blytheville and 86 in Gosnell. In 1995, the year-round housing stock in the area will have grown to 10,151 units, 8,831 in Blytheville and 1,320 in Gosnell. Available vacancies will number 294 in Blytheville and 87 in Gosnell for a total of 381 units (3.8%).

Eaker AFB family housing consists of 102 two-bedroom, 568 three-bedroom, and 158 four-bedroom Capehart units. An additional 100 four-bedroom units have recently been completed bringing the total number of units to 928. There are five unaccompanied enlisted personnel housing facilities onbase with a total of over 132,000 square feet of space. These buildings will be renovated by 1990 and will have sufficient space to house 90 percent of the unaccompanied program-related military personnel.

Education. Blytheville School District No. 5 and Gosnell School District No. 6 provide public education services to area residents. Blytheville School District No. 5 serves the City of Blytheville and also has one rural school seven miles to the south in Burdett. The district has approximately 4,420 students enrolled for the 1987-88 school year, a staff of 297 (the majority of whom are classroom teachers), and an overall pupil-to-teacher ratio of 16.1-to-1 at the elementary level. Military dependents make up approximately 5 percent of the Blytheville School District's total enrollment. Under P.L. 81-874 guidelines, the district is classified as a "Regular A" district. Enrollment is expected to increase to 4,530 by 1990-91 and 4,590 by 1995-96. Gosnell School District No. 6 has three schools that serve the City of Gosnell and one school in the community of Dell. The district has approximately 2,020 students enrolled for the 1987-88 school year. Military dependents from adjacent Eaker AFB account for approximately 58 percent of the district's enrollment, and bring in an estimated $1.2 million in federal impact aid. Under P.L. 81-874 guidelines, the district is classified as a "Super A" district. There are approximately 100 classroom teachers in the district. A new high school facility has recently been completed. The district has an overall pupil-to-teacher ratio of 23.2-to-1 at the elementary level, equal to the weighted average state standard of 23.2-to-1. Enrollment is expected to increase to 2,080 by 1990-91 and 2,110 by 1995-96, and staffing will increase to maintain existing student-to-teacher ratios.

Public Services. The City of Blytheville employs approximately 175 people in 17 departments. The Police Department has 41 sworn officers and a total of 49 personnel. The Fire Department, operating out of two station houses in the city, is staffed by 34 personnel. The staffing levels provide the city with 7.2 personnel per 1,000 population. The city would need four additional personnel by 1995, increasing city employment from 175 to 179, or the number of personnel per 1,000 population would drop to 7.0. The City of Gosnell employs approximately 12 people. The Police Department has 5 full-time personnel, while the Fire Department consists of an all-volunteer force of 21. No additional staffing needs are projected for the City of Gosnell. Mississippi County employs approximately 170 people in 26 departments. County staffing levels provide the area with 2.9 personnel per 1,000 population. The county would need 6 additional personnel by 1995, increasing staffing from 170 to 176 or the number of personnel per 1,000 population would drop to 2.8.

Public Finance. Services provided by the City of Blytheville are funded principally through the general and street funds. Budgeted revenues of these funds were approximately $4 million in 1987. County and state sales tax allocations and utility franchise taxes are the city's principal revenue sources. Property taxes account for only six percent of this revenue total. Expenditures from these funds were estimated to be $3.8 million in 1987. Over the 1990 to 1995 period, Blytheville revenues and expenditures are projected to remain in the $3.9-million to $4-million range. Services provided by the City of Gosnell are funded principally through the general fund and the street fund. In 1986, revenues from these funds were approximately $350,000. Franchise taxes and state-shared revenue are the principal revenues of the city. In 1986, expenditures were approximately $460,000. Year-end balances of these funds were $270,000, representing about 59 percent of expenditures in that year. The city has no general obligation bond indebtedness. Over the 1990 to 1995 period, Gosnell revenues and expenditures are projected to be in the $440,000 to $460,000 range.

The Gosnell School District revenues and expenditures were approximately $6 million in fiscal year 1987, representing about $2,800 per pupil. Year-end fund balances were $3.8 million, representing about 60 percent of expenditures in that year. Over the 1990 to 1995 period, revenues and expenditures are projected to grow slightly to approximately $6.2 million. Budgeted revenues and expenditures of Blytheville School District No. 5 are approximately $10.9 million, representing about $2,500 per pupil. Over the 1990 to 1995 period, revenues and expenditures are projected to grow slightly to approximately $11.4 million.

The Mississippi County revenues and expenditures were estimated to be $6.6 million in 1987. Reserve funding levels are approximately $2.1 million. Over the 1990 to 1995 period, revenues and expenditures are projected to grow slightly to the $6.7-million to $6.8-million range.

4.5.1.3 Impacts of the Proposed Action

For the Proposed Action, a brief summary of the program-related effects on key socioeconomic indicators is presented in Table 4.5.1-1.

Employment and Income. The Proposed Action would create both direct and secondary jobs in the ROI. During the peak construction year (1991), total new jobs would number 703. Of these newly created jobs, 337 would be direct (231 civilian and 106 military) and 366 would be secondary. The number of local hires would be 506. During the construction phase, the number of weekly commuters would be less than 15. During the operations phase (1993 onward), total jobs associated with the Proposed Action would be 562 (400 direct and 162 secondary). Of the 400 direct jobs, 338 would be military and 62 civilian. The number of local hires would be 180. There would be no weekly commuters during the operations phase.

The Proposed Action would generate personal income (in 1986 dollars) ranging from $5.5 million to $15.0 million during the construction phase (1990-1992) and $10.3 million a year during the operations phase (1993 and thereafter). The share for Mississippi County would range from $2.9 million to $10.8 million during the construction phase, and stabilize at $8.8 million from 1993 and thereafter. The county's relatively low share of the personal income during the construction phase would be due to the import of some labor and materials from outside the county area. The spending associated with the Proposed Action in the ROI would range from $4.5 million to $12.7 million during the construction phase, then stabilize at $6.3 million during the operations phase.

Population and Demographics. The Proposed Action would affect population in both the ROI and Mississippi County. Inmigration to the ROI would range from 106 in 1990 to 1,067 in 1992, and would stabilize at 994 during the operations phase. Mississippi County's share of that inmigrating population would range from 89 in 1990 to 1,031

Table 4.5.1-1

Selected Socioeconomic Indicators, Peacekeeper
Rail Garrison Program, Eaker AFB, Arkansas, 1990-1993
Proposed Action

	1990	1991	1992	1993[1]
Region of Influence				
Employment (Jobs)				
Total Program-Related Jobs	248	703	741	562
Direct Jobs	112	337	476	400
Civilian	106	231	136	62
Military	6	106	340	338
Secondary Jobs	136	366	265	162
Local Hires	206	506	330	180
Program-Related Spending (000s 86$)	$4,554	$12,746	$9,867	$6,328
Personal Income (000s 86$)				
Direct	$2,801	$7,709	$ 9,270	$ 7,370
Secondary	2,719	7,341	5,045	2,971
Total Personal Income	$5,520	$15,050	$14,315	$10,341
Gosnell				
Population				
Baseline Population	3,769	3,779	3,789	3,789
Program-Related Change	36	172	372	348
Change as % of Baseline	1.0%	4.6%	9.8%	9.2%
Housing Demand				
Temporary Units	3	8	7	5
Permanent Units	9	52	112	105
Total Units	12	60	119	110
School District Enrollment				
Elementary	3	15	36	34
Secondary	2	13	29	28
Total Enrollment	5	28	65	62
Blytheville				
Population				
Baseline Population	24,554	24,620	24,686	24,752
Program-Related Change	54	288	660	624
Change as % of Baseline	0.2	1.2	2.7	2.5
Housing Demand				
Temporary Units	5	11	11	8
Permanent Units	16	78	168	157
Total Units	21	89	179	165
School District Enrollment				
Elementary	2	19	52	51
Secondary	1	15	43	42
Total Enrollment	3	34	95	93

Note: [1]Program-related effects would continue at these levels throughout the life of the program.

in 1992, and 972 in 1993 and thereafter. This increase would be 1.6 percent of the baseline population in the county during the operations phase.

Of the 972 persons inmigrating to Mississippi County during the operations phase, 107 are expected to live onbase, 348 in Gosnell, and 517 in Blytheville.
The percentage increase in population as measured against the baseline population of the area around the base (the cities of Blytheville, within whose boundaries the base is located, and Gosnell) would be 3.6 percent in the peak inmigration year (1992) and 3.4 percent in 1993.

The inmigration-related increase in population of the City of Blytheville would be 2.7 percent in 1992 and 2.5 percent in 1993 and thereafter.

The inmigration-related increase in population of the City of Gosnell would be 9.8 percent in the peak inmigration year (1992) and 9.2 percent during the operations phase. Military personnel and their dependents would account for 29 percent of the region's population in 1993.

Housing. Most program-related households would be housed in privately owned permanent housing units and temporary facilities in Blytheville. Some additional program-related households could elect to live in Gosnell. The remaining individuals (107 noncommissioned officers and airmen) would be housed onbase in unaccompanied enlisted personnel housing facilities.

The offbase program-related demand for housing is expected to begin in 1990. In this year, approximately 25 permanent units (6.6% of the available vacancies in the two communities) and 10 temporary facilities (4% of the available vacancies in the two communities) would be required. The peak demand for temporary facilities would occur in 1991. The short-duration demand would be for 20 facilities in that year (8.0% of the available vacancies), and would decline to the long-duration demand of 15 facilities (6.0% of the available vacancies) by 1993. The peak demand for permanent units would be experienced in 1992. In that year, the short-duration demand would be for 280 units or 74.1 percent of the available vacancies (170 in Blytheville and 110 in Gosnell), and would decline to the long-duration demand of 260 units or 68.6 percent of the available vacancies (155 in Blytheville and 105 in Gosnell) by the following year (1993). In 1992, the available vacancy rate would fall from 3.8 percent to 1.0 percent in the two-city area. The long-duration available vacancy rate would fall from 3.8 percent to 1.2 percent.

The short- and long-duration demand for temporary facilities in both cities would not cause a shortage even during periods of peak baseline occupancy. These demands would be beneficial for property owners. Although an adequate supply of housing units exist in the two cities, many military families may prefer to live in Gosnell which is projected to have 86 available vacancies in both 1992 and 1993. The demands for 110 units (174.5% of available vacancies) in 1992, and 105 units (166.7% of available vacancies) from 1993 and thereafter, would tighten the housing market in Gosnell. These effects would be beneficial to landlords in both cities, but may result in shortages of low-income housing in Gosnell.

Education. The program is expected to bring an additional 155 students to the Gosnell Dell No. 6 and Blytheville No. 5 school districts during the operations phase. Schools in the Gosnell Dell district are expected to receive 60 new students. This district, with the recent addition of a new high school facility, would be able to accommodate the increased enrollment at both the elementary and secondary levels. In the Gosnell Dell district, elementary level pupil-to-teacher ratios are expected to rise from 23.2-to-1 to 23.8-to-1 during the operations years. This ratio would be above a weighted average state standard of 23.2-to-1, but could be accommodated with additional staffing since facility space is available. Program-related enrollment increases of 95 students are expected for the Blytheville district. The addition of these students to the Blytheville

district is expected to increase elementary level pupil-to-teacher ratios from 16.1-to-1 to 16.4-to-1 during the operations years. These increases in class size are not expected to have a measurable effect on educational service levels in the area and are still below state standards. Some additional staffing may be needed; however, existing facilities would be able to accommodate this increase in enrollment.

Public Services. Program-related increases in population would lead to a 2.5-percent increase in demand for public services provided by the City of Blytheville over baseline levels in 1993. The increased service demands would be experienced by a majority of the departments now providing service to area residents. To maintain current service levels as measured by the city's rate of 7.2 personnel per 1,000 population, the city would need 4 additional personnel by 1993, increasing city staffing from a baseline level of 178 to 182. Most of the additional staffing would be needed in the Police, Fire, and Public Works departments. If no additional personnel were hired, the number of personnel per 1,000 population would drop from 7.2 to 7.0. This reduction in the number of personnel per 1,000 population would not result in an appreciable deterioration of the community's current level of public service provision.

The City of Gosnell would experience a 9.2-percent increase in demands for public services provided by the city. The city would need one additional employee by 1993. If no additional personnel were hired, the number of city personnel per 1,000 population would drop from 3.2 to 2.9. This reduction in the number of personnel per 1,000 population would not result in an appreciable deterioration from the community's current level of public service.

Program-related increases in population would lead to a 1.6-percent increase in demand for public services provided by Mississippi County over baseline levels in 1993. To maintain existing service levels, the county would need to hire three additional personnel by 1993, increasing county staffing from a baseline level of 175 to 178. Even without additional staffing, the number of county personnel per 1,000 population would remain at 2.9. This level of population increase would not affect the county's ability to deliver public services at current levels to area residents.

Public Finance. Program-related increases in expenditures of the cities and counties would be limited to outlays for additional personnel. Expenditure increases in Gosnell would be minor (less than $25,000 annually) and could be met through existing revenue sources (local sales taxes, property taxes, reserve funds, and state revenue turnbacks). Increases in the City of Blytheville and Mississippi County would be slightly higher (up to $60,000), which also could be met through existing revenue sources.

Based on an average per pupil cost of $2,800, program-related expenditure increases in the Gosnell School District would range up to $180,000 in the peak year (1992) and $170,000 during operations, representing approximately one percent to two percent of projected baseline expenditures. Entitlements under P.L. 81-874 programs would amount to approximately $60,000. Based on an average per pupil cost of $2,500, program-related expenditure increases in the Blytheville School District would range up to $250,000 in the peak year (1992) and $230,000 during the operations phase, representing approximately 1 to 2 percent of projected baseline expenditures. Entitlements under P.L. 81-874 programs would be minimal (less than $10,000). Temporary revenue shortfalls ($70,000 to $90,000 in 1992) could occur as state foundation program monies generally lag behind the additional enrollment. Reserve funding levels of $3.8 million in the Gosnell School District (representing approximately 60% of yearly operating expenses) and approximately $1 million in the Blytheville School District should be a 'equate to cover potential shortfalls.

Summary of Impacts. For the Proposed Action at Eaker AFB, short- and long-duration socioeconomic impacts would be low because inmigration would cause population in the Eaker AFB area to increase by 3.6 percent over baseline forecasts during the peak

inmigration year (1992) and by 3.4 percent during program operations (beginning in 1993). This level of program-induced population growth would result in low impacts on housing, education, public services, and public finance within the Eaker AFB area for both the peak and succeeding years. However, the City of Gosnell would experience population increases of 9.8 percent in 1992 and 9.2 percent during operations (1993 and thereafter). This would cause an increase in demand for housing and public service facilities in that city. Impacts would not be significant because the increased demand for housing would be met by available vacancies, existing educational facilities would absorb program-related enrollment increases, no new public service facilities would need to be constructed, and existing revenue sources of the jurisdictions would be adequate to meet program-related expenditures. Both short- and long-duration beneficial socioeconomic effects would be associated with the Proposed Action, including increases in employment and income in the ROI, and greater utilization of temporary and permanent housing vacancies within the Eaker AFB area. Impacts would be the same for both the onbase and offbase siting options.

4.5.1.4 Impacts of the Alternative Action

For this Alternative Action, a brief summary of the program-related effects on key socioeconomic indicators is presented in Table 4.5.1-2.

Employment and Income. The effects of the Alternative Action on employment and income in the ROI would be greater than those of the Proposed Action. During the construction phase, the Alternative Action would create new jobs ranging from 284 in 1990 to 797 in 1992, which is 36 to 56 more jobs than the Proposed Action. Of the 789 new jobs during the peak construction year (1991), 372 would be direct (256 civilian and 116 military) and 417 would be secondary. The number of local hires would be 572, which is 66 more than for the Proposed Action. During the operations phase, total new jobs created by the Alternative Action would number 617, which is 55 more than the Proposed Action. Of these 617 new jobs, 439 would be direct (68 civilian and 371 military) and 178 would be secondary. Local hires would number 198 or 18 more than local hires for the Proposed Action.

During the construction phase, the Alternative Action would generate personal income (in 1986 dollars) ranging from $6.3 million in 1990 to $17.0 million in 1991 in the ROI, $0.8 million to $1.9 million more than generated by the Proposed Action. Mississippi County's share of that personal income would range from $3.3 million in 1990 to $9.3 million in 1991. During operations, the Alternative Action would generate $11.4 million in personal income for the ROI, $9.6 million of which would go to Mississippi County. In the ROI, the program-related spending would range from $5.1 million in 1990 to $14.6 million in 1991, and then stabilize at $6.9 million during the operations phase.

Population and Demographics. In the ROI, the increase in population would range from 120 in 1990 to 1,166 in 1992, 14 to 99 more persons than for the Proposed Action. During the operations phase, total inmigrants to the ROI would number 1,092, which is 98 more than the Proposed Action. During the construction phase, Mississippi County's share of the inmigration would range from 101 in 1990 to 1,128 in 1992. Of the 1,092 total inmigrants during operations, 1,066 would move to Mississippi County. As a result of this inmigrating population, the change in total population as a percent of the county's total baseline population would be 0.2 percent higher than the 1.6 percent for the Proposed Action during the operations phase. The number of weekly commuters would increase by two from 1990 to 1992.

Of the 1,067 total inmigrants to Mississippi County during the operation phase, 113 would live onbase, 382 in Gosnell, and the remaining 572 in Blytheville. The proportional share of military personnel and their dependents in the area's population would be 30 percent in 1993.

Table 4.5.1-2

Selected Socioeconomic Indicators, Peacekeeper
Rail Garrison Program, Eaker AFB, Arkansas, 1990-1993
Alternative Action

	1990	1991	1992	1993[1]
Region of Influence				
Employment (Jobs)				
Total Program-Related Jobs	284	789	797	617
Direct Jobs	131	372	516	439
Civilian	125	256	143	68
Military	6	116	373	371
Secondary Jobs	153	417	281	178
Local Hires	235	572	349	198
Program-Related Spending (000s 86$)	$5,155	$14,615	$10,506	$6,949
Personal Income (000s 86$)				
Direct	$3,276	$8,536	$10,017	$8,088
Secondary	3,044	8,435	5,345	3,263
Total Personal Income	$6,320	$16,971	$15,362	$11,351
Gosnell				
Population				
Baseline Population	3,769	3,779	3,789	3,799
Program-Related Change	41	190	407	382
Change as % of Baseline	1.1	5.0	10.7	10.0
Housing Demand				
Temporary Units	4	8	8	6
Permanent Units	12	58	122	115
Total Units	16	66	130	121
School District Enrollment				
Elementary	3	17	40	37
Secondary	2	14	32	31
Total Enrollment	5	31	72	68
Blytheville				
Population				
Baseline Population	24,554	24,620	24,686	24,752
Program-Related Change	61	317	721	685
Change as % of Baseline	0.2	1.3	2.9	2.8
Housing Demand				
Temporary Units	6	13	11	8
Permanent Units	18	87	183	172
Total Units	24	100	194	180
School District Enrollment				
Elementary	2	21	58	56
Secondary	1	17	47	46
Total Enrollment	3	38	105	102

Note: [1]Program-related effects would continue at these levels throughout the life of the program.

The program-related increase in population as measured against the baseline population of the area around the base (the cities of Blytheville, within whose boundaries the base is located, and Gosnell) would be 4.0 percent in 1992 and 3.7 percent in 1993 and thereafter. The inmigration-related increase in population of the City of Gosnell would be 10.7 percent in the peak inmigration year (1992) and 10.0 percent in 1993 and thereafter. The corresponding increases in population of the City of Blytheville are 2.9 percent and 2.8 percent, respectively.

Housing. The Alternative Action would not change the expected program-related occupancy patterns within Blytheville and Gosnell. An additional six unaccompanied military personnel would live in onbase unaccompanied enlisted personnel housing facilities.

The initial demand for housing in Blytheville would increase by five permanent units in 1990. The additional workers would not change the demand for temporary facilities appreciably but would require an additional 25 permanent units (15 in Blytheville and 10 in Gosnell) in 1992 and during the operations phase (1993 and thereafter), reducing available vacancies by a total of 80.1 percent in 1992 and 74.8 percent during operations. The long-duration vacancy rate would decline from 3.8 percent to 0.9 percent as a result of the Alternative Action.

The likelihood that families in Gosnell would face rent increases would be greater because of the increased excess demand for housing in Gosnell (182.5% of available vacancies). However, this excess demand would be met in the City of Blytheville. This additional demand for permanent units would not be severe enough to cause problems in Blytheville.

Education. The Alternative Action would bring in an additional 15 students above levels associated with the Proposed Action. Gosnell Dell School District would receive 70 students and Blytheville School District would receive 100. Pupil-to-teacher ratios would not differ appreciably from those identified for the Proposed Action. The current facilities have the capacity to absorb this enrollment increase. Additional staffing may be required to maintain current standards.

Public Services. The Alternative Action would lead to slightly greater inmigration than the Proposed Action. This would cause slightly greater demands for public services. These demands would be expected to affect most of the departments within each jurisdiction. Staffing levels and personnel per 1,000 population rates would remain essentially the same as those identified for the Proposed Action.

Public Finance. Because public service staffing levels in local jurisdictions would remain essentially unchanged with this alternative, expenditure increases would not vary greatly from levels estimated for the Proposed Action.

Summary of Impacts. For the Alternative Action at Eaker AFB, short- and long-duration socioeconomic impacts would be low because inmigration would cause population in the Eaker AFB area to increase by 4.0 percent over baseline forecasts during the peak inmigration year (1992) and by 3.7 percent during program operations (beginning in 1993). This level of program-induced population growth would result in low impacts on housing, education, public services, and public finance within the Eaker AFB area for both the peak and succeeding years. However, the City of Gosnell would experience population increase of 10.7 percent in 1992 and 10.0 percent in 1993 and thereafter. This would cause an increase in demand for housing and public service facilities in that city. Impacts would not be significant because the increased demand for housing would be met by available vacancies, existing education facilities would absorb program-related enrollment increases, no new public facilities would need to be constructed, and existing revenue sources of the jurisdictions would be adequate to meet program-related expenditures.

Both short- and long-duration beneficial socioeconomic effects would be generated by the Alternative Action, including increases in employment and income in the ROI and greater utilization of temporary and permanent housing vacancies within the Eaker AFB area. Impacts would be the same for both the onbase and offbase siting options.

4.5.2 UTILITIES

4.5.2.1 Region of Influence

The utilities ROI for Eaker AFB includes the host communities of Blytheville and Gosnell, and the base.

4.5.2.2 Existing and Future Baseline Conditions

Potable Water Treatment and Distribution. The City of Blytheville and Eaker AFB derive their potable water from groundwater. The average daily potable water demand for the city was 3.75 million gallons per day (MGD) in 1987. Potable water treatment (iron removal) capacity is 6 MGD. The city's water storage of 2 million gallons (MG) is adequate to handle increased summer demands. The average daily potable water demand for the city is projected to be 4.2 MGD in 1990 and 4.22 MGD in 1994. Gosnell Water Company provides service to the City of Gosnell from two wells with an estimated capacity of 0.5 MGD. In 1987, average daily demands were 0.35 MGD and are projected to increase to 0.38 MGD in 1990 and remain at that level through 1994. The average daily potable water demand for the base from 1985 to 1987 averaged 0.75 MGD or 56 percent of its water treatment capacity; the without-program demand is not expected to increase.

Wastewater. In the City of Blytheville, wastewater is currently treated by sewage lagoons. The average daily wastewater flow for 1987 was three MGD and the treatment system is operating at capacity. As a result of an out-of-court settlement with the U.S. Environmental Protection Agency, the city is constructing three activated sludge wastewater facilities with a total capacity of 3.75 MGD. They are expected to be completed in mid-1988. The wastewater flows for the city are expected to remain constant.

The City of Gosnell operates a lagoon system with a 0.4-MGD capacity. Average daily flows are estimated to be 0.27 MGD and are projected to increase to 0.30 MGD in 1990 and remain stable through 1994.

Eaker AFB operates its own 0.86-MGD wastewater treatment facility that consists of primary and secondary clarifiers, a trickling filter, and rotating biological contactors. Currently, it is adequate to handle present average daily flows of 0.49 MGD. The wastewater flows onbase without the program are not expected to increase.

Solid and Hazardous Waste. Solid waste for the City of Blytheville is collected by private and public collectors. Solid waste at Eaker AFB is collected by a private contractor. The solid waste generated by the city and the base is currently disposed of at the Mississippi County landfill.

Onbase hazardous wastes are managed by Eaker AFB; the Defense Reutilization and Marketing Office is responsible for the proper handling of wastes and arranging for transport to treatment and disposal facilities. The base stores the wastes in a conforming storage facility at a newly constructed facility adjacent to Building 426. The wastes include solvents, batteries and battery acid, sodium chromate, oils, paints, thinners, and other regulated materials.

Energy Utilities. Arkansas Power and Light (AP&L) provides electric power to Eaker AFB, the majority of Arkansas, and a portion of Missouri. As part of the Middle South

Utilities System, AP&L is interconnected into a system that provides service to a four-state region. In 1986, peak demand reached 3,804 megawatts (MW) with the company having a total capability of 6,101 MW. AP&L projects peak demand will increase to 4,468 MW in 1990 and to 5,431 MW in 1994. Additional demands will be met by increasing purchased power and maintaining current generating facilities. Eaker AFB consumed 41,135,517 kilowatt-hours in 1987, with current peak power demands of ten MW. A 27.5 megavolt-amperes substation was recently constructed and provides adequate power to existing and future missions.

Natural gas is provided to the region by Associated Natural Gas (ANG) Company and sales to their Arkansas district were 3,080 million cubic feet (MMcf) in 1987. Their system is supplied by Texas Eastern and Texas Gas and currently there is an excess supply. Eaker AFB consumed 210,898 thousand cubic feet in fiscal year 1987 and supplies are available from ANG to meet existing and future demands.

Fuel oil usage at Eaker AFB in 1985 and 1986 was 30,295 and 34,390 gallons, respectively. Storage is provided by 49 tanks with a total capacity of 196,695 gallons. Fuel oil is used primarily at the weapons storage area and as a back-up fuel in other base facilities. Delivery is by tanker truck from local suppliers. Aviation fuel is stored in five tanks with a total capacity of 2.25 MG. Supplies are received through a direct transfer line from the Blytheville River-Rail terminal. In 1987, the base consumed approximately 160,000 gallons of diesel and had storage for 35,000 gallons. Diesel fuel supplies arrived by tanker truck from local and regional suppliers.

4.5.2.3 Impacts of the Proposed Action

For the utilities resource, the impact analysis is the same for the onbase and offbase site options unless otherwise noted.

Potable Water Treatment and Distribution. Program-related requirements of 0.09 MGD would increase average daily demands in the City of Blytheville by 2.3 percent from a baseline level of 4.2 MGD to 4.29 MGD in 1992. The city's treatment facilities, with a 6-MGD capacity would be operating at 72 percent and storage would be adequate to meet summer demands. Program-related requirements of 0.04 MGD would increase average daily demands in the City of Gosnell by 9.8 percent from a baseline level of 0.38 MGD to 0.42 MGD in 1992. The city's treatment facilities, with a 0.5-MGD capacity would be operating at 84 percent and storage would be adequate to meet summer demands. Daily requirements at Eaker AFB would increase from a baseline level of 0.75 MGD to 0.79 MGD (5.1%) in the same year.

Wastewater. Average daily flows for the City of Blytheville would increase from a baseline level of 2.96 MGD to a peak of 2.53 MGD in 1992 because of a 0.07-MGD or 2.3-percent program-related increase. The existing treatment plant, with a 3.7-MGD capacity, would be operating at 68 percent and would be able to adequately treat the increased flows. Average daily flows for the City of Gosnell would increase from a baseline level of 0.30 MGD to a peak of 0.33 MGD in 1992 because of a 0.03-MGD or 9.8-percent program-related increase. The existing treatment plant, with a 0.4-MGD capacity, would be operating at 82 percent and would be able to treat the increased flows. Wastewater flows at Eaker AFB would increase from a baseline level of 0.49 MGD to 0.51 MGD (4.8%) in 1992.

Solid and Hazardous Waste. Solid waste generation would increase by 1.9 tons per day (T/day) or 3.4 percent in the cities of Blytheville and Gosnell in 1992. Solid waste generation at Eaker AFB would increase by 0.3 T/day or 2.3 percent in the peak year (1992). With the city and private haulers already adequately disposing of 54 T/day, the program-related increase would require no additional equipment or personnel. Existing landfills have space and would be able to handle the increased flow without significantly affecting their lifespan. For the onbase option, the garrison would be

located in an area that was previously landfilled with rubble and domestic and industrial wastes. Any disturbance on or adjacent to these sites should take into consideration the nature of these sites. Materials excavated from this area may require disposal in an appropriate landfill. Program-related hazardous waste generation at Eaker AFB would be incorporated into the existing management system, stored onbase, and then transported to treatment and disposal facilities.

Energy Utilities. Program-related electricity demands would peak in 1993 with an increase of 3.26 MW. This demand would increase the projected peak demand of 5,177 MW for the AP&L system by 0.07 percent. The system has adequate power supplies to meet this increase. Electrical requirements at Eaker AFB would be 2.74 MW or a 30-percent increase on the new substation. Adequate capacity would be available from this substation to meet the demands. Natural gas consumption would increase by 29.84 MMcf. The ANG Company has an adequate infrastructure and reserves to meet the new demand. Natural gas use at Eaker AFB would increase from a projected demand of 211 MMcf to 215 MMcf or by 2.1 percent. The ANG has adequate capacity to supply the base. Diesel fuel consumption at the base would increase as a result of the program. A new fuel storage tank (20,000 gal) would be constructed in the existing tank farm to support the program. Supplies would continue to be filled by the Defense Fuels Supply Center through contracts with local and regional suppliers.

Summary of Impacts. Utility requirements associated with the Peacekeeper Rail Garrison program would increase demands on the City of Blytheville systems by less than three percent in 1992 (the peak year). During the operations phase, the increases would be reduced slightly but remain above one percent. Program-related requirements would increase demands on the City of Gosnell's water and wastewater systems by 9.8 percent. Both peak year and operations requirements of energy utilities would be less than one percent. Because the peak year requirements would not be substantially greater than the impacts associated with the operations requirements, all utility impacts would be of long duration. These impacts would be moderate because of increased demand for utility service in the City of Gosnell. Impacts would not be significant because each utility system has adequate capacity to meet the new demands without increasing personnel or expanding existing facilities.

4.5.2.4 Impacts of the Alternative Action

For this resource, the impact analysis is the same for the onbase and offbase site options unless otherwise noted.

Potable Water Treatment and Distribution. With the additional construction associated with six Train Alert Shelters (TASs) and the operations personnel to support the program, potable water requirements for the City of Blytheville would be 0.1 MGD, which is 0.01 MGD greater than the Proposed Action. Program-related potable water requirements for the City of Gosnell would be slightly greater than the Proposed Action and equal 0.04 MGD. Both cities have adequate capacity available in their treatment and distribution systems to process the additional demand. Onbase potable water requirements would remain at 0.04 MGD.

Wastewater. Average daily flows to the City of Blytheville treatment plant would peak in 1992 at 0.07 MGD, which is the same as for the Proposed Action. Average daily flows to the City of Gosnell lagoon system would increase slightly to 0.03 MGD. Both cities have adequate capacity to treat the additional flows. Wastewater flows to the base treatment facility would increase to 0.03 MGD, which is 0.01 MGD greater than the Proposed Action. Adequate capacity is available to process the additional flow.

Solid and Hazardous Waste. Solid waste generation of the increased construction and operations activities from the Alternative Action would be slightly greater than the Proposed Action. Solid waste generation at the base would remain essentially the same

as the Proposed Action. The increases would not adversely affect the city or private haulers. Adequate landfill space would continue to be available. For the onbase option, the garrison would be located in an area that was previously landfilled with rubble and domestic and industrial wastes. Any disturbance on or adjacent to these sites would need to take into consideration the nature of these sites. Materials excavated from this area may require disposal in an appropriate landfill. Hazardous waste generation would be slightly greater than the Proposed Action as a result of the maintenance activities associated with the additional trains. These wastes would be incorporated into the existing management system and transported to treatment and disposal facilities.

Energy Utilities. Demands for electricity are 0.7 MW greater for the Alternative Action than the Proposed Action. The current generation and transmission system of the AP&L and the new substation would have adequate capacity to meet the increased demands. Demands for natural gas are three MMcf greater for the Alternative Action than the Proposed Action. The ANG has an adequate infrastructure and reserves to meet these increased demands. Diesel fuel consumption would be greater than the Proposed Action. A new fuel storage tank would be constructed in the existing tank farm to support the program. Supplies would continue to be filled by the Defense Fuels Supply Center through contracts with local and regional suppliers.

Summary of Impacts. Utility requirements associated with the Alternative Action would be slightly greater than those identified for the Proposed Action. Because the peak year requirements would not be substantially greater than the impacts associated with the operations requirements, all utility impacts would be of long duration. The long-duration impacts associated with the increased demands for utility service in the City of Gosnell would be high. These impacts would not be significant because each utility system has adequate capacity to meet the new demands without increasing personnel or expanding existing facilities.

4.5.3 *TRANSPORTATION*

4.5.3.1 Region of Influence

The ROI for transportation includes the principal city streets in Blytheville, Arkansas and the primary highways leading to Eaker AFB.

4.5.3.2 Existing and Future Baseline Conditions

The principal city streets in Blytheville consist of segments of the primary highways that pass through the city. Main Street, part of Arkansas State Highways 18, 151, and 239, had segments with an average annual daily traffic (AADT) ranging between 11,840 and 15,040 in 1987. Within the central business district, Arkansas State Highways 18, 151, and 239 pass through one-way couplets Walnut and Ash, which had AADTs of 6,010 per direction. South Division Road and 6th Street, part of U.S. 61, had AADTs ranging between 6,150 and 10,810 in 1987. Arkansas State Highway 151, which connects Blytheville with Gosnell and Eaker AFB, had an AADT between 10,160 and 13,250 in 1987.

Traffic flow along the major roads is generally free-flowing; level of service (LOS) is mainly A. (Refer to Section 3.4.4 and Table 3.4.4-1 for description of LOS letter scores). However, there are two areas of congestion around Blytheville. One is the section of Arkansas State Highway 18 or Main Street within the City of Blytheville, which has an estimated LOS C. This is due to the lack of vehicle access in the area that channels traffic onto Interstate 55. The second area of congestion is along Arkansas State Highway 151, a two- to four-lane highway from Blytheville to the base main gate. The two-laned portion of this highway is heavily used by base personnel and also by civilians living in Gosnell and working in Blytheville. During the peak hours (between 7:00 A.M. and 8:00 A.M. and between 4:00 P.M. and 5:00 P.M.), this section was rated at

LOS C in 1987. Traffic stoppage is frequent due to military and civilian personnel entering the base main gate. Based on population projections for the city, traffic volumes on these principal streets are expected to increase slightly by 1994 but the resulting LOS ratings would remain the same.

The primary access to the base is provided by Arkansas State Highways 18 and 151. The base has three gates. The main gate is across Arkansas State Highway 151 from the City of Gosnell, Arkansas. The second gate is approximately 2,000 feet south of the main gate on Arkansas State Highway 151. The third gate is also along Arkansas State Highway 151 approximately 2.5 miles from the City of Blytheville, Arkansas.

Peak-hour traffic volume through the main gate is close to 1,000 vehicles. Traffic volume through the third gate is 750 vehicles during peak hours. The base does not have many traffic problems. Only short queues occur at the main gate at the close of the workday. Traffic flow was rated at LOS B during the peak hours. The cantonment areas are located adjacent to the housing area, which do not present driving problems for personnel living onbase.

4.5.3.3 Impacts of the Proposed Action

During the construction phase, an increase in incoming vehicular traffic would occur as a result of the movement of construction workers, materials, and equipment. Construction activities would require an estimated 476 program-related personnel during the peak employment year (1992). Of these, 300 program-related employees would reside in the cities of Blytheville and Gosnell and would commute daily to the base. They would generate an additional 273 passenger vehicle trips to the base during the peak hours in 1992. This increase in traffic would add to the congestion at the main gate to Eaker AFB. Additional heavy vehicle trips to the base would also increase traffic volumes at the gates. However, these movements could occur during off-peak hours and would not cause additional delays at the main gate during the peak hours. Although program-related commuters would cause additional delays and congestion along Main Street and Arkansas State Highway 151 to Gosnell, their LOS ratings of C would not be reduced. Increased queues and waiting times at the gates would also occur.

During the operations phase, an estimated 274 out of 400 program-related employees would reside in the cities of Blytheville and Gosnell. They are expected to add 249 passenger vehicle trips to the base and would cause a slight increase in congestion and delays along Main Street and Arkansas State Highway 151 (to Gosnell and the base) but without reducing the LOS ratings of C. Increased queues and waiting times would also occur at the entrance gates. In addition, occasional program-related deliveries of supplies and equipment could increase traffic volumes at the gates. However, deliveries are expected to occur during off-peak hours and could use other access routes to the base. The right-of-way for the old railroad spur could be upgraded and used as an additional access to the base.

Interruptions to vehicular flow along U.S. 61 where the connector spur crosses would also occur. The trains would only move out of the garrison when either major maintenance or repair necessitates that they be transported to the Main Operating Base or depot facilities, or when directed to disperse during times of national need. In addition, a training train would travel periodically to the garrison installation to accomplish operations, security, and maintenance training. These train interruptions at railroad/road crossings would not cause substantial delays to vehicular traffic. Moreover, these train interruptions would only occur occasionally.

Locating the garrison at either the onbase or offbase site option would not cause any changes to the transportation impacts. Therefore, both short- and long-duration impacts on transportation for either the onbase or offbase siting option would be negligible because the LOS rating along Main Street in the City of Blytheville and along Arkansas

State Highway 151 to Gosnell and the base would remain at level C. A slight increase in queues and waiting time at the main gate could occur, but this would not continue indefinitely. Employees commuting from the City of Blytheville would not reduce the LOS ratings along the principal city streets.

4.5.3.4 Impacts of the Alternative Action

Compared to the Proposed Action (4 TASs), the Alternative Action (6 TASs) would require slightly more program-related personnel. During the construction phase, an estimated 516 program-related personnel would be needed by 1992 (the peak employment year). Of these employees, 327 are expected to reside in the cities of Blytheville and Gosnell. They are estimated to add 297 passenger vehicle trips to the base during the peak hours. They would also slightly increase delays and queues at the entrance gate as with the Proposed Action. However, program-related commuting would not reduce the LOS ratings along Main Street and Arkansas State Highway 151 lower than C.

During the operations phase, an estimated 301 out of 439 program-related personnel would reside in the cities of Blytheville and Gosnell. They are expected to generate 274 vehicle trips (25 more than for the Proposed Action) to the base during the peak hours and would cause additional delays and congestion along Arkansas Highway 151 and the main gate. However, the LOS would not be reduced below C. Peacekeeper and training train impacts on vehicular traffic at the U.S. 61 crossing would be about the same as the Proposed Action.

Commuting associated with the Alternative Action would be slightly greater than with the Proposed Action However, both short- and long-duration impacts on transportation for either the onbase or offbase siting option would still be negligible because the LOS rating along Main Street and Arkansas State Highway 151 to Gosnell and the base would not change and would remain at level C. The LOS ratings along the principal city streets in Blytheville also would not change.

4.5.4 LAND USE

4.5.4.1 Region of Influence

The land use ROI includes Eaker AFB; adjacent private lands located north, east, and west of the affected areas of the base; and land along a connector spur corridor for both the onbase and offbase options. The onbase option corridor is approximately 1.2 miles long (offbase) over private land and the offbase option corridor is approximately 1.3 miles long (offbase) through private land. The connector spur corridors of both options share a common proposed connector wye with the main line of the Burlington Northern Railroad.

4.5.4.2 Existing Conditions and Future Baseline Conditions

Most of Eaker AFB is located within the corporate limits of the City of Blytheville. The city has adopted a comprehensive plan and zoning ordinance; however, the base is exempt from their provisions. The comprehensive plan has designated as residential the unincorporated private land located within the city's sphere of influence in the southern half of Section 33 between the eastern base boundary (Pemiscot Bayou) and U.S. 61. Mississippi County has no zoning or Comprehensive Plan.

Figure 4.5.4-1 presents a generalized overview of land use onbase and in the surrounding areas. The primary land uses are agricultural, military (associated with Eaker AFB), and residential. Agricultural land uses consist of the cultivation of cotton, soybeans, and winter wheat in various crop rotation patterns on nonirrigated cropland both within Eaker AFB and on the surrounding private land. There is one center pivot irrigation system in the southeastern quarter of Section 29, east of the northern end of the base

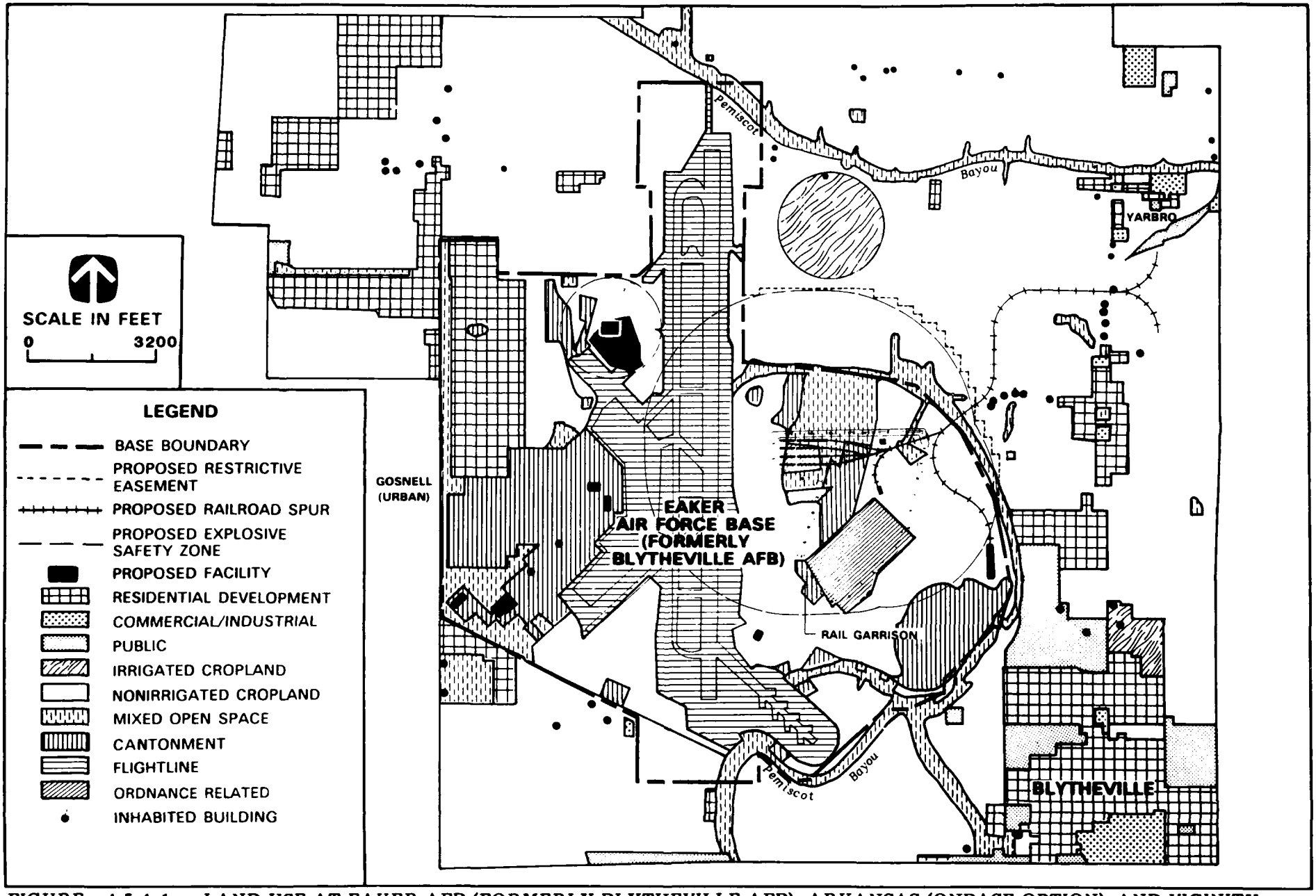


FIGURE 4.5.4-1 LAND USE AT EAKER AFB (FORMERLY BLYTHEVILLE AFB), ARKANSAS (ONBASE OPTION) AND VICINITY

runway, on land which produces cotton and soybeans in crop rotation. The soils within and surrounding the base have been classified as prime farmlands. No unique farmlands exist in the area.

Residential land uses are located north and east of the base. North of the base, approximately 22 inhabited structures (17 in a mobile home park) are located west of the Eaker AFB runway, along an unpaved county road; one inhabited building is located north of the base runway; two inhabited structures are located along the former alignment of Arkansas State Highway 150 (now a county road); and three inhabited buildings are located on the south side of Arkansas State Highway 150 and east of the base runway. East of the base boundary (Pemiscot Bayou), five inhabited structures are located within Section 33 on the western end of an unpaved county road. The 60-acre residential Golf Links subdivision is located in the northeastern corner of Section 4 between the eastern base boundary and U.S. 61. In addition, the corridor of U.S. 61 contains a strip of low-density residential development and a small mobile home park about 2,000 feet north of the Golf Links subdivision.

Offbase, the ROI also contains four low-voltage electrical distribution lines, a railroad communications line, a buried telephone cable, a waterline, two gas lines, U.S. 61, Arkansas State Highway 150, three county roads, and three city roads.

The visual attributes of the ROI are typical of the northern part of the Gulf Coastal Plains section of the Coastal Plains Physiographic Province. The vicinity of the base is very flat with little topographical relief. Natural vegetation has been removed to accommodate agriculture and urbanization. Landscape forms are flat and horizontal; colors are mostly green and light brown, with dark browns in winter. Textures are medium and well ordered. Existing onbase structures are very low on the horizon (where views are not blocked by structures and trees) as viewed from U.S. 61 (AADT 2,400-6,000) east of the base, and Arkansas State Highway 150 (AADT 1,300) north of the base. Water towers are the most prominent onbase structures. The terrain is so flat that only those dozen or so residences in the Golf Links subdivision that back up to the eastern base boundary actually have views into the base area. The views from other residences are blocked by those homes that back up to the base boundary.

4.5.4.3 Impacts of the Proposed Action

If the onbase siting option is selected, the garrison site would be located within the east-central portion of the base. This would require relocation of the existing explosive ordnance disposal and grenade ranges. No fee acquisition of land would be required. However, the proposed program would require the acquisition of approximately 275 acres of a restrictive easement northward from the base boundary. This land currently is in agricultural use and contains no inhabited buildings. The existing nonirrigated and irrigated agricultural land would not be affected by the easement, but no new inhabited buildings could be built in the easement area during the life of the program.

The connector spur for the onbase option would require acquisition of about 25 acres of prime farmland including the acreage necessary for the wye. This land is currently in nonirrigated agriculture (Figure 4.5.4-1).

The TASs would be at least 6,500 feet from both U.S. 61, east of the base and Arkansas State Highway 150, north of the base. The TASs would be located about 4,700 feet from the Golf Links subdivision located in the northeastern corner of Section 4. With the very flat terrain of the area, the TASs would be visible from these key observation points, but because of the distances involved, would be too low on the horizon to be noticeable to the casual observer. However, the proposed Training Train Shelter (TTS) would be located only about 400 feet west of the western boundary of the Golf Links subdivision which is between U.S. 61 and the eastern base boundary. The very flat terrain would allow residents of many of the houses in that subdivision an uninterrupted view of the TTS.

If the offbase option is selected (Figure 4.5.4-2), the proposed program would include the expansion of the base northward to include acquisition of approximately 370 acres of prime farmland in fee simple for the garrison. This land currently is utilized for nonirrigated agriculture (cotton and soybeans in rotation). The offbase option would require the acquisition of approximately 335 acres of restrictive easement northward to the south side of Arkansas State Highway 150. About two acres of this area is in an existing flight easement. The land is occupied by one inhabited building (residence) which may require relocation. The remainder of the land is devoted to agriculture. The existing irrigated and nonirrigated cropland would not be affected by the easement but no new buildings for habitation could be constructed during the life of the program.

The northern 320 acres of the acquisition area (portions of the northern half of Sections 32 and 33) are located in the unincorporated area of Mississippi County, where no land use zoning or plans apply. The southern 50 acres (southern portion of Section 33) are located within the City of Blytheville sphere of influence and are designated for residential uses. The adjoining area east of the 50-acre acquisition has the same residential designation. Construction of program facilities (the TTS) in this area may be considered incompatible with the city's residential-use designation.

The connector spur of the offbase option would require acquisition of about 17 acres of prime farmland including the acreage necessary for the wye. The proposed connector spur land is currently nonirrigated agricultural.

For the offbase siting option, the TASs would be located about 6,600 feet from U.S. 61 and about 3,500 feet from Arkansas State Highway 151. The TTS would be located only about 100 feet (at the closest point) from the proposed eastern base boundary and about 2,200 feet from U.S. 61. East of that boundary, most of the land is vacant but several houses (not in a subdivision) are located about 800 feet north of the TTS site.

Summary of Impacts. For the onbase option, about 25 acres of prime farmland currently in nonirrigated cropland would be acquired for rail spur, but no land would be acquired for the garrison. No inhabited buildings would require relocation. Although the view of the TASs from U.S. 61 would not be objectionable, the view of the 800-foot-long, 30-foot-high TTS from the Golf Links subdivision could be objectionable to some residents. With these conditions, short- and long-duration impacts on land use would be moderate for the onbase option. Impacts would not be significant because no inhabited buildings would require relocation, nor would the visual impacts be highly controversial.

For the offbase option, the approximately 390-acre acquisition required for the garrison and rail spur is approximately 0.09 percent of the inventory of nonirrigated cropland and 1.3 percent of the prime farmland in Mississippi County. One inhabited building would have to be relocated from the restrictive easement. Further, the view of the TTS could be objectionable to the few nearby residents. With these conditions, short- and long-duration impacts on land use would be low for the offbase option. Impacts would be significant because one inhabited building may have to be relocated.

4.5.4.4 Impacts of the Alternative Action

Impacts of the Alternative Action with the onbase option would be about the same as the Proposed Action except that the restrictive easement would be approximately 280 acres instead of 275 acres for the Proposed Action. Because of the proximity of the proposed TTS to the Golf Links subdivision (about 400 ft), views of the TTS could be objectionable to some residents. For these reasons, the short- and long-duration impacts of the Alternative Action on land use would be moderate. Impacts would not be significant because no inhabited buildings would require relocation.

Impacts of the Alternative Action with the offbase option would be about the same as for the Proposed Action with two exceptions: the required restrictive easement would be

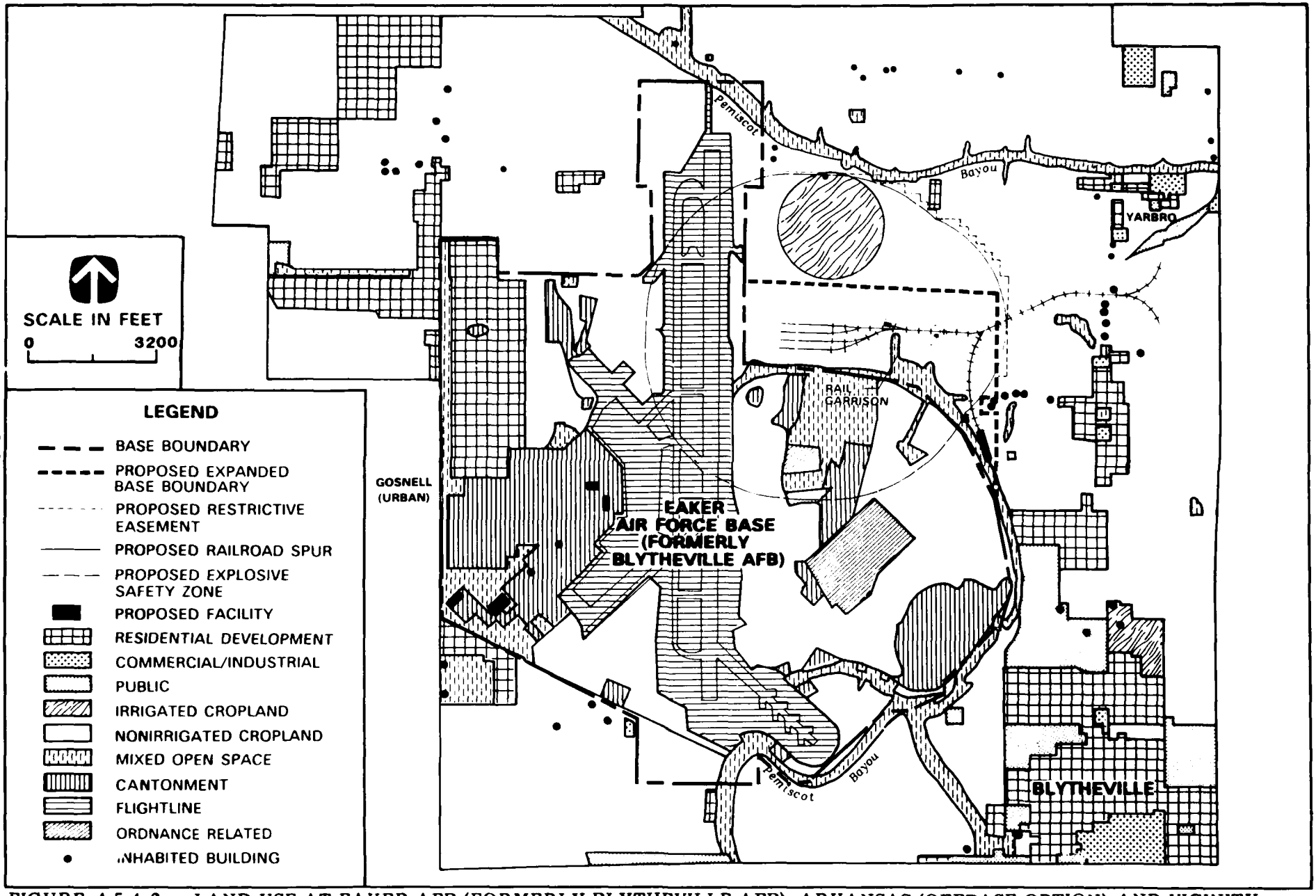


FIGURE 4.5.4-2 LAND USE AT EAKER AFB (FORMERLY BLYTHEVILLE AFB), ARKANSAS (OFFBASE OPTION) AND VICINITY

about 380 acres, and three inhabited buildings may require relocation from within the easement. For these reasons, the short- and long-duration impacts of the Alternative Action on land use would be low. Impacts would be significant because the inhabited buildings may have to be relocated, and a part of the 370-acre fee acquisition for the garrison and TTS would be incompatible with the adjoining residential area.

4.5.5 CULTURAL RESOURCES

4.5.5.1 Region of Influence

The ROI for Eaker AFB consists of the Eastern Lowlands-St. Francis Basin portion of the Mississippi River drainage in northeastern Arkansas and adjacent parts of Tennessee, and the southeast Missouri "bootheel." The area extends along the Mississippi River from the northern end of Pemiscot County, Missouri to the southern end of Mississippi County, Arkansas. Most of the drainages flow south and west toward the St. Francis River and consist of a series of bayous, ditches, and sloughs. It is expected that prehistoric and historic resources will occur near drainages and on high areas near water. The resources on and near Eaker AFB are a part of the regional data base contained within the ROI.

4.5.5.2 Existing and Future Baseline Conditions

Prehistoric Resources. A variety of prehistoric site types have been recorded within the ROI including large village sites with and without mounds; small, scattered farmsteads and isolated hamlets; large stratified village sites to the east; large, buried middens; surface sites on braided areas; occurrences of buried megafauna to the southeast of the base; and isolated projectile and spear points. The time period represented by these sites is from approximately the Late Woodland period (A.D. 400) into the Middle Mississippian period (A.D. 1500). Two deeply buried Early Woodland period sites (ca. 500 B.C. - A.D. 1) have been recorded west of Eaker AFB. It is possible that such sites occur on or in the immediate vicinity of the base, where they could also be buried as a result of the New Madrid earthquake of 1811-1812.

An archaeological survey of about 765 acres was recently conducted in the proposed siting areas for the garrison and rail spur. Thirteen sites are located in or near proposed impact areas (Table 4.5.5-1). Six of these are entirely onbase, five occur offbase (3MS106, BAFB-4, -5, -6, -9), and portions of two have been recorded both onbase and offbase (BAFB-3, 3MS195). Eight sites are believed to be eligible or potentially eligible for inclusion in the National Register of Historic Places (NRHP), including three prehistoric sites onbase. The largest of these, site 3MS105, is a major multicomponent village covering approximately 70 acres dating to the Late Woodland and Late Mississippian periods. Sites BAFB-3 and -9 appear to represent these same time periods, but they are buried, and their extent and condition remain unknown. Site BAFB-1 is a Late Woodland site partially disturbed by runway construction. Site 3MS195, on the northwestern boundary line of the base, was an agricultural field identified on an 1847 General Land Office map; no buildings were located in its vicinity.

Site 3MS106, located just northeast of the base, is a prehistoric habitation and is eligible for the NRHP. Site BAFB-4 is a potentially eligible prehistoric site of undetermined type and size east of the base. Site BAFB-5, located north of 3MS106, is a prehistoric habitation believed to be eligible. Site BAFB-6, east of 3MS106, is a potentially eligible prehistoric artifact scatter.

Historic Resources. Historic site types in the ROI include tenant farmhouses (approximately 1 per 40 acres throughout the ROI), occasionally a large plantation in eastern Mississippi County, slave cabins, cemeteries associated with dispersed communities and plantations, logging industry activities, and drainage ditches; many dating from the turn of the century and still in use. None of the structures onbase are old enough to qualify for the NRHP.

Table 4.5.5-1

Archaeological Sites at Eaker AFB, Arkansas

Site No.	Site Type	National Register Status
3MS105*	Prehistoric multicomponent village	Eligible
3MS106	Prehistoric habitation and mound	Eligible
BAFB-5	Prehistoric habitation	Eligible
BAFB-9	Prehistoric/historic habitation	Eligible
BAFB-4*	Prehistoric (type unknown)	Potentially eligible
BAFB-1*	Prehistoric/historic artifact scatter	Potentially eligible
BAFB-3**	Buried multicomponent prehistoric artifact scatter; ceramic sherds, deer bones	Potentially eligible
BAFB-6	Prehistoric artifact scatter	Potentially eligible
Sawba Cemetery*	Historic cemetery	Not eligible
BAFB-2*	Projectile point and lithic scatter	Not eligible
BAFB-7*	Historic artifact scatter	Not eligible
BAFB-8**	Historic artifact scatter	Not eligible
3MS195	Historic agricultural field	Not eligible

Notes: *Site located onbase.
**Base boundary crosses site.

Native American Resources. Few Native Americans reside in Arkansas at present, but the program area was ancestral territory for groups of Quapaw who now live in Oklahoma, and the Michigamea, who had lost their tribal identity by the middle of the nineteenth century. Sacred or traditional use areas may exist, but it is not considered a strong possibility. Consultations have been initiated with the Quapaw but no sensitive sites have yet been identified.

Paleontological Resources. A search into geological and paleontological literature has been made, and it has been determined that no rare or unusual fossil materials have been identified on or in the vicinity of Eaker AFB.

4.5.5.3 Impacts of the Proposed Action

The program impact areas consist of approximately 385 acres for the garrison, support facilities, and relocated facilities onbase. Three miles of new rail line from the TAS and 12 acres in the connecting wye to the Burlington Northern main line east of the base would be required. New road construction of approximately 1.5 miles in the garrison and 5 miles outside the garrison would be necessary. If the offbase option is chosen, approximately 102 acres would be disturbed in the garrison area. Approximately two miles of new rail lines would be necessary.

Prehistoric Resources. Site 3MS105 is located in the area chosen for the garrison and is considered eligible for inclusion in the NRHP. This site is one of few known in the ROI covering such a long time period. Prehistoric sites are important primarily for the amount of information they can contribute to fill current gaps in the data base for this

little known area. The size and complexity of site 3MS105 alone contribute significantly to our knowledge of prehistoric people because of the amount, richness, and diversity of its cultural materials. It also covers a long time period (ca. 500 B.C. A.D. 1500) and can make contributions to the state's research goals as defined in the Resource Protection Planning Process. Site 3MS105 has been described by an archaeologist familiar with this area as the largest site of its type recorded in the region. Site BAFB-9 would be affected by construction of the railroad wye at the Burlington Northern main line.

Historic Resources. A historic cemetery, North Sawba, is located south of site 3MS105 and directly northwest of the Weapon Storage Area; it would not be affected by the Proposed Action. The cemetery does not meet the criteria for eligibility for inclusion in the NRHP (Code of Federal Regulations 1986, 36 CFR §60.4).

Native American Resources. Sacred or traditional areas of concern have not been identified for any Native American groups, probably because of the brevity of their occupation of the area, and the long time span since their removal.

Paleontological Resources. No rare or unusual fossil material would be affected by the Proposed Action.

Summary of Impacts. Long-duration impacts of the Proposed Action onbase would be high because of the rarity and regional importance of site 3MS105. Construction would disturb much of sites 3MS105 and BAFB-9, reducing their information potential. Therefore, impacts would be significant. The explosive ordnance disposal range would be relocated to the northwestern section of the base, west of the airstrip. Although site 3MS195 would be within the explosive safety zone, no damage is likely. No NRHP-eligible historic sites would be affected. No Native American sacred or traditional use areas have been identified in the proposed program areas. However, some groups may have concerns about the disposition of human remains at site 3MS105. No short-duration impacts are expected.

Choice of the offbase option would result in a long-duration, low impact. One prehistoric site (BAFB-5) consisting of several house clusters was recorded running north to south at the eastern side of the proposed garrison area. Additionally, site BAFB-9 would be disturbed by construction of the rail spur wye at the main line. While it may be possible to route the rail line between house clusters, the overall research potential of the sites would probably be diminished. Therefore, impacts would be significant. No NRHP-eligible historic sites would be affected, and no short-duration impacts would occur. The purchase of offbase lands would be beneficial for sites which could be avoided and afforded protection under federal law.

Mitigation Measures. Mitigation measures may include, but are not limited to, avoidance or preservation in place by fencing, planting ground cover, or covering with fill. If these measures are not possible, data recovery such as mapping or excavation would be necessary at sites eligible for the NRHP.

If the sites could be avoided, the level of impact would be negligible, provided some acceptable method of protection is chosen. Preservation in place could result in a low and not significant impact except in the case of covering with fill. This method of preservation may have as yet undetermined effects, but it would probably be low and not significant.

4.5.5.4 Impacts of the Alternative Action

An additional 28 acres of ground disturbance would result if the Alternative Action is chosen; it would be an expansion of the area previously selected for the Proposed Action.

Prehistoric Resources. If the onbase garrison area is selected, a larger portion of site 3MS105 could be affected. If the offbase garrison area is chosen, no additional impacts would occur.

Historic Resources. Expansion south of the Proposed Action garrison area could result in impacts on the North Sawba Cemetery, but the cemetery is not eligible for the NRHP.

Native American and Paleontological Resources. No sacred or traditional areas of concern to Native American groups and no rare or unusual fossil materials have been identified. No impacts on these resources are expected from the Alternative Action.

Summary of Impacts. Long-duration impacts of the Alternative Action onbase would be high. Construction in the garrison area would damage site 3MS105 and the rail spur would disturb site BAFB-9. Impacts would cause the loss of information potential, and would therefore be significant. No short-duration impacts would result from the Alternative Action.

Long-duration impacts of the Alternative Action offbase would be low. While the additional garrison area would not affect any sites, the spur to the rail line would still cross sites BAFB-5 and BAFB-9, diminishing their research potential. Therefore, the impact would be significant. No short-duration impacts would occur.

Mitigation Measures. Mitigation measures for the Alternative Action would be the same as for the Proposed Action.

4.5.6 BIOLOGICAL RESOURCES

4.5.6.1 Region of Influence

The ROI for biological resources for Eaker AFB is defined as the areas where these resources would be directly affected by program activities (Section 4.5, Figure 4.5-1). The proposed rail garrison site (south site) is located onbase and an alternative site is located offbase, but adjacent to the existing base boundary. Areas of indirect disturbance in the ROI where program-induced impacts may occur are defined as those recreational areas within an approximately 1-hour driving time of Blytheville, Arkansas. Recreational areas include the Mississippi River, St. Francis River, Big Lake and Wapanocca national wildlife refuges, state wildlife management areas, and Crowley Ridge State Park.

4.5.6.2 Existing and Future Baseline Conditions

Biological Habitats. Eaker AFB has been extensively developed and much of the base has been seeded to bermuda grass and rye. An extensive landscaping plan has been developed for the base, and trees such as oaks, cypress, magnolia, dogwood, maple, sycamore, and willow have been planted throughout the base. Approximately 1,658 acres onbase are used as cropland. The majority of the area surrounding the base out to approximately one mile is also used for growing cotton, soybeans, wheat, and alfalfa. Grasslands and woodlands also occur in this area (Figures 4.5.6-1 and 4.5.6-2). The poor quality habitats onbase and in the surrounding area do not support diverse wildlife species; however, a few species such as the eastern cottontail rabbit, raccoon, virginia opossum, and gray squirrel do occur onbase and in the surrounding region. Various species of birds, amphibians, and reptiles also utilize these habitats. A 2.5-acre pond occurs onbase and has been stocked with catfish. Future baseline conditions onbase are expected to be similar to existing conditions based on current base management plans.

Bottomland woodlands, grasslands, and agricultural lands occur in the remainder of the ROI. The Mississippi and St. Francis rivers are the major aquatic habitats in the region and support important fisheries resources. These rivers are the primary recreational

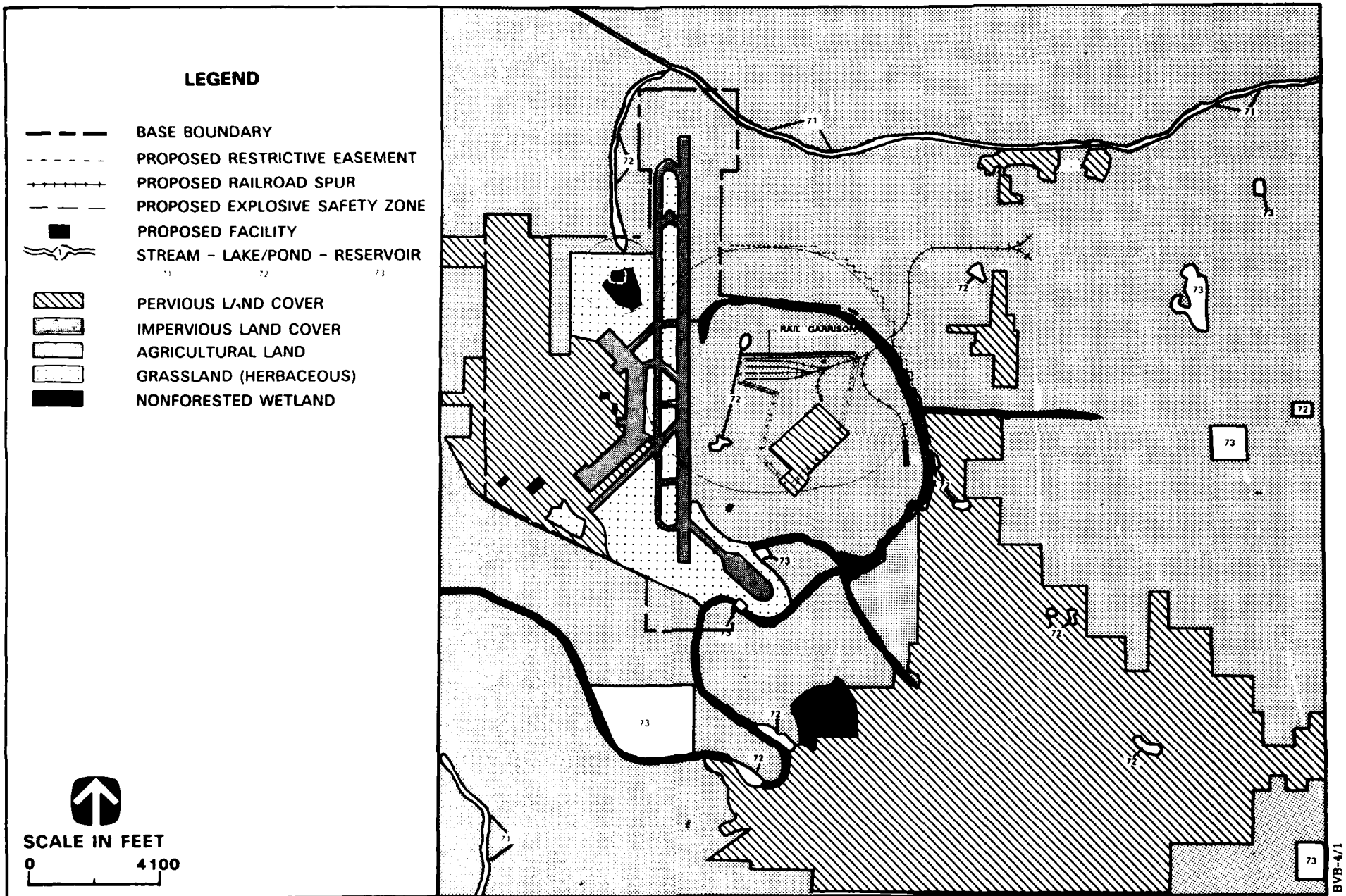


FIGURE 4.5.6-1 HABITAT AND LAND COVER TYPES AND POTENTIAL DISTURBANCE AREAS ON EAKER AFB (FORMERLY BLYTHEVILLE AFB), ARKANSAS (ONBASE OPTION) AND IN THE VICINITY

areas for fishermen in the region. The state wildlife management areas and Big Lake and Wapanocca national wildlife refuges provide recreation for hunters. Other unique and sensitive areas in the ROI include the riparian zones that occur along the streams and rivers in the region. Future baseline conditions would be similar to existing conditions based on projections for population increases and increased recreation use in the ROI.

Threatened and Endangered Species. No federally listed threatened and endangered species occur onbase. The state-recognized Cooper's hawk may occasionally occur onbase. Several federally listed threatened and endangered and state-recognized species occur in the ROI (Table 4.5.6-1), but suitable habitat for these species does not occur in the vicinity of potential program facilities.

4.5.6.3 Impacts of the Proposed Action

Biological Habitats. Construction of garrison facilities at Eaker AFB would result in the destruction of plants and plant cover, increased small mammal mortality, and displacement of mobile species. Approximately 294 acres of land would be disturbed during construction of the proposed program; 113.9 acres of land would be permanently lost and 180.3 acres would be temporarily disturbed (Section 4.5, Table 4.5-3). Most of the area that would be disturbed (165 acres) is in agricultural use. An additional 37.5 acres support grassland habitat, and 91.6 acres were previously disturbed during development of other base programs (Table 4.5.6-2). Approximately 0.1 acre of wetland would be disturbed. These disturbances are not likely to seriously affect the biological resources onbase or diminish the biological diversity because a relatively small area would be affected, and the area provides only minimal cover and forage for wildlife.

Table 4.5.6-1

Federally Listed, Federal-Candidate, and State-Sensitive Species
Eaker AFB, Arkansas and Vicinity

Common Name	Federal Scientific Name	State Status	Status	Distribution
American peregrine falcon	Falco peregrinus anatum	E	-	May occur in region as transient
Bald eagle	Haliaeetus leucocephalus	E	-	Occurs in region
Cooper's hawk	Accipiter cooperi	-	SA	Occurs in region, may occur onbase occasionally
Fat pocketbook mussel	Potamilus capax	E	-	May occur in region
Glossy ibis	Plegadis falcinellus	-	SA	Occurs in region
Hooded merganser	Lophodytes cucullatus	-	SA	Occurs in region
Midwest worm snake	Carphophis amoenus helenae	-	SA	May occur in region
Red fox	Vulpes vulpes	-	SA	Occurs in region
Spotted dusky salamander	Desmognathus fuscus conanti	-	SA	May occur in region

Notes: E = Endangered
SA = Special animal

Sources: U.S. Air Force 1977c; U.S. Fish and Wildlife Service 1984.

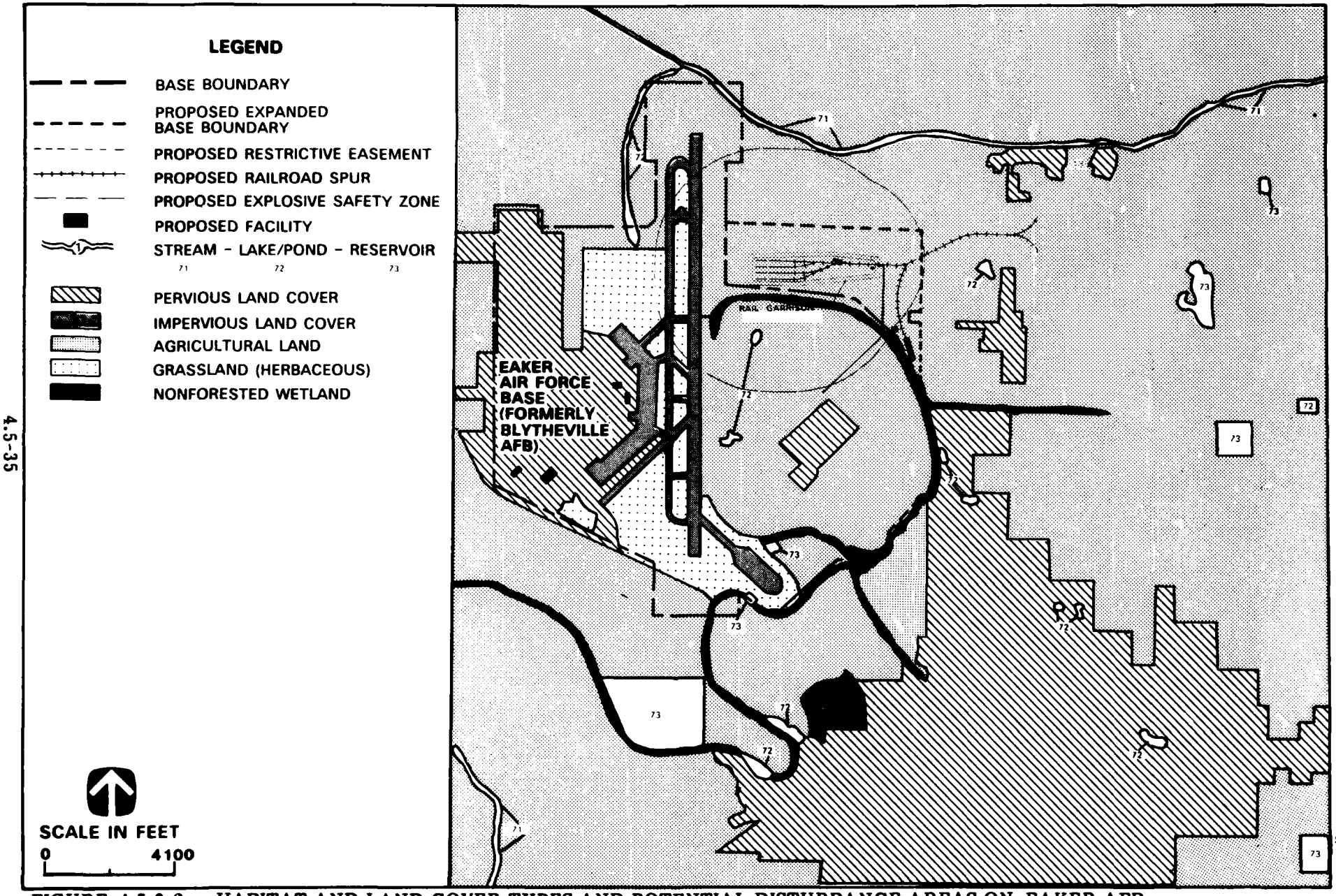


FIGURE 4.5.6-2 HABITAT AND LAND COVER TYPES AND POTENTIAL DISTURBANCE AREAS ON EAKER AFB (FORMERLY BLYTHEVILLE AFB), ARKANSAS (OFFBASE OPTION) AND IN THE VICINITY

Table 4.5.6-2

Habitat and Land Cover Types Potentially Disturbed by the Peacekeeper Rail Garrison Program at Eaker AFB, Arkansas

Habitat Type	Garrison, Support, and Relocated Facilities (acres)	Rail Line (acres)	Total (acres)
	ONBASE		
Proposed Program			
Agricultural	149.9	15.1	165.0
Grassland	37.5	0.0	37.5
Nonforested wetland	0.0	0.1	0.1
Developed land	87.4	4.2	91.6
TOTAL:	274.8	19.4	294.2
Alternative Action			
Agricultural	155.5	15.1	170.6
Grassland	37.5	0.0	37.5
Nonforest wetland	0.0	0.1	0.1
Developed land	94.6	4.2	98.8
TOTAL:	287.6	19.4	307.0
	OFFBASE		
Proposed Program			
Agricultural	109.4	10.6	120.0
Developed land	54.5	4.0	58.5
TOTAL:	163.9	14.6	178.5
Alternative Action			
Agricultural	130.4	10.6	141.0
Developed land	54.5	4.0	58.5
TOTAL:	184.9	14.6	199.5

Construction of garrison facilities offbase would also result in the destruction of plants and plant cover, increased small mammal mortality, and displacement of mobile species. Approximately 120 acres of agricultural land would be disturbed (Table 4.5.6-2). The remaining area that would be disturbed has already been developed (Table 4.5.6-2). The minor disturbances resulting from construction would be similar to those for the onbase option because a relatively small area would be affected and the area provides only minimal cover and forage for wildlife.

In compliance with Executive Order No. 11990 and in accordance with requirements of Section 404 of the Clean Water Act, alternative sites were considered for location of program facilities. In order to collocate facilities of the proposed program with existing facilities and meet engineering and operational constraints, it was determined that there is no practicable alternative to the proposed construction of some facilities in wetlands. Furthermore, site-specific program design and construction techniques would include all practicable measures to minimize harm to wetlands.

Program implementation would result in a slight increase in population in Mississippi County. This growth would result in a slight increase in regional recreational activities; however, biological resources would not be degraded because recreation-related impacts would be small. Portions of the Mississippi River, Big Lake and Wapanocca national wildlife refuges, various state wildlife management areas, and the numerous state parks in the area would receive the greatest increase in recreational use.

Threatened and Endangered Species. No impacts on threatened and endangered species are expected to occur with either the onbase or offbase option.

Summary of Impacts. The proposed program at Eaker AFB would result in minor impacts on biological resources onbase and in the region. The program would affect 294.2 acres onbase or 178.5 acres offbase of mainly grassland, cropland, and previously developed land which would not reduce regional wildlife populations or diversity. Temporarily disturbed areas would be revegetated and the Air Force would investigate means to mitigate other impacts. Program-induced recreational activities would not adversely affect regional biological resources because the increase of activities would be very small, and recreational activities would be dispersed over a large area. Therefore, short- and long-duration impacts would be negligible for both the onbase and offbase options.

4.5.6.4 Impacts of the Alternative Action

The Alternative Action (onbase option) would result in the disturbance of 37.5 acres of grassland, 170.6 acres of agricultural land, 98.8 acres of developed land, and 0.1 acre of wetland habitat. The offbase option would affect only agricultural and developed land (Table 4.5.6-2). Additional areas that would be affected by either option are agricultural land or developed land, and have little habitat value. No threatened and endangered species are expected to be affected by this program at either site. Impacts for this alternative are expected to be similar to the Proposed Action: short- and long-duration impacts would be negligible for both the onbase and offbase options.

4.5.7 WATER RESOURCES

4.5.7.1 Region of Influence

The ROI for Eaker AFB is the St. Francis River watershed of the Lower Mississippi River Basin. The boundaries of the ROI are the State of Missouri on the north, Arkansas State Highway 18 on the south, Interstate 55 on the east, and the Big Lake National Wildlife Refuge on the west (Figure 4.5.7-1). The ROI has an areal extent of approximately 110 square miles and encompasses the support communities of Blytheville and Gosnell.

4.5.7.2 Existing and Future Baseline Conditions

Major Water Users. Total water use in Mississippi County amounted to approximately 97,220 acre-feet (acre-ft) in 1985. The agricultural category was the largest user, accounting for about 91 percent of the total. Municipal use accounted for five percent. Current and projected water use for Eaker AFB and the cities of Blytheville and Gosnell is presented in Figure 4.5.7-1. These entities obtain their water from deep wells. Eaker AFB is currently designing a new well to ensure an adequate supply. The water supplies of the cities are adequate to meet all anticipated needs and no major water resource developments are expected to occur during the projected period.

Surface Water Hydrology and Quality. The hydrologic setting of the ROI is typical of a floodplain of the Mississippi River. The terrain is very flat and there are numerous agricultural drainage ditches in the area. There are also several bayous that have been dredged for use in the drainage system. Stormwater runoff from the eastern part of the base (including both onbase and offbase garrison sites) drains to Pemiscot Bayou. The western part of the base drains to Ditch No. 25. These both flow southwest to the Little

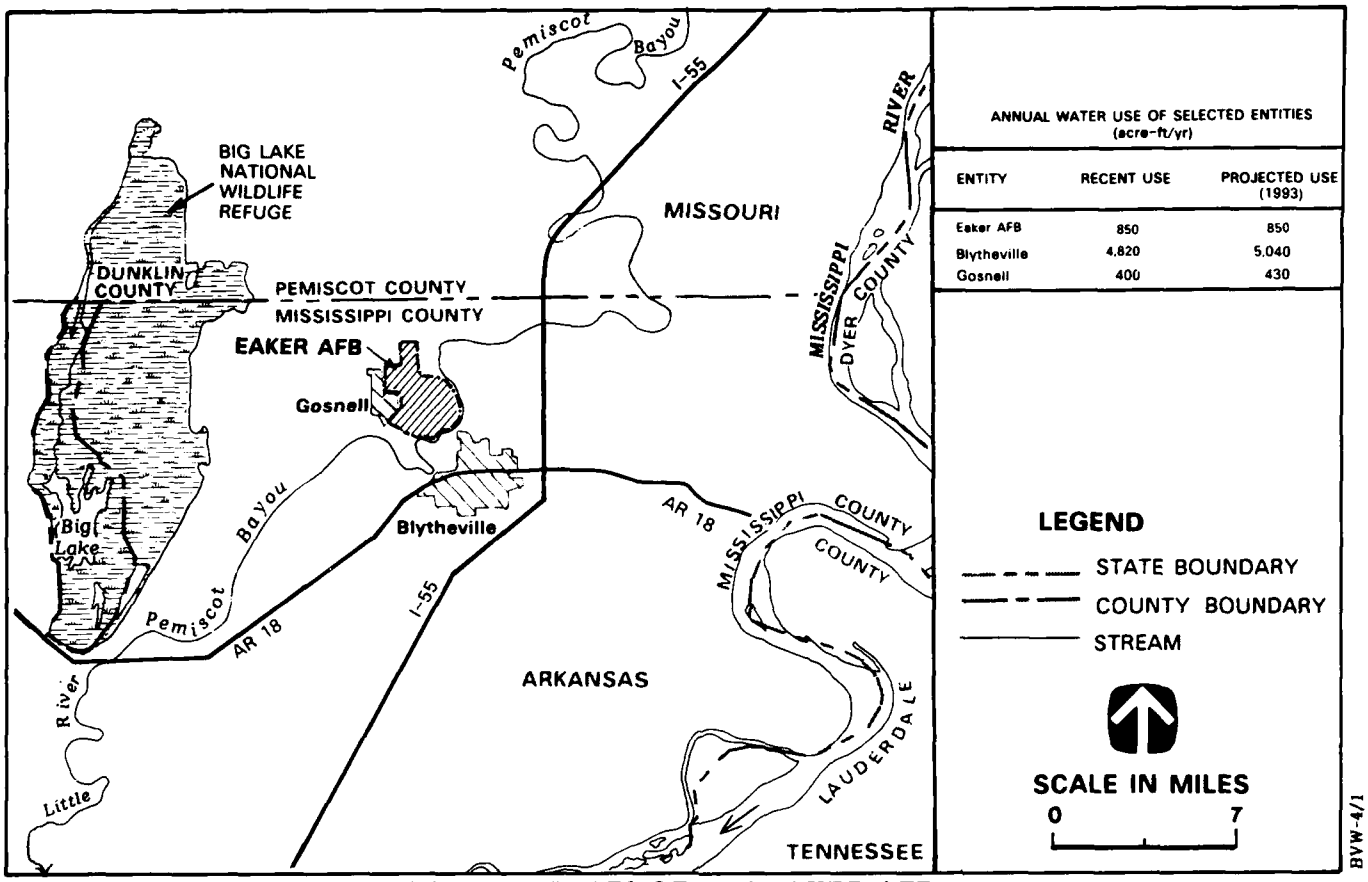


FIGURE 4.5.7-1 HYDROLOGIC FEATURES OF THE EAKER AFB (FORMERLY BLYTHEVILLE AFB), ARKANSAS REGION OF INFLUENCE

Table 4.5.7-1

Program-Related Water Use
Within the Eaker AFB Region of Influence
Peacekeeper Rail Garrison Program (Proposed Action)
(values in acre-ft)

	1990	1991	1992	1993 Onwards
Eaker AFB				
Construction/Operations	22	32	29	22
Domestic	0	5	17	17
Blytheville Domestic	10	49	106	99
Gosnell Domestic	4	19	42	39
TOTAL:	36	105	195	178

River, which flows into the St. Francis River and, in turn, discharges to the Mississippi River approximately 150 miles south of Eaker AFB. Treated wastewater effluent from the major entities in the ROI is discharged at six separate points to the Little River system. Effluent from Eaker AFB is in compliance with applicable standards, while effluents from Blytheville and Gosnell are not. Corrective measures are expected to be implemented by 1989, and adequate wastewater treatment will be provided at all the affected entities during the projection period (Section 4.5.2.2). Total wastewater discharge by the affected entities to the Little River system currently amounts to about 4,230 acre-feet per year (acre-ft/yr). Surface water quality in the ROI tends to be fair. Water quality problems include elevated fecal coliform bacteria counts and relatively high sediment loads. Both of these problems are principally attributed to nonpoint source runoff from agricultural activities. Stream channelization also contributes considerably to the sedimentation problem. The potential for flooding at the base is minimal. Only a narrow corridor along Pemiscot Bayou and a small area along an unnamed tributary to Ditch No. 25 are subject to inundation during a 100-year flood event.

Groundwater Hydrology and Quality. Most of the water use of the ROI is supplied by abundant groundwater resources. The Wilcox Formation (Tertiary age) is the principal aquifer of the ROI. This is a deep, confined aquifer of regional importance and supplies all of the municipal water requirements of the ROI. The water quality of this aquifer is excellent. Irrigation wells and rural residences generally obtain water of inferior quality from more shallow Quaternary deposits. Moderate historical declines in the potentiometric levels of the Wilcox Formation have been reported. However, groundwater levels in the ROI have stabilized in recent years.

4.5.7.3 Impacts of the Proposed Action

Major Water Users. Total program-related water use would peak at about 200 acre-ft/yr in 1992 and stabilize at about 180 acre-ft/yr during the operations phase (Table 4.5.7-1). All of this water would be pumped from existing wells. Arkansas statutes do not address groundwater allocation, and no pumping restrictions have been imposed on any of the affected entities. Program-related water use represents peak annual increases of six percent, two percent , and ten percent over the 1992 baseline water use of Eaker AFB (850 acre-ft), Blytheville (5,030 acre-ft), and Gosnell (420 acre-ft), respectively. The affected entities have adequate pumping capacities to accommodate the proposed program, and the small increases in ROI water use would not interfere with existing major water users.

Surface Water Hydrology and Quality. Overall program-induced increases in effluent discharge into the Little River system would peak at about 140 acre-ft/yr in 1992, a 3-percent increase over the baseline discharge of the affected entities of 4,430 acre-ft/yr. All streams in the ROI are classified for municipal supply, but their undependability in sustaining adequate flows and their marginal water quality limit their value for that use. All of the affected entities would have adequate available capacity to treat program-induced wastewater (Section 4.5.2.3). Therefore, the small increase in discharge to the Little River system would not appreciably degrade baseline water quality over the duration of the proposed program.

With the onbase siting option, construction of the garrison at Eaker AFB would result in land disturbance and associated erosion on 208 acres. In addition, 2.7 miles of new rail spur would be constructed in the Pemiscot Bayou drainage to connect the garrison site to an existing rail line. The northern part of the proposed garrison site lies adjacent to Pemiscot Bayou (Section 4.5, Figure 4.5-1). However, the terrain is virtually level and the erosion potential is low. The bayou is a turbid, perennial stream that is dredged on an as-needed basis. The limited amount of program-induced sediment yield to the bayou should, therefore, not substantially degrade its baseline water quality. A new railroad bridge for the connecting rail spur would be constructed over Pemiscot Bayou. Bridge construction would temporarily raise suspended sediment concentrations to very high

levels in the bayou immediately downstream. However, this large increase in turbidity would not persist more than a few days following cessation of ground-disturbing activities around the bridge, and no lingering effects would result. Water quality in the bayou should return to preconstruction levels within a few weeks.

The offbase siting option for the garrison is similar to the onbase siting option. The proposed garrison site would encompass 102 acres in a flat area within 300 feet of Pemiscot Bayou, and two miles of new connecting rail spur would be constructed (Section 4.5, Figure 4.5-2). A new bridge over Pemiscot Bayou would also be constructed (except that this bridge would be part of a new access road). Construction activities associated with the offbase siting option would, therefore, result in virtually the same effects as previously described.

Groundwater Hydrology and Quality. The Wilcox Aquifer would supply all of the program-related water requirements. Although the safe yield of this aquifer is not known, the aquifer is recognized as a prolific regional unit with large reserves of available groundwater. Program-induced pumpage is relatively small and would have only minor effects on local hydrogeologic conditions.

Summary of Impacts. The water supply of the ROI is adequate to meet program-related water requirements and no appreciable groundwater level declines would result. Slight degradation of surface water quality and minor hydrologic changes would occur. The short- and long-duration impacts on water resources would be low for either siting option. None of these impacts would be significant.

4.5.7.4 Impacts of the Alternative Action

Major Water Users. Total program-related water use during the operations phase would be about 220 acre-ft/yr, a 10-percent increase over the Proposed Action. Baseline-plus-program water use at Eaker AFB would increase by an additional one percent compared to the Proposed Action. The comparable increase in water use at Blytheville and Gosnell would also be minor. The available water supply is adequate to meet the water needs of this alternative without interfering with existing major water users.

Surface Water Hydrology and Quality. With six Train Alert Shelters (TASs) the disturbed area at the garrison would increase by about 6 percent to 221 acres for the onbase site or by 21 percent to 123 acres for the offbase site. The respective short-term sediment yield could be expected to increase by a similar percentage. However, the water quality effects on the nearest perennial stream, Pemiscot Bayou, are not expected to be substantially different from those of the Proposed Action.

Groundwater Hydrology and Quality. Program-induced groundwater pumpage would increase by 20 acre-ft/yr over the Proposed Action peak pumpage of 210 acre-ft/yr. This small increase should not materially affect groundwater levels or the large groundwater reserves of the Wilcox Aquifer.

Summary of Impacts. Short- and long-duration impacts on water resources resulting from either siting option are expected to essentially remain the same as for the Proposed Action: low and not significant.

4.5.8 GEOLOGY AND SOILS

4.5.8.1 Region of Influence

The ROI at Eaker AFB for geology and soils includes the installation and associated program-related areas in the immediate vicinity. The land within a 1-mile radius of the installation and a 1,000-foot-wide corridor along the connecting rail spur were characterized for purposes of establishing the local baseline context. In addition, a

regional ROI was established for geologic hazards for the purpose of developing a regional tectonic framework for seismicity at the installation.

4.5.8.2 Existing and Future Baseline Conditions

Eaker AFB lies within the Mississippi River alluvial plain which is an extensive, flat, lowland floodplain. Quaternary-age deposits composed of clay, sandy clay, sand, and gravel occur onbase to a depth of approximately 125 feet. The installation lies in seismic zone 3 (Uniform Building Code 1985) in the New Madrid Seismic Province (Figure 4.5.8-1), which is historically characterized by large magnitude earthquakes. Three events of magnitude 8.5 (Mercalli Intensity 10-11) or greater, five of magnitude 7.8, and ten of magnitude 7 occurred between December 1811 and February 1812 (Nuttli 1983). There have been 19 recent (1965 to 1974) events with magnitudes of less than 5.4 within 50 miles of the base (Stover 1977), and events with magnitudes of 2 to 4 have occurred between 1981 and 1987. The predicted maximum credible earthquake (MCE) for the region is a magnitude of 8.5 based on historical occurrence of such events. Maximum horizontal acceleration in rock is expected to be greater than 0.32 g, with a 90-percent probability of not being exceeded in 50 years (Algermissen et al. 1982). Recurrence intervals for large earthquakes (> 7.2 magnitude) estimated from historical data range from 500 to 700 years (Nuttli 1974; Algermissen 1972, 1973; McClain and Myers 1970; Mann and Howe 1973). Frequency-magnitude relationships suggest that events with a magnitude of about 6.2 have recurrence intervals of 90 to 100 years. It is reasonable to conclude that ground surface rupture and vertical ground movement are viable hazards likely to accompany future large earthquakes based on historical data. The area near Eaker AFB is also susceptible to liquefaction (Figure 4.5.8-2). Depth to groundwater is generally 10 feet to 15 feet near the installation and the lithology of the sediments is very conducive to liquefaction. The maximum credible earthquake is also sufficiently high which makes seismically induced liquefaction a likely occurrence at the installation. Seismically induced landslides occurred along the banks of the Mississippi River during the 1811 to 1812 earthquakes (Fuller 1912; Nuttli 1983) and are likely to accompany future large earthquakes. Other areas susceptible to landslides or terrain failure were not discovered in the ROI.

Energy and Mineral Resources. No oil, gas, or coal leases/fields have been identified in the ROI. No uranium mines/leases, Known Geothermal Resource Areas, or metallic/non-metallic mineral resource mining operations or leasing activities exist in the ROI.

Soil Resources. The U.S. Soil Conservation Service (SCS) has mapped 24 soil types in the ROI. Nine of these soil types occur in areas where program-related facilities may be located at either siting option. They occur on level surfaces and range from poorly drained to excessively drained. Most have a loamy texture but some have a sandy or clayey texture. Soil erosion susceptibility was evaluated for wind and sheet erosion. Wind erosion of unvegetated/disturbed ground in the ROI is not a major concern of the SCS in Arkansas. However, the prevailing southerly wind direction would make north-south elongated tracts of land susceptible to wind erosion. The garrison for either siting option would be located on soils with a moderate susceptibility to wind erosion while the rail spur and other facilities for either siting option would be located on soils with a moderate to high susceptibility. For the onbase siting option, the garrison, rail spur, and other facilities would be located on soils with a low to high susceptibility to sheet erosion. For the offbase siting option, the garrison and rail spur would be located on soils of low to moderate susceptibility, while other facilities would be located on soils with a low to high susceptibility to sheet erosion.

4.5.8.3 Impacts of the Proposed Action

Energy and Mineral Resources. No energy or mineral resources have been identified in the ROI. Therefore, impacts on energy and mineral resources are not expected.

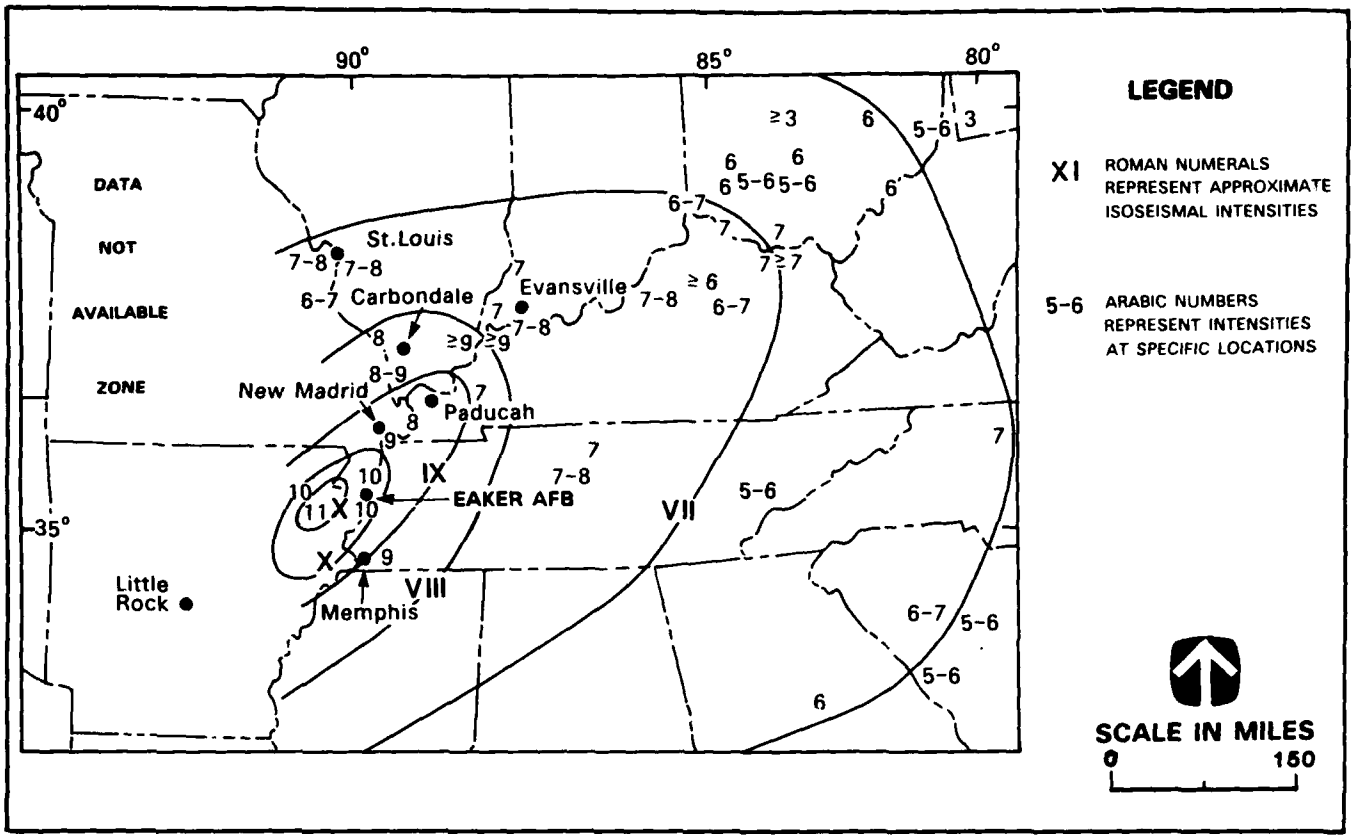


FIGURE 4.5.8-1 ISOSEISMAL MAP OF MODIFIED MERCALLI INTENSITIES FOR THE DECEMBER 16, 1811 EARTHQUAKE IN THE NEW MADRID SEISMIC PROVINCE

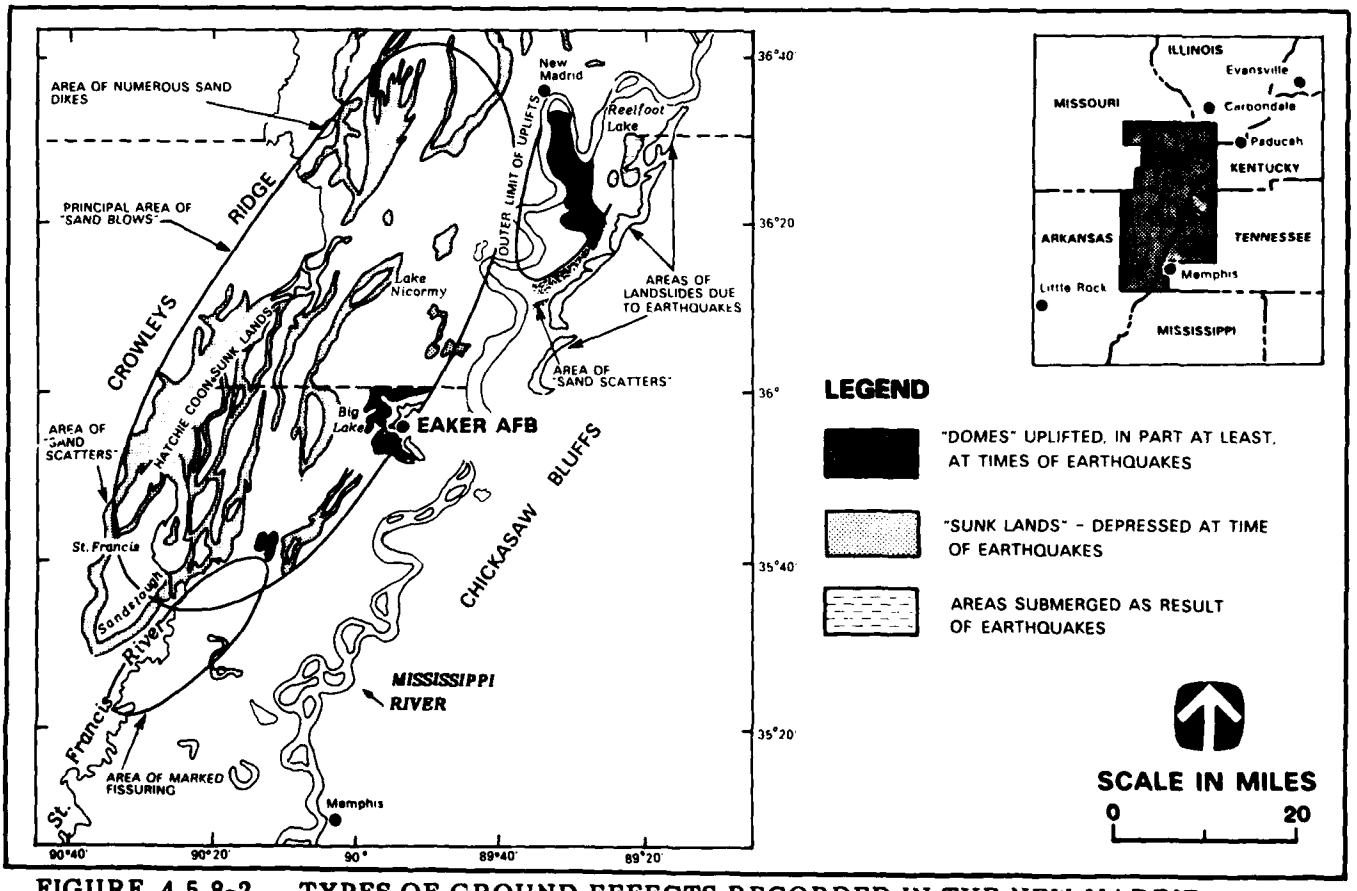


FIGURE 4.5.8-2 TYPES OF GROUND EFFECTS RECORDED IN THE NEW MADRID SEISMIC PROVINCE NEAR EAKER AFB, ARKANSAS

Soil Resources. Program-related wind erosion at the proposed garrison, other facilities, and rail spur for either siting option is primarily projected to occur at rates of less than 0.1 ton per acre per year (T/ac/yr). This is because regional wind velocities are low and do not substantially influence rates of soil erosion. During garrison construction, soil would erode at a rate of 1.2 T/ac/yr for large exposed areas of a soil type. The application of 1 ton per acre (T/ac) of straw mulch would temporarily reduce this rate to less than 0.1 T/ac/yr. Program-induced sheet erosion for the onbase siting option at the garrison, other facilities, and along the rail spur is projected to occur at rates of 5.1 T/ac/yr to 14.8 T/ac/yr. The application of one T/ac of straw mulch after construction would temporarily reduce the rates of erosion to one T/ac/yr to three T/ac/yr for all soils affected. For the offbase siting option, sheet erosion at the garrison and along the rail spur is projected to occur at lower rates of 5.1 T/ac/yr to 10.9 T/ac/yr. At the other proposed facility sites, erosion rates would remain at 5.1 T/ac/yr to 14.8 T/ac/yr. The application of one T/ac of straw mulch would temporarily reduce the rates of erosion to one T/ac/yr to three T/ac/yr for all soils affected. The range of soil erosion rates identified for either site option of the proposed program (5.1 to 16 T/ac/yr) are comparable to those determined for general urban development (16 to 156 T/ac/yr) as supplied by the U.S. Department of Housing and Urban Development (1981).

Soil erosion impacts are based on the combined effects of wind and sheet erosion values and how they compare to the maximum tolerable soil loss for each soil type. Soil erosion rates would exceed the maximum tolerable soil loss (5 T/ac/yr) of the affected soil types during construction. Program-induced soil erosion is therefore expected to cause short-duration impacts for either siting option. Long-duration impacts are not expected because accelerated rates of erosion would occur for only a short period of time prior to mulching and reestablishing a vegetative cover in the disturbed areas.

Summary of Impacts. Overall short-duration impacts from the proposed program for either siting option on the geology and soils resource are expected to be high because accelerated rates of erosion during program-related construction would exceed the maximum tolerable soil loss of the soils affected. Long-duration impacts for either siting option are expected to be negligible because accelerated rates of erosion would not continue into the operations phase of the program. Short-duration impacts are not expected to be significant because increased rates of erosion would not result in an appreciable net loss of topsoil over the short period of time under consideration.

4.5.8.4 Impacts of the Alternative Action

The Alternative Action would slightly increase the size of the garrison for both the onbase and offbase siting options. Therefore, impacts on the geology and soils resource would be about the same as for the Proposed Action. Consequently, all levels of impact and significance would remain the same as for the Proposed Action. Short-duration impacts would be high and not significant and long-duration impacts would be negligible.

4.5.9 AIR QUALITY

4.5.9.1 Region of Influence

The ROI for air quality includes Eaker AFB, the City of Blytheville, and the interstate highways and principal arterials in Mississippi County.

4.5.9.2 Existing and Future Baseline Conditions

Eaker AFB is located in the Northeast Arkansas Air Quality Control Region (No. 020). There are no Prevention of Significant Deterioration Class I areas within 50 miles of the base. Ambient air quality has not been monitored either at Eaker AFB or in Mississippi County. A particulate matter (PM_{10}) monitoring station is located in Stuttgart, a town

in east-central Arkansas. The site is in a rural setting similar to the Blytheville area, and the air quality measurements made there should be representative of the Eaker AFB area. The maximum 24-hour PM_{10} observation was 81 micrograms per cubic meter ($\mu g/m^3$) and the annual arithmetic mean was 31 $\mu g/m^3$; both are within the standards. Eaker AFB and Mississippi County are classified as attainment areas for all criteria pollutants. The air quality emissions (carbon monoxide [CO], sulfur oxides [SO_x], nitrogen oxides [NO_x], volatile organic compounds [VOC] [a measure of reactive hydrocarbons], and total suspended particulates [TSP]) from various sources in Mississippi County are shown in Table 4.5.9-1.

Future baseline air quality emissions of TSP, CO and sulfur dioxide will increase slightly due to the construction of a steel mill in Mississippi County. However, these increases should not cause any violation to the National Ambient Air Quality Standards (NAAQS).

4.5.9.3 Impacts of the Proposed Action

Direct air emissions would result from construction of the rail spur line and support facilities and operation of the proposed program at Eaker AFB. Emission sources associated with construction include light-duty vehicle traffic, diesel trucks, offsite heavy-duty vehicles, diesel construction equipment, and fugitive dust from ground disturbance.

The highest monthly fugitive dust emissions from proposed program construction activity are about 26 tons for the onbase option and 10 tons for the offbase option. Fugitive dust calculations assume a 50-percent reduction as a result of watering the construction sites. All of the fugitive dust emissions at Eaker AFB were conservatively assumed to be within the 10-micrometer particle size and referenced against the PM_{10} standard for impact analysis. It is expected that actual PM_{10} emissions would be smaller than the emissions calculated under the U.S. Environmental Protection Agency (EPA) guidelines for TSP.

Construction-related impacts were calculated for 24-hour and annual averaging periods. A program-related increase of 1.3 $\mu g/m^3$ for the onbase option, which includes particulates from combustion products, would occur increasing the 24-hour average background concentration to 82.3 $\mu g/m^3$. The predicted 24-hour average background concentration would not equal or exceed the 24-hour NAAQS of 150 $\mu g/m^3$ (PM_{10}). The annual background concentration would increase to 31.4 $\mu g/m^3$, which would not equal or exceed the PM_{10} standards of 50 $\mu g/m^3$. Fugitive dust generated by either the onbase or offbase options for the peak construction year would have negligible impacts on Mississippi County air quality. The EPA-minimum threshold levels for fugitive dust would not be exceeded, and no violation of the NAAQS would occur.

Overall short- and long-duration air quality impacts for either site option would be negligible.

4.5.9.4 Impacts of the Alternative Action

The Alternative Action (6 TASs) for the onbase option would cause a 0.2-percent increase in fugitive dust emissions over the Proposed Action. This would result in a total increase of 1.5 $\mu g/m^3$ above existing background concentrations, increasing the 24-hour average ambient concentration to 82.5 $\mu g/m^3$. The Alternative Action impacts would be negligible and would not cause any violation of the NAAQS. Overall short-duration (construction) air quality impacts would be negligible. Long-duration (operations) air quality impacts would be minimal.

The offbase option fugitive dust increase would be 0.2 percent. Therefore, the Alternative Action impacts offbase would also be negligible for fugitive dust emissions. Overall short- and long-duration air quality impacts for either site option would be negligible.

Table 4.5.9-1

Mississippi County, Arkansas Air Emissions Inventory, 1987
(tons per year)

Emission Source	TSP	SO_x	NO_x	VOC	CO
Fuel Combustion	98	249	551	173	536
Industrial Process	0	0	0	1,750	0
Solid Waste Disposal	152	6	36	228	711
Air/Water Transportation	254	36	270	733	2,119
Land Transportation	906	267	3,149	1,531	7,792
Miscellaneous	21,102	0	2	14	77
Eaker AFB	28	58	177	743	1,312
TOTAL:	22,540	616	4,185	5,172	12,547

Source: U.S. Environmental Protection Agency 1988b.

4.5.10 NOISE

4.5.10.1 Region of Influence

The ROI for the noise resource is broadly defined as the area where program-related noise level increases occur. Specifically, the ROI includes Eaker AFB, the City of Blytheville, and the interstate highways and principal arterials in Mississippi County.

4.5.10.2 Existing and Future Baseline Conditions

The major noise sources are aircraft operations and vehicular traffic within the vicinity of Eaker AFB. Currently, the bulk of existing residential development in the vicinity of Eaker AFB is concentrated to the west and northwest within the corporate limits of Gosnell, Arkansas. There are some scattered residential developments south of the base.

Most of the other land immediately adjacent to the base is agricultural. There are, however, several areas of medium-density residential development in Gosnell and on the west side of Blytheville that conflict with the Air Installation Compatible Use Zone land use guidelines. Present noise levels exceed 70 decibels on the A-weighted scale (dBA) expressed as day-night-equivalent-source levels (L_{dn}). With the installation of a new T-9 noise suppressor for engine testing, noise levels would be reduced to 65 dBA or less in the City of Gosnell. However, base housing residents experience noise levels of 65 dBA to 69 dBA (L_{dn}).

In addition to aircraft noise, Gosnell City experiences noise from vehicular traffic along Arkansas State Highway 151. Noise levels at sensitive receptors (residential areas) within 200 feet of the highway range from 60 dBA to 65 dBA (L_{dn}).

4.5.10.3 Impacts of the Proposed Action

Temporary impacts resulting from construction-related noise would occur within the immediate vicinity of construction sites. The various activities that would take place include construction of industrial structures, the rail spur, and roadways (grading, compacting, and paving); landscaping; and cleanup at Eaker AFB.

Construction-related noise for both offbase and onbase site options at Eaker AFB would affect offbase residential areas for very short periods during rail spur construction. The estimated construction noise levels near the residences along U.S. 61 (about 200 ft from the proposed spur line) would be 74 dBA, causing an increase of 9 dBA above background. The short-duration noise impacts on the sensitive residential receptors would be moderate. However, the impacts would not be significant because they would not exceed the 10-dBA criterion. Construction-related TAS noise at Eaker AFB for either the onbase or offbase option is not anticipated to affect offbase or onbase residential areas because such noise levels from point sources attentuate quickly with distance. Potential construction-related noise levels of 80 dBA to 85 dBA at 100 feet from the source within the TAS construction site would be reduced to 50 dBA at the offbase residential areas which are located about 5,700 feet from the construction location. The noise levels at base residential areas, which are located about 9,400 feet from the TAS construction site, would be 46 dBA. These noise levels would be masked by ambient noise levels of about 55 dBA to 65 dBA (L_{dn}). Once the construction activity ceases, noise levels would return to near ambient conditions. During the operations phase, noise would be generated by program vehicular traffic and train training activity. Additional traffic due to the proposed program would cause approximately a 0.2-dBA (L_{dn}) increase in noise levels at the sensitive receptors (residential-areas) within 200 feet of Arkansas State Highway 151. This increase in vehicular noise levels would have a negligible impact on the sensitive receptors. Offbase training train activities would result in about 48 additional trips per year on the main line. These activities would cause minor, temporary increases in average noise levels on sensitive receptors along the main rail line. The long-duration impacts would be negligible.

Overall short-duration noise impacts for either siting option would be moderate and not significant, while long-duration impacts would be negligible.

4.5.10.4 Impacts of the Alternative Action

The noise levels resulting from the construction of six TASs at the garrison site would be about the same as the Proposed Program for either site option. The short-duration noise impacts at the offbase residential receptors would be moderate because of the construction of the rail spur line. However, these noise impacts would not be significant because they would not exceed the 10-dBA criterion. The long-duration impacts would be negligible.

4.5.11 Impacts of the No Action Alternative

With the No Action Alternative, the Peacekeeper Rail Garrison system would not be deployed. Activities at Eaker AFB will continue to support other existing or proposed missions. For the host communities in the vicinity of the base, environmental changes would occur as a result of normal community growth. Future baseline conditions reflecting the No Action Alternative were described in earlier portions of this chapter.

4.5.12 Irreversible and Irretrievable Resource Commitments

Deployment of the Peacekeeper Rail Garrison program at Eaker AFB would result in the irreversible and irretrievable commitments of some human and natural resources. The affected resources are the following:

- The proposed program requires the use of relatively small amounts of labor, materials, energy, and other economic resources during both the construction and operations phases. The local procurement of building materials (such as cement, sand, and gravel) may alter some resource characteristics in the deployment area. Although these economic factors, once used by the proposed program, generally cannot be recovered for other purposes, the extent of their use would be small in comparison to total resource availability.

- Land utilized for the program facilities will be irreversibly committed for the duration of the program. Such use of land would not cause an irretrievable commitment because the land can be reclaimed through removal of program facilities and implementation of necessary soil rehabilitation.

- Both irreversible and irretrievable commitments would occur if National Register of Historic Places (NRHP)-eligible prehistoric sites are destroyed or damaged during construction and operations. While data recovery is possible, avoidance is preferred because future technological advances in the discipline will permit future researchers to make more effective use of the resources.

- Both irreversible and irretrievable commitments would occur if NRHP-eligible historic sites and architectural resources are destroyed during construction and operations.

- Both irreversible and irretrievable commitments would occur if sacred or ceremonial areas are destroyed during construction and operations. Any impact may destroy the sacred nature of the area.

- Disturbed biological communities, given sufficient time, can recover to a state approximating predisturbance conditions once the disturbance ends. Therefore, few of the temporary biological impacts expected from the proposed program would be irreversible and irretrievable.

- Soils would be permanently disturbed at construction and related sites (e.g., borrow pits, roads, buildings, and rail spur) and may be irreparably damaged during the life of the program if disturbed areas are not mulched or revegetated, especially at the garrison location. Aggregate resources would be used for construction of buildings, roads, and rail spurs.

4.5.13 Relationship Between the Local Short-Term Use of Man's Environment and the Maintenance and Enhancement of Long-Term Productivity

Deployment of the Peacekeeper Rail Garrison program at Eaker AFB would result in the short-term use of some human and natural resources that may affect the maintenance and enhancement of long-term productivity. The affected resources are the following:

- Short-term program-generated disruptions and delays of traffic would result in a decrease in the comfort, convenience, and safety afforded users of primary roads leading to the base. No effect on long-term productivity is expected.

- Additional information gained during program-related surveys of archaeological and historic resources may contribute to the data base and improve man's knowledge of the area's history. This would enhance the management of remaining cultural resources in the region.

- Areas temporarily disturbed by the construction activities would result in short-term losses of biological habitats. However, recovery rates are expected to be relatively fast and no effect on long-term productivity is expected.

- Soil erosion during construction would increase sedimentation to local streams resulting in short-term deterioration of surface water quality. However, the additional loss of soil would not affect soil productivity or long-term quality of streams.

- Reductions in air quality levels would result from fugitive dust during construction. However, no long-term reduction in air quality is expected.

4.5.14 Environmental Concerns Associated With a Possible Future Second Rail Connector

A second rail egress from Eaker AFB could be achieved by providing a northwesterly rail connector to the main line of the St. Louis-Southwestern (Southern Pacific) Railroad (Figure 4.5.14-1). This connector would require the acquisition of approximately 412 acres of land and the construction of 34 miles of new track. An abandoned rail right-of-way (ROW) would be used for about 26 miles of the total requirement. Additionally, eighteen 100-foot bridges, four 200-foot bridges and one 1,500-foot bridge would be required for stream and river crossings.

Construction costs for this second rail connector would be approximately $44.4 million (1986 dollars) and would require approximately 320 direct construction workers and 590 secondary workers over a 1-year period. Although many of these workers would be from the local area (including Crittenden and Mississippi counties in Arkansas, Dunklin and Pemiscot counties in Missouri, and Dyer and Shelby counties in Tennessee), a substantial number of direct and secondary workers and their dependents could be expected to inmigrate into the area. The cities of Blytheville and Gosnell, as well as other towns along the rail corridor, could experience temporary population increases that exceed their normal growth capacities.

Potential shortages of temporary and permanent housing could occur during the construction period. In some locations, the capacity of local school systems to accommodate new students may be exceeded.

Local governments and agencies may find it difficult to maintain existing service levels for public services and utilities, especially if adequate new revenues are not available. Increases in traffic resulting from construction activity and commuting workers may result in additional traffic congestion along some roads and highways.

The rail connector ROW would use mostly nonirrigated cropland with some mixed open space. East of Arkansas State Highway 181 in the Town of Gosnell, the ROW corridor would pass through one or more residential subdivisions. North of the base, there is pivot-irrigated cropland through which the ROW is proposed to pass. The scattered farmhouses in the ROW corridor could probably be avoided. There may be potential conflict with existing structures where the wye would connect with the St. Louis-Southwestern (Southern Pacific) Railroad main line just north of the Town of Paragould.

Construction activities along approximately eight miles of ROW may affect major prehistoric sites, particularly on a natural levee northwest of the base. The remaining 26 miles of the rail route would cause no concerns for cultural resources because it was previously disturbed.

The second rail connector route would cross the St. Francis River, an important fishery, and 22 other streams, including a major floodway. Wildlife species living in and around these water bodies could be adversely affected by construction-related activities. The spur would also traverse large areas of floodplain and wetland, resulting in the permanent disturbance (by draining and filling) of some critical habitats. Wildlife in other natural areas along the rail corridor (including the Big Lake Wildlife Refuge and Management Area) would also experience varying levels of disturbance.

There is potential for substantial disturbance of several channel banks. The construction of a 1,500-foot bridge across the St. Francis River would result in appreciable short-term water quality degradation. While increases in stream sedimentation are of concern along other drainage crossings, they are not expected to result in a major water quality

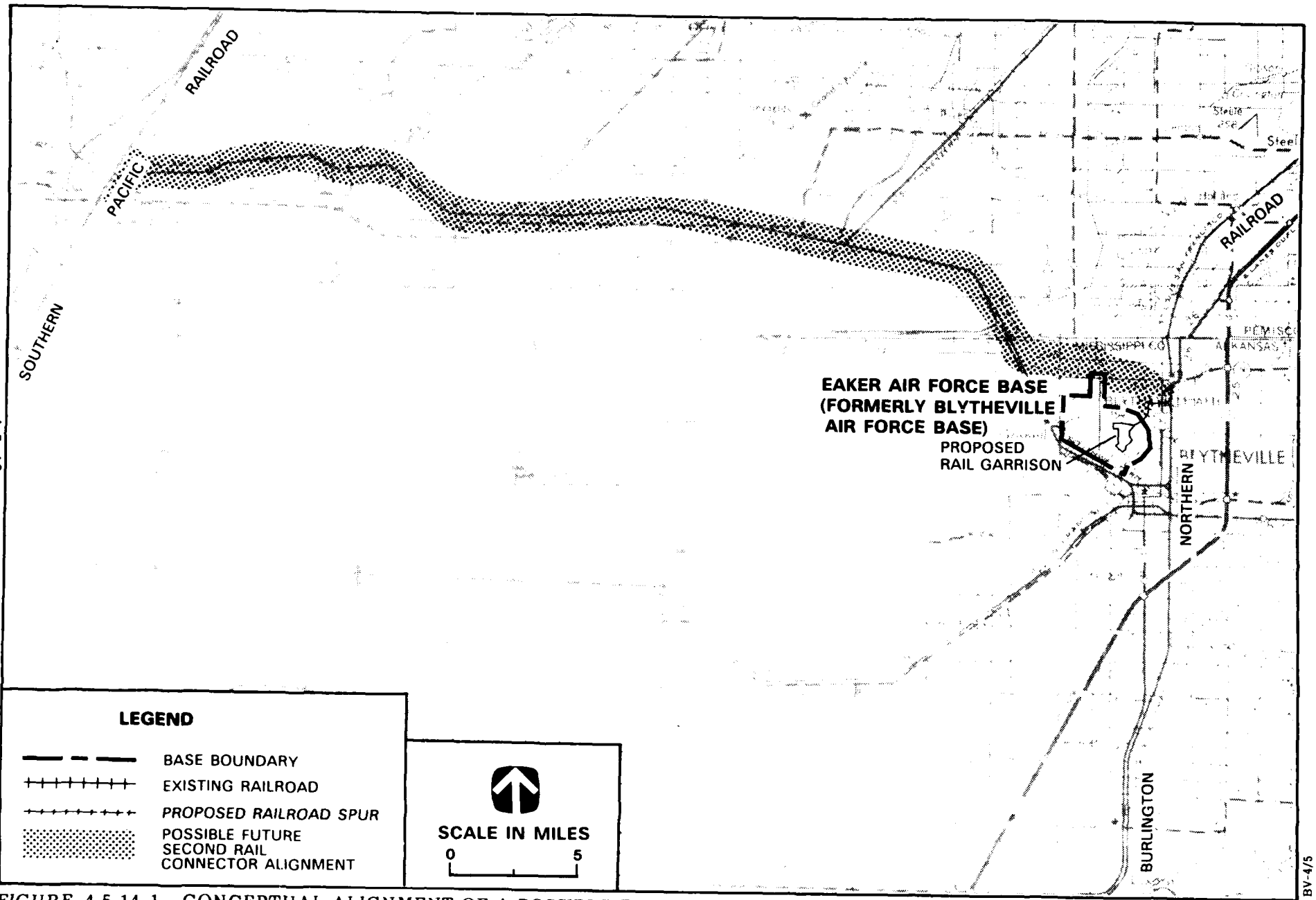


FIGURE 4.5.14-1 CONCEPTUAL ALIGNMENT OF A POSSIBLE FUTURE SECOND RAIL CONNECTOR FOR EAKER AFB (FORMERLY BLYTHEVILLE AFB), ARKANSAS

problem. Construction activities at potential small irrigation canal crossings could temporarily curtail water supply to irrigators.

Soil erosion during construction may substantially increase rates of sedimentation to the major waterways affected by the rail line. Terrain failure will need to be evaluated in Quaternary terrace deposits.

The existing air quality in the northeast Arkansas Air Quality Control Region is good. Eaker AFB and Mississippi County are classified as in attainment for all criteria pollutants. Construction of a second rail connector would cause increases in fugitive dust and gaseous pollutant emissions. These emissions would not cause any violations of the NAAQS.

The existing noise levels along the second rail connector vary from 65 dBA to 75 dBA (L_{dn}) near the base, and from 45 dBA to 55 dBA (L_{dn}) in the rural areas. Temporary increases in noise levels would result from rail construction activities in the vicinity of sensitive noise receptors in residential communities along the route.

4.6 FAIRCHILD AIR FORCE BASE, WASHINGTON

Fairchild Air Force Base (AFB), with an area of approximately 4,550 acres, is located in Spokane County in northeastern Washington. The host organization at this Strategic Air Command base is the 92nd Bombardment Wing, with B-52H bomber and KC-135A tanker aircraft. Major tenants at Fairchild AFB include the Air Training Command (ATC) 3636th Combat Crew Training Wing and the Washington Air National Guard 141st Air Refueling Wing.

Fairchild AFB employed 4,236 military personnel (584 officers and 3,652 enlisted), 625 appropriated fund civilian personnel, and 534 other civilian personnel at the end of fiscal year 1987. Approximately 54 percent of the military personnel live on Fairchild AFB and 46 percent live in the communities near the base.

The City of Spokane, located approximately 12 miles east of the base, is the host community for Fairchild AFB (Figure 4.6-1). Spokane, the largest city in eastern Washington, is the major commercial and retail trade center in the region. Many of the personnel living offbase reside in Spokane and its suburbs. In addition, some personnel live in the community of Medical Lake, approximately three miles southwest of the base, and in several other small communities, including Cheney and Airway Heights. The cities of Spokane and Medical Lake had estimated 1985 populations of 172,100 and 3,624, respectively. Spokane County had an estimated population of 354,300 in 1985. In addition to being the financial and economic center of the region, the economy of the Spokane area is dominated by agriculture, forestry and wood products, manufacturing, and retail trade. Located at the intersection of major north-south and east-west highways, Spokane also serves as the regional transportation center for the region.

The following sections provide a description of activities associated with the deployment of the Peacekeeper Rail Garrison program at Fairchild AFB for the Proposed Action (4 Train Alert Shelters [TASs]) and the Alternative Action (6 TASs).

Proposed Action. For the Proposed Action at Fairchild AFB, the Air Force would construct garrison facilities and provide personnel necessary for the deployment and operation of up to four Peacekeeper missile trains. Approximately $80.3 million (in 1986 dollars) of construction would occur at the base for the Proposed Action. Construction activities for the purpose of analysis are assumed to begin in 1990 and be completed in 1992, with full operations beginning in 1993. Direct employment requirements would be 73 in 1990, peak at 507 in 1992, and stabilize at 419 during the full operations phase. Peak construction employment of 205 would occur in 1991. Annual direct employment requirements for the Proposed Action are presented in Table 4.6-1 for site activation, construction, assembly and checkout, and operations activities.

The garrison would be located in the southern portion of the base and collocated with the existing Weapons Storage Area (Figure 4.6-1). Acquisition of restrictive easements on 324 acres of land adjacent to the southern boundary of the base would be required to accommodate the explosive safety zone for the garrison (Table 4.6-2). One inhabited building would be located within the explosive safety zone. Seven buildings (including the 4 TASs), roads, utilities, parking, and approximately 1.5 miles of railroad track would be constructed within the garrison. Construction of the garrison would permanently disturb approximately 96 acres and temporarily disturb 129 acres (Table 4.6-3).

The rail spur connecting the garrison to the Burlington Northern (BN) main line north of the base would use 3.1 miles of existing track (1.6 miles onbase and 1.5 miles offbase) and require the construction of 3.0 miles of track onbase. A spur would be constructed outside the garrison to the existing onbase track and a portion of the onbase track would be realigned (Figure 4.6-1). In addition, an onbase wye would be constructed. Approximately 17 acres would be disturbed permanently and 26 acres temporarily outside the garrison for the connecting spur and wye (Table 4.6-3).

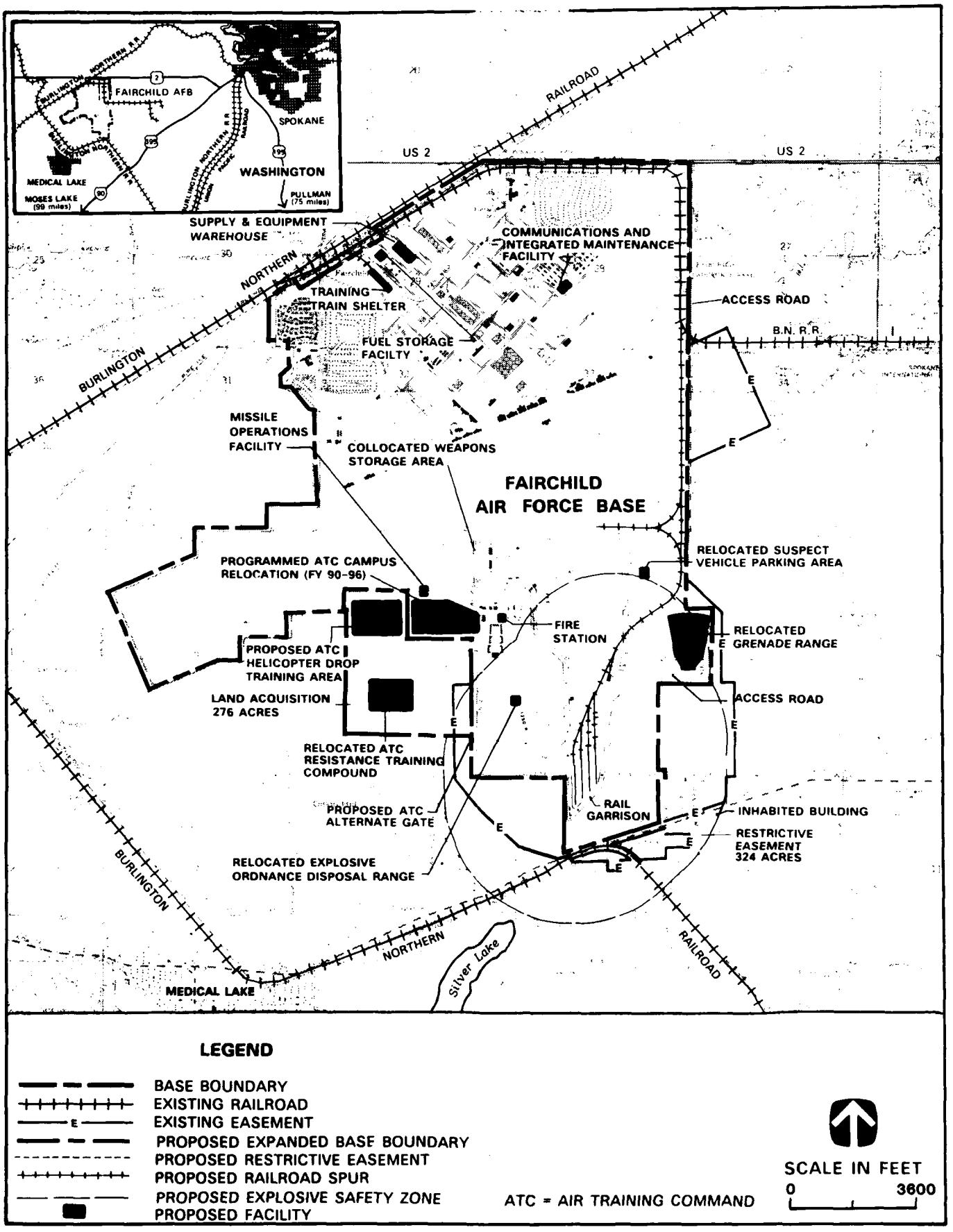


FIGURE 4.6-1 PROPOSED PEACEKEEPER RAIL GARRISON FACILITIES AT FAIRCHILD AFB, WASHINGTON

Table 4.6-1

Annual Direct Employment (Military and Civilian) for the Peacekeeper Rail Garrison Program in the Fairchild AFB Area by Calendar Year (Full-Time Equivalent Jobs)

	1989	1990	1991	1992	1993[1]
Proposed Action					
Site Activation	1	15	24	11	0
Construction	0	57	205	76	0
Assembly & Checkout	0	1	18	1	0
Operations	0	0	123	419	419
TOTAL:	1	73	370	507	419
Alternative Action					
Site Activation	1	16	24	11	0
Construction	0	75	219	76	0
Assembly & Checkout	0	2	27	2	0
Operations	0	0	136	461	461
TOTAL:	1	93	406	550	461

Note: [1]Employment would continue at these levels for the life of the program.

Table 4.6-2

Offbase Land Acquisition and Easement Requirements Peacekeeper Rail Garrison Program Fairchild AFB, Washington (acres)

	Proposed Action	Alternative Action
Land Acquisition		
Garrison Area	0	4
Rail Spur	0	0
Housing Area	0	0
Relocated Facilities	276	276
TOTAL:	276	280
Restrictive Easements	324	343

Table 4.6-3

**Summary of Area Disturbed by the Peacekeeper Rail Garrison Program
Fairchild AFB, Washington
(Proposed and Alternative Actions)**

Facility Group	Area Disturbed (acres)		
	Permanent	Temporary	Total
Proposed Action			
Garrison Facilities	95.7	129.0	224.7
Rail Spur	16.9	26.3	43.2
Support Facilities	39.8	66.2	106.0
Relocated Facilities	16.2	9.2	25.4
TOTAL:	168.6	230.7	399.3
Alternative Action			
Garrison Facilities	100.3	146.5	246.8
Rail Spur	16.9	26.3	43.2
Support Facilities	40.0	66.4	106.4
Relocated Facilities	16.2	9.2	25.4
TOTAL:	173.4	248.4	421.8

The Proposed Action would require the construction of support facilities with a total floor space of approximately 72,200 square feet. To provide access to the Training Train Shelter, a 0.3-mile rail spur would be constructed from the BN main line (Figure 4.6-1). In addition, about 1.4 miles of new base boundary fencing would be required. Construction of the support facilities, fencing, roads, utilities, and parking would permanently disturb approximately 40 acres and temporarily disturb 66 acres (Table 4.6-3).

The Proposed Action would also require the relocation of several existing base facilities, including some roads and utilities, to new locations. Relocation of some of the facilities would require acquisition of 276 acres adjacent to the southern boundary of the base (Figure 4.6-1; Table 4.6-2). Relocation of the facilities would permanently disturb approximately 16 acres and temporarily disturb 9 acres (Table 4.6-3). In addition, the relocation of the ATC campus is programmed to occur in the same time frame as the Proposed Action.

Alternative Action. For the Alternative Action, the Air Force would construct garrison facilities and provide personnel for the deployment and operation of up to six Peacekeeper missile trains. Approximately $95.9 million (in 1986 dollars) of construction would occur at Fairchild AFB for the Alternative Action. Construction and operations activities are assumed to occur in the same time frame as for the Proposed Action. Annual direct employment requirements for the Alternative Action are presented in Table 4.6-1.

The garrison would contain six TASs (instead of 4) and would be constructed in approximately the same location as for the Proposed Action (Figure 4.6-2). Nine buildings (including the 6 TASs), roads, utilities, parking, and approximately 2.1 miles of track would be constructed within the garrison. To accommodate the garrison, acquisition of four acres adjacent to the southern boundary of the base would be required. Acquisition of restrictive easements on an additional 19 acres (total of 343 acres) would be required to accommodate the explosive safety zone (Table 4.6-2). Three inhabited

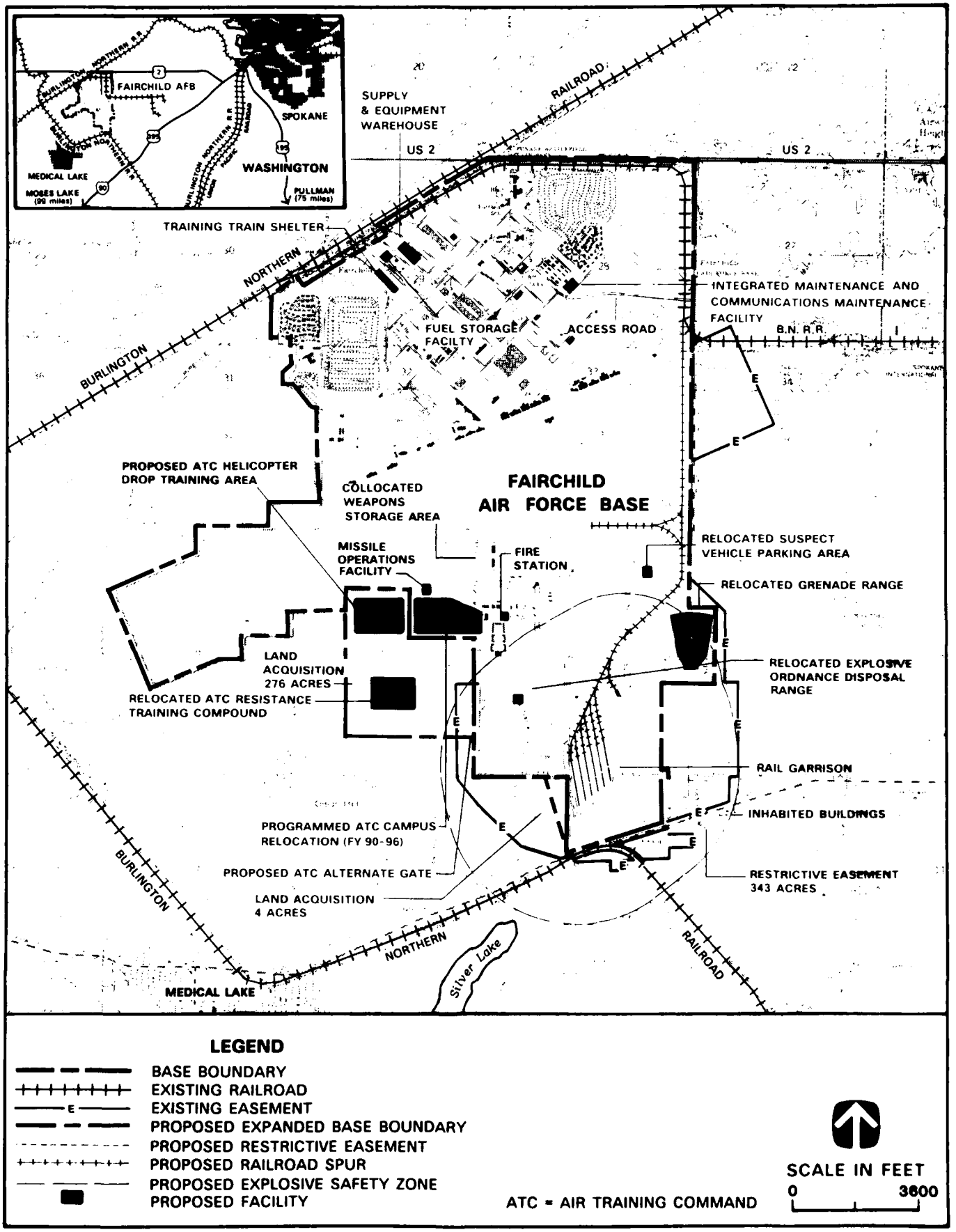


FIGURE 4.6-2 PROPOSED PEACEKEEPER RAIL GARRISON FACILITIES AT FAIRCHILD AFB, WASHINGTON (ALTERNATIVE ACTION)

buildings would be located within the explosive safety zone. Construction of the six-TAS garrison would disturb approximately 4.5 additional acres permanently (100.3 acres total) and 17.5 acres temporarily (146.5 acres total) (Table 4.6-3).

For the Alternative Action, technical and personnel support facility requirements, the rail spur connecting the garrison to the BN main line, and the relocation of existing base facilities would be similar to the Proposed Action.

Summary of Program Impacts. The Proposed Action at Fairchild AFB would result in significant impacts on land use and biological resources. Short- and long-duration land use impacts would be moderate because of impacts on visual attributes, and the possible relocation of one inhabitable building. These impacts would be significant because of the necessity to relocate the inhabitable building. Long-duration impacts on biological resources would be moderate because wetland areas would experience permanent disturbance and several federal-candidate and state-recognized sensitive species would likely be affected. These impacts would be significant because of the ecological importance of the habitats and the level of concern these potential wetland impacts would elicit from natural resource management agencies.

Impacts for all other resources would not be significant.

The Alternative Action at Fairchild AFB would not alter the level of impact or significance ratings for any resource.

Both short- and long-duration beneficial socioeconomic effects would be generated by the Proposed and Alternative Actions, including increases in employment and income, and greater utilization of temporary and permanent housing.

4.6.1 SOCIOECONOMICS

4.6.1.1 Region of Influence

The Fairchild Air Force Base Region of Influence (ROI) for the employment and income element includes Spokane County, Washington and Kootenai County, Idaho. The ROI for the remaining elements includes Spokane County and cities of Spokane and Medical Lake. Because of the relatively large size of Spokane (estimated 1990 population of 176,230), potential program effects on Spokane would be inappreciable. For this reason, potential program-related effects and baseline analyses focus on the community of Medical Lake, and Spokane is discussed only where applicable.

4.6.1.2 Existing and Future Baseline Conditions

Employment and Income. Total employment in the ROI was 193,176 in 1984, a 5.5-percent increase above the 1980 employment level of 183,166. Major employment sectors included services, retail trade, government, and manufacturing. Farm sector employment represented only two percent of the total. The services and retail trade sectors accounted for over half the total employment in 1984. The unemployment rate in the ROI was 7.9 percent in 1986, lower than the state's 8.2 percent.

Because 85 percent of the population of the ROI is in Spokane County, the employment rate of the county followed the trend of the ROI. However, from 1980 to 1984, employment in four sectors within the county (farm; construction; transportation and utilities; and finance, insurance, and real estate) declined in contrast to only two sectors (farm; and transportation and utilities) in the ROI. Construction employment was 10,456 in 1984 compared to 10,330 in 1980 in the ROI.

Total employment in the ROI is projected to reach 202,038 in 1990 and 214,114 in 1995, up from 193,176 in 1984. The unemployment rate, however, is projected to decline from 8.2 percent in 1984 to 7.5 percent in 1990, and to 7 percent by 1995.

From 1980 to 1984, total earnings (in current dollars) in the ROI increased from $2.5 billion to $3.1 billion and in Spokane County from $2.2 billion to $2.7 billion. Discounting for inflation, these increases in total earnings represented a 2.6-percent and a 3.9-percent decline over the 1980 to 1984 period, respectively. Per capita personal income in the ROI increased from $8,761 in 1980 to $11,051 in 1984 and in Spokane County from $8,877 in 1980 to $11,220 in 1984.

Total earnings (in 1986 dollars) in the ROI are projected to increase to $3.4 billion in 1990 and $3.6 billion in 1995. The corresponding per capita personal income is projected at $11,533 and $11,339, respectively. Per capita personal income in Spokane County is projected at $11,635 in 1990 and $11,450 in 1995.

Population and Demographics. The population of Spokane County in 1985 was estimated at 354,300, a 3.6-percent increase above the 1980 population of 341,835. The county's population is projected to increase to 367,138 by 1990 and 387,138 by 1995. The City of Spokane had a population of 172,100 in 1985, an increase of 900 since 1980. The City of Medical Lake had a population of approximately 3,624 in 1985. The City of Medical Lake's population is projected to be 3,671 in 1990 and 3,871 in 1995. Military personnel and their dependents accounted for five percent of the area's estimated 181,433 population (onbase residents plus Medical Lake and Spokane populations) in 1987.

Housing. The 1980 housing stock in Medical Lake was estimated at 904 units by the Census Bureau. Vacancies were estimated to be 3.2 percent of the total, or 29 units. Of these vacancies, 21 were available (2.3% of the total). No current estimates of housing stock or vacancies in Medical Lake were identified. There are no temporary facilities in Medical Lake. The 1980 permanent year-round housing stock in the City of Spokane was estimated at 76,010 units in 1980. Of the units, 3,313 (4.4%) were reported to be available vacancies. Current estimates place the number of available vacancies within the city at almost 5,400 units, an increase of approximately 2.7 percentage points.

By 1990, the year-round housing stock in Medical Lake is expected to number 915 units. No increase in available vacancies is forecast by 1990. In 1995, the year-round housing stock will have grown to almost 975 units, 23 of which will be available vacancies. No increase in temporary facilities is projected.

Fairchild AFB family housing consists of 958 Wherry and 541 Capehart units. An additional 81 appropriated fund units exist in the surrounding community for a total of 1,580 units. Also, 62 five-bedroom housing units are proposed onbase for the fiscal year 1991 Military Construction Program. The base is seeking funding for the construction of 282 one- to two-bedroom units for accompanied junior enlisted personnel. The onbase unaccompanied permanent party personnel housing inventory consists of 1,436 enlisted and 2 officer spaces. In 1987, about 14 percent of the enlisted quarters were vacant (201 spaces) while the officer quarters were fully occupied. The onbase transient quarters consist of 220 enlisted and 228 officer spaces. In 1987, occupancy rates were 82 percent for enlisted and 41 percent for officers. These spaces are generally held for visiting personnel.

Education. Medical Lake School District No. 326 had a 1987-88 school year enrollment of approximately 1,800 students. The district has 140 certified staff and operates two elementary schools, one middle school, and one high school. Each of these schools currently has space for an additional 100 students. Current overall student-to-teacher ratios at the elementary level are 16.7-to-1, below a state guideline of 25-to-1. Approximately 56 percent of the district's enrollment qualifies for federal impact (P.L. 81-874) funds and the district is classified as a "Super A" district. Enrollment is expected to increase to 1,840 by 1990 and to 1,940 by 1995. Spokane School District No. 81 operates 34 elementary, 6 junior high, 5 senior high, and 10 special schools. Enrollment for the district is approximately 27,800.

Public Services. The City of Medical Lake has 16 full-time employees and another 16 seasonal and part-time employees. The Police Department has six full-time officers and the Fire Department has three full-time fire fighters supplemented by a volunteer force. These staffing levels provide a public service level of 1.9 personnel per 1,000 population. To maintain these service levels, the city would need to hire 1 additional person by 1995 or the number of personnel per 1,000 population would drop to 1.8. Health services in Medical Lake are provided by a local clinic. Medical services in the City of Spokane, with six major hospitals, provide comprehensive services to area residents including those of Medical Lake. The City of Spokane provides a wide array of services to residents in the community. The city employs approximately 1,725 people within 46 departments. The Police Department and the Fire Department each employ about 300 personnel.

Public Finance. In 1986, revenues and other financing sources for the City of Medical Lake amounted to $1.6 million, while expenditures were $1.2 million. Intergovernmental revenue and utility taxes are the city's principal revenue sources. Year-end balances were approximately $350,000, representing about 30 percent of expenditures in 1986. Over the 1990 to 1995 period, expenditures are projected to remain within the $1.2- to $1.3-million range. Assessed valuation was approximately $38.5 million. Net general obligation bond indebtedness was less than $1,000,000 with approximately $900,000 in reserve bonding capacity available.

Medical Lake School District No. 326 had revenues of $8 million and expenditures of $8.3 million in 1986. Over the 1990 to 1995 period, expenditures are projected to be $8.3 million to $8.7 million. The year-end fund balance was approximately $800,000, representing ten percent of expenditures in 1986. Indebtedness was approximately $270,000 at the end of 1986.

Revenues and expenditures of the City of Spokane's general and special revenue funds were approximately $72 million in 1986. Year-end fund balances were about $5 million, representing approximately seven percent of expenditures in that year. Spokane County revenues and expenditures were $63.2 million and $59.8 million, respectively, in 1986. Year-end fund balances were $16.1 million, representing 27 percent of expenditures in that year.

4.6.1.3 Impacts of the Proposed Action

For the Proposed Action, a brief summary of the program-related effects on key socioeconomic indicators is presented in Table 4.6.1-1.

Employment and Income. The Proposed Action would create new jobs ranging from 228 in 1990 to 954 in 1991, and stabilizing at 619 during the operations phase beginning in 1993. During the construction phase, direct jobs would range from 73 in 1990 to 507 in 1992, secondary jobs from 155 in 1990 to 584 in 1991, and local hires from 197 in 1990 to 744 in 1991. Of the 619 total operations phase jobs, 419 would be direct (356 military and 63 civilian) and 200 would be secondary. The number of local hires would be 218.

The total jobs created by the Proposed Action would be less than 0.5 percent of the total baseline jobs in the ROI in any given year. Therefore, the with-program and without-program unemployment rates would be almost identical, except in 1991, when the with-program rate would be 0.2 percentage points lower than the projected baseline unemployment rate.

The Proposed Action would generate personal income (in 1986 dollars) ranging from $5.7 million in 1990 to $23.0 million in 1991, and stabilizing at $12.0 million in 1993 and thereafter in the ROI. Spokane County's share of that personal income would vary from $5.3 million in 1990 to $21.4 million in 1991, then stabilize at $11.7 million in 1993 and thereafter. The program-related spending would range from $6.7 million in 1990 to

Table 4.6.1-1

Selected Socioeconomic Indicators, Peacekeeper Rail Garrison Program
Fairchild AFB, Washington, 1990-1993
Proposed Action

	1990	1991	1992	1993[1]
Region of Influence				
Employment (Jobs)				
Total Program-Related Jobs	228	954	851	619
Direct Jobs	73	370	507	419
Civilian	67	259	149	63
Military	6	111	358	356
Secondary Jobs	155	584	344	200
Local Hires	197	744	418	218
Program-Related Spending (000s 86$)	$6,739	$25,254	$14,165	$8,442
Personal Income (000s 86$)				
Direct	$ 1,893	$8,683	$9,976	$7,708
Secondary	3,850	14,317	7,788	4,312
Total Personal Income	$5,743	$23,000	$17,764	$12,020
Spokane				
Population				
Baseline Population	176,226	178,049	180,004	181,946
Program-Related Change	58	375	761	700
Change as % of Baseline	0.0	0.2	0.4	0.4
Housing Demand				
Temporary Units	5	19	16	11
Permanent Units	18	113	229	211
Total Units	23	132	245	222
School District Enrollment				
Elementary	4	32	73	69
Secondary	4	27	60	56
Total Enrollment	8	59	133	125
Medical Lake				
Population				
Baseline Population	3,671	3,709	3,750	3,791
Program-Related Change	8	50	101	93
Change as % of Baseline	0.2	1.3	2.7	2.5
Housing Demand				
Temporary Units	0	0	0	0
Permanent Units	2	15	30	28
Total Units	2	15	30	28
School District Enrollment				
Elementary	1	4	10	9
Secondary	0	4	8	8
Total Enrollment	1	8	18	17

Note: [1]Program-related effects would continue at these levels throughout the life of the program.

$25.2 million in 1991, then stabilize at $8.4 million during the operations phase in the ROI.

Population and Demographics. Spokane County would experience almost all of the population-related effects of the Proposed Action. The inmigration to the county would vary from 76 in 1990 to 1,121 in 1992, then stabilize at 1,041 in 1993 and thereafter. The inmigration would account for 0.3 percent or less of the total baseline population of the county in any given year. The number of weekly commuters would number less than 20 during the construction phase.

Of the 1,041 inmigrants to Spokane County during the operations phase, 108 would live onbase, 700 in the City of Spokane, 93 in Medical Lake, and 140 in other surrounding communities. City of Spokane inmigration would amount to less than a 1-percent increase over baseline population levels. The percentage increase in Medical Lake's population due to inmigration would be 2.7 in 1992 (peak year) and 2.5 in 1993 and thereafter. Military personnel and their dependents would account for 5.6 percent of the Fairchild AFB area population in 1993. Because of the relatively large size of Spokane (estimated 1990 population of 175,000), potential program effects on Spokane would be inappreciable. For this reason, potential program-related effects and baseline analyses focus on the community of Medical Lake.

Housing. Most program-related households would be housed in privately owned permanent housing units and temporary facilities in Spokane. The impacts of these households on the permanent and temporary housing markets in Spokane would be negligible. Most of the remaining program-related households are expected to live in Medical Lake, while others are likely to be scattered over various rural areas within the county. Therefore, this impact analysis focuses on the effects of housing demands for permanent units within Medical Lake. Most unaccompanied military personnel (108 officers, noncommissioned officers, and airmen) would be housed onbase in newly constructed unaccompanied enlisted personnel housing facilities.

The offbase program-related demand for housing is expected to begin in 1990. In this year, less than five permanent units would be required in Medical Lake. There would not be a demand for temporary facilities in this community. The peak demand for about 30 permanent units (out of 22 available or 136.4%) would be experienced in 1992. This demand would be of long duration because it would continue during the program. The excess demand for permanent housing units would be readily absorbed by excess vacancies in Spokane. However, it is expected that the overall vacancy rate in Medical Lake would fall to the normal level as a result of the Proposed Action. For landlords and property owners, this would be a beneficial effect of the program. However, due to the increased pressure on prices caused by program-related demand, this long-duration demand for housing could cause a shortage of low and moderately priced housing in Medical Lake.

Education. Program-induced enrollment increases are expected to result in an increase of 170 students in Spokane County. Medical Lake School District No. 326 is expected to receive approximately 20 students during the operations phase. Pupil-to-teacher ratios at the elementary level would rise from 16.7-to-1 to 16.8-to-1 during the operations phase. This would still be below the state guideline of 25-to-1. Current staffing and facilities would be able to accommodate these additional pupils. An additional 150 students would be enrolled in other districts in the area, the majority in the City of Spokane. These enrollment increases would have an inappreciable effect on schools within Spokane School District No. 81.

Public Services. Program-related increases in population would lead to increases in demands for public services provided by the City of Medical Lake of about 2.4 percent over baseline levels in 1993. The increased service demands would be experienced by a majority of the departments now providing service to area residents. To maintain

current service levels, as measured by the city's 1.9 personnel per 1,000 population, the city would need 1 additional employee by 1993. If no additional personnel were hired, the number of personnel per 1,000 population would drop from 1.9 to 1.8. This reduction in the number of personnel per 1,000 population would not result in an appreciable deterioration from the community's current level of public service provision. Program-induced population inmigration into Spokane would not have a measurable effect on public service levels within the community given the comprehensive infrastructure already in place.

Public Finance. Program-related increases in expenditures of potentially affected jurisdictions would be limited to outlays for additional personnel. Because little or no increase in personnel in Spokane County and in the City of Spokane is projected, expenditure impacts would be negligible. In Medical Lake, expenditures associated with an additional employee (approximately $25,000) would represent approximately a 2-percent increase over projected baseline expenditures during the operations phase.

Based on an average per pupil cost of $2,600, expenditure increases in Spokane School District No. 81 would be approximately $290,000 in the peak year (1992) and $280,000 during the operations phase. These increases would represent a less than 1-percent increase over projected baseline levels. In Medical Lake School District No. 326, based on an average per pupil cost of $4,100, expenditure impacts in the school district would be approximately $60,000 in both the peak year (1992) and operations phase. Because the additional enrollment would be classified primarily as "B" students under the P.L. 81-874 programs, entitlements from this source would be negligible (less than $10,000). This increase would represent a less than 1-percent increase over projected baseline levels.

Summary of Impacts. For the Proposed Action at Fairchild AFB, short- and long-duration socioeconomic impacts on the City of Medical Lake would be low because inmigration would cause population in the city to increase between 2.7 percent and 2.5 percent over baseline forecasts during both the peak inmigration year (1992) and program operations (beginning in 1993), respectively. This level of program-induced population growth would result in low impacts on housing, education, public services, and public finance within the Medical Lake area for both the peak and succeeding years. Impacts would not be significant because the increase in demand for housing would be met by available vacancies both in Medical Lake and Spokane, existing educational facilities would absorb program-related enrollment increases, no new public service facilities would need to be constructed, and existing revenue sources of the jurisdictions would be adequate to meet program-related expenditures.

Both short- and long-duration beneficial socioeconomic effects would be generated by the Proposed Action, including increases in employment and income in the ROI and greater utilization of temporary and permanent housing vacancies within the Fairchild AFB area.

4.6.1.4 Impacts of the Alternative Action

For the Alternative Action, a brief summary of the program-related effects on key socioeconomic indicators is presented in Table 4.6.1-2.

Employment and Income. The effects of the Alternative Action on employment and income in the ROI would be greater than those of the Proposed Action. During the construction phase, the Alternative Action would create new jobs ranging from 296 in 1990 to 1,046 in 1991, 68 to 92 more jobs than those created by the Proposed Action. Of the 1,046 new jobs during the peak construction year (1991), 406 would be direct (284 civilian and 122 military) and 640 would be secondary. The number of local hires would be 814, which is 70 more than the Proposed Action. During the operations phase, total new jobs created by the Alternative Action would number 681, which is 62 more than the Proposed Action. Of these 681 new jobs, 461 would be direct (69 civilian and

Table 4.6.1-2

Selected Socioeconomic Indicators, Peacekeeper Rail Garrison Program
Fairchild AFB, Washington, 1990-1993
Alternative Action

	1990	1991	1992	1993[1]
Region of Influence				
Employment (Jobs)				
Total Program-Related Jobs	296	1,046	915	681
Direct Jobs	92	406	550	461
Civilian	86	284	156	69
Military	6	122	394	392
Secondary Jobs	204	640	365	220
Local Hires	259	814	440	240
Program-Related Spending (000s 86$)	$9,417	$27,526	$15,030	$9,288
Personal Income (000s 86$)				
Direct	$ 2,384	$9,542	$10,776	$8,478
Secondary	5,132	15,731	8,230	4,745
Total Personal Income	$7,516	$25,273	$19,006	$13,223
Spokane				
Population				
Baseline Population	176,226	178,049	180,004	181,946
Program-Related Change	69	413	833	772
Change as % of Baseline	0.0	0.2	0.5	0.4
Housing Demand				
Temporary Units	7	23	19	13
Permanent Units	20	125	251	233
Total Units	27	148	270	246
School District Enrollment				
Elementary	5	36	80	76
Secondary	4	29	66	62
Total Enrollment	9	65	146	138
Medical Lake				
Population				
Baseline Population	3,671	3,709	3,750	3,791
Program-Related Change	9	55	111	103
Change as % of Baseline	0.2	1.5	3.0	2.7
Housing Demand				
Temporary Units	0	0	0	0
Permanent Units	3	17	33	31
Total Units	3	17	33	31
School District Enrollment				
Elementary	1	5	10	10
Secondary	0	4	9	8
Total Enrollment	1	9	19	18

Note: [1]Program-related effects would continue at these levels throughout the life of the program.

392 military) and 220 would be secondary. Local hires would number 240 or 22 more than local hires with the Proposed Action.

During the construction phase, the Alternative Action would generate personal income (in 1986 dollars) ranging from $7.5 million in 1990 to $25.3 million in 1991 in the ROI, $1.8 million to $2.3 million more than generated by the Proposed Action. Spokane County's share of that personal income would range from $6.9 million in 1990 to $23.5 million in 1991. During operations, the Alternative Action would generate $13.2 million in personal income for the ROI; $12.9 million of that personal income would go to Spokane County. In the ROI, the program-related spending would range from $9.4 million in 1990 to $27.5 million in 1991, then stabilize at $9.3 million during the operations phase.

Population and Demographics. The Alternative Action-related population increase would range from 92 in 1990 to 1,230 in 1992 in the ROI, 15 to 106 more persons than for the Proposed Action. During the construction phase, Spokane County's share of the inmigration would range from 90 in 1990 to 1,227 in 1992. Of the 1,148 total inmigrants during operations (105 more than the Proposed Action), 1,146 would move to Spokane County. Therefore, like the Proposed Action, the Alternative Action would affect population in Spokane County only. Even with this additional inmigration, total inmigrant population as a percent of the total baseline county population would remain almost identical to the Proposed Action. The proportional share of military personnel and their dependents in the Fairchild AFB area population would be 5.6 percent in 1993.

Of the 1,146 inmigrants to the county during the operations phase, 119 would live onbase, 770 in the City of Spokane, 103 in Medical Lake, and the remaining 154 in other surrounding communities. The inmigration would increase Medical Lake's population by 3.0 percent in 1992 and by 2.7 percent in 1993 and thereafter over the baseline population projections.

Housing. The Alternative Action would not change the expected program-related occupancy patterns within the Spokane area. An additional 11 unaccompanied military personnel would live in newly constructed unaccompanied enlisted personnel housing onbase.

The demand for permanent housing in Medical Lake would increase by about five units each year beginning in 1991. There would be no demand for temporary facilities in the community. The additional five households who would seek housing in Medical Lake would not be able to find available units in the community. They would, however, find housing in Spokane. The overall vacancy rate in Medical Lake would remain at its frictional level for the Alternative Action.

The additional long-duration demand for permanent units during operations would create a potential shortage of low and moderately priced housing in Medical Lake. Beneficial effects would still be experienced by landlords and property owners.

Education. During the operations phase, the Alternative Action would cause an enrollment increase of 15 additional students for a total of 185. Of the total 185 students, Medical Lake School District No. 326 would receive about 20 students, Spokane School District No. 81 would receive 140, and the remainder would attend other districts within the area. Pupil-to-teacher ratios would remain the same as those identified for the Proposed Action. Current staffing and facilities should be able to accommodate these students.

Public Services. The slightly higher population inmigration for this alternative would result in slightly higher service demands. The increase in demands would not result in measurable increases in city or county personnel over what is projected for the Proposed Action. The number of personnel per 1,000 population for the City of Medical Lake would remain the same as those levels identified for the Proposed Action.

Public Finance. Because public service staffing levels would remain essentially unchanged with this alternative, expenditure increases would remain at levels estimated for the Proposed Action. The additional school enrollments could be accommodated with no additional personnel or facilities required.

Summary of Impacts. For the Alternative Action at Fairchild AFB, short- and long-duration socioeconomic impacts would be low because inmigration would cause population in Medical Lake to increase by 3.0 percent and 2.7 percent over baseline forecasts during both the peak inmigration year (1992) and program operations (beginning in 1993), respectively. This level of program-induced population growth would result in negligible impacts on housing, education, public services, and public finance within Medical Lake for both the peak and succeeding years. Impacts would not be significant because the increase in demand for housing would be met by available vacancies in Medical Lake and Spokane, existing educational facilities would absorb program-related enrollment increases, no new public service facilities would need to be constructed, and existing revenue sources of the jurisdictions would be adequate to meet program-related expenditures.

Both short- and long-duration beneficial socioeconomic effects would be generated by the Alternative Action, including increases in employment and income in the ROI and greater utilization of temporary and permanent housing vacancies within the Fairchild AFB area.

4.6.2 UTILITIES

4.6.2.1 Region of Influence

The utilities ROI for Fairchild AFB includes the host communities of Medical Lake and Spokane and the base.

4.6.2.2 Existing and Future Baseline Conditions

Potable Water Treatment and Distribution. The City of Medical Lake receives potable water from a well system that it shares with Eastern State Hospital. In 1987, average daily demands for the city equaled 0.38 million gallons per day (MGD). Capacity of the entire well system is 2.5 MGD and the city has 2.45 million gallons (MG) of storage. The City of Spokane provides potable water to its residents from a large aquifer system and average daily demands amount to 65 MGD. It is estimated that average daily use will increase to 66.5 MGD in 1990 and 69.4 MGD in 1994. Pumping capacity and system storage is adequate to meet peak summer demands of 160 MGD. The city chlorinates the water and additional capacity is developed on an as-needed basis from new wells.

Average daily potable water use at Fairchild AFB was 2.75 MGD in 1987. The capacity of the onbase well system is estimated to be 7.5 MGD. System storage equals 2.3 MG and is adequate for meeting peak summer demands.

Wastewater. Wastewater from the City of Medical Lake is treated in 11.5 acres of lagoons. Current flows to the lagoons amount to 0.2 MGD. Wastewater treatment for Spokane occurs at a 44-MGD activated-sludge facility which also employs phosphorus removal. The plant currently processes 30 MGD and its discharge to the Spokane River consistently meets Washington Pollutant Discharge Elimination System permit requirements. Wastewater flows are estimated to increase to 31.4 MGD in 1990 and 33.23 MGD in 1994. Fairchild AFB operates its own treatment plant with a 1.5-MGD capacity. Wastewater flows to the plant in fiscal year 1987 equaled 0.89 MGD.

Solid and Hazardous Waste. Solid waste collection and disposal is provided by the City of Spokane and various private firms. Total daily disposal requirements will increase from the current volume of 1,095 tons per day (T/day) to 1,120 T/day in 1990 and to

1,180 T/day by the year 2000. Currently, it is estimated that all landfills will reach capacity by the mid-1990s. An effort is under way to begin construction of a waste-to-energy facility to handle 800 T/day. Solid waste generated onbase is disposed of by a private contractor. A total of 6,600 tons per year or 18 T/day was removed in 1987.

Onbase hazardous wastes are managed by Fairchild AFB and the Defense Reutilization and Marketing Office (DRMO) is responsible for providing the proper handling of wastes and arranging for transport to treatment and disposal facilities. The base stores the wastes in an interim storage facility located adjacent to the DRMO. A new facility has been designed and is awaiting review by the U.S. Environmental Protection Agency. The wastes included solvents, battery acids, oils and fuels, paints, thinners, and other regulated materials.

Energy Utilities. Washington Water Power (WWP) provides electrical service to the City of Spokane and a portion of Fairchild AFB. Total sales of electricity for the system were 8.67 billion kilowatt-hours (kWh) in 1986, a 6.3-percent decrease from 1985. Competition from low-cost oil and gas and a mild winter were the major factors for this decline. The peak demand of 1,668 megawatts (MW) was met with resources from a system with a 2,062-MW capability. This peak included a 112-MW demand from San Diego Gas & Electric whose contract terminated in 1987. The WWP projects a 1.9-percent increase in peak demand between 1987 and 1997. To meet the projected peak demands of 1,647 MW in 1990 and 1,745 MW in 1994, the company will rely on purchased power and hydroelectric generating plant upgrades.

Fairchild AFB receives electricity from WWP and the federal Bonneville Power Authority (BPA). In FY 1987, the base consumed a total of 68,026,654 kWh, with 32,491,654 kWh from WWP and 35,535,000 kWh from BPA. Currently, a new substation is being constructed and an underground distribution system is being installed onbase. With this improvement, existing and future demands for electricity can be met.

The WWP supplies natural gas to 80,600 customers in Washington including the City of Spokane and Fairchild AFB. In 1986, WWP had sales that reached 18,500 million cubic feet (MMcf), a 30-percent decrease from 1985. The company purchases gas from suppliers in the Northwest and Canada and currently has access to adequate reserves to meet future demands. Fairchild AFB consumed 603 MMcf of natural gas which included supplies to the central heating plant. The main plant, with a daily capacity of 450 million British thermal units (MBtu), provides heat and steam to the industrial area and hangers. Peak demands on this system have not exceeded 200 MBtu. A smaller facility (20 MBtu) provides steam to the Air Training Command facility. It is estimated that the facility is operating at 50 percent of design capacity.

Liquid fuels are supplied to Fairchild AFB through contracts with local and regional distributors that are filled through the Defense Fuels Supply Center (DFSC). Fuel oils are currently delivered to the base by tanker trucks and JP-4 (jet fuel) enters the base by the Yellowstone pipeline. Storage for JP-4 consists of 25 tanks with a total capacity of 3.98 MG. Diesel fuel is stored in four underground tanks with a total capacity of 24,000 gallons. There is a single 25,000-gallon underground storage tank for No. 2 fuel oil.

4.6.2.3 Impacts of the Proposed Action

Potable Water Treatment and Distribution. Program-related requirements of 0.18 MGD would increase average daily demands in the City of Spokane by 0.26 percent from a baseline level of 67.9 MGD to 68.1 MGD in 1992. The city's pumping and distribution facilities, with adequate capacity, would be able to meet peak summer demands. Program-related requirements of 0.02 MGD would increase average daily demands in the City of Medical Lake by 5.1 percent from baseline levels of 0.39 MGD to 0.41 MGD in 1992. The city's water system, with a 2.5-MGD capacity, would be operating at

16 percent and storage would be adequate to meet summer demands. Daily requirements at Fairchild AFB would increase from baseline levels of 2.62 MGD to 2.67 MGD. Program-related demands would equal 0.05 MGD or 1.9 percent in the same year. With an estimated 7.5-MGD capacity, the base has adequate capacity to pump and treat the supply needed to meet the program-related demand.

Wastewater. Average daily flows for the City of Spokane would increase from a baseline level of 32.3 MGD to a peak of 32.4 MGD in 1992 because of a 0.08-MGD or 0.24-percent program-related increase. The existing treatment plant, with a 44-MGD capacity, would be operating at 74 percent and would be able to adequately treat the increased flows. Average daily flows for the City of Medical Lake would increase from a baseline level of 0.21 MGD to a peak of 0.22 MGD in 1992 because of a 0.61-MGD or 4.7-percent program-related increase. The existing lagoon system would be able to adequately treat the increased flows. Wastewater flows at Fairchild AFB would increase from a baseline level of 0.93 MGD and reach 0.96 MGD as a result of a 0.03-MGD or 3.4-percent program-related increase. Wastewater treatment capacity equals 1.5 MGD and would be adequate to process onbase flows.

Solid and Hazardous Waste. Solid waste generation would increase by 4.3 T/day or less than one percent in the ROI in 1992. Solid waste generation at Fairchild AFB would increase by 0.49 T/day or 2.8 percent in 1992 (peak year). With the city and private haulers already adequately disposing of 443 T/day, the program-related increase would require no additional equipment or personnel. Program-related hazardous waste generated onbase would be incorporated into the existing management system, stored onbase, and then transported to treatment and disposal facilities.

Energy Utilities. Program-related electricity demands would peak in 1992 with an increase of 3.24 MW. Approximately 2 MW would be added to the WWP system, increasing the projected peak demand by 0.03 percent to 1,684 MW. The WWP has adequate power supplies to meet this increase. Electrical requirements at Fairchild AFB would equal a 2.72-MW increase. The WWP and BPA would share this increased load, and adequate capacity is available from two substations to meet the demands. Natural gas consumption would increase by 76 MMcf or 0.4 percent. The WWP has an adequate infrastructure and reserves to meet the new demand. Natural gas use onbase would increase from a projected demand of 603 MMcf to 624 MMcf or by 3.5 percent. The WWP has adequate capacity to supply Fairchild AFB. As a result of the program, diesel fuel consumption onbase would increase. Supplies would continue to be filled by the DFSC through contracts with local and regional suppliers.

Summary of Impacts. Utility requirements associated with the Peacekeeper Rail Garrison program would increase demands on the City of Spokane systems by less than one percent in 1992 (peak year). Regional solid waste facilities would process an additional 4.3 percent in 1992. Program demands on the potable water and wastewater systems in the City of Medical Lake would increase baseline demands by two percent to five percent. Both peak year and operations requirements on energy utilities would be less than one percent. Because the peak year requirements would not be substantially greater than the impacts associated with the operations requirements, all utility impacts would be of long duration. The long-duration impacts associated with regional solid waste requirements and demands of the utility systems for the City of Medical Lake would be low because the increases are less than five percent. These impacts would not be significant because each utility system has adequate capacity to meet the new demands without increasing personnel or expanding existing facilities.

4.6.2.4 Impacts of the Alternative Action

Potable Water Treatment and Distribution. With the additional construction associated with six Train Alert Shelters (TASs) and the operations personnel to support the program, potable water requirements would be 0.19 MGD, which is 0.01 MGD greater than the

Proposed Action. Adequate capacity is available in the City of Spokane's pumping and distribution system to process the additional demand. Program-related requirements on the City of Medical Lake's system would increase by less than 0.5 percent.

Wastewater. Average daily flows to the City of Spokane's treatment plant would peak at 0.08 MGD in 1992, which is 0.02 percent greater than the flows identified for the Proposed Action. The city has adequate capacity to treat these flows. Wastewater flows to the City of Medical Lake's lagoons would be 0.01 MGD, which is the same as the Proposed Action.

Solid and Hazardous Waste. Solid waste generation from the increased construction and operations activities would be slightly greater than the Proposed Action. Solid waste generation for both the region and the base is 0.45 T/day greater during the construction and operations phases. These increases would not adversely affect the city or private haulers. Hazardous waste generation would be slightly greater than the Proposed Action as a result of the maintenance activities associated with the additional trains. These wastes would be incorporated into the existing management system and transported to treatment and disposal facilities.

Energy Utilities. Demands for electricity would be 0.62 MW greater for the Alternative Action than the Proposed Action. Both WWP and BPA have adequate capacity in their current generation and transmission system to meet the increased demands. Demands for natural gas would be 6.2 MMcf greater for the Alternative Action than the Proposed Action. The WWP has an adequate infrastructure and reserves to meet these increased demands. Diesel fuel consumption would be greater than the Proposed Action. Supplies would continue to be filled by the Defense Fuels Supply Center through contracts with local and regional suppliers.

Summary of Impacts. Utility requirements associated with the Alternative Action would be slightly greater than those identified for the Proposed Action. Because the peak year requirements would not be substantially greater than the impacts associated with the operations requirements, all utility impacts would be of long duration. These impacts would remain low because the increases are less than five percent. Impacts would not be significant because each utility system has adequate capacity to meet the new demands without increasing personnel or expanding existing facilities.

4.6.3 TRANSPORTATION

4.6.3.1 Region of Influence

The ROI for transportation includes the principal city streets in Spokane and Medical Lake, Washington and the primary highways leading to Fairchild AFB.

4.6.3.2 Existing and Future Baseline Conditions

The principal city streets in Spokane consist of segments of the primary highways that pass through the city such as Division Street, Trent Avenue, Nine Mile Road, and Driscoll Boulevard. Division Street, part of U.S. 395, had sections with an average annual daily traffic (AADT) of 31,000 to 36,200 in both directions in 1985. Trent Avenue, part of Washington State Highway 290, had an AADT of 8,150 to 14,600 one-way in the central business district (CBD), and between 12,000 to 22,600 in both directions outside of the CBD. Nine Mile Road and Driscoll Boulevard are segments of Washington State Highway 291 in the city and had AADTs ranging between 3,600 and 8,200. Other principal streets in Spokane include Sprague Avenue, Monroe Street, Hamilton Street, and Mission Avenue. They have AADTs ranging from 3,000 to 9,000 vehicles per direction. Washington State Highway 902, the primary access to Medical Lake from Interstate 90, had AADTs of 3,000 to 4,350 in 1985.

Current level of service (LOS) ratings at these principal city streets vary from free-flowing to unstable flow conditions. Traffic flow in the city is generally good with only some delays occurring along major city arterials. Sections of Division Street between 3rd Avenue and Francis Avenue are nearing maximum capacity and the LOS was estimated at D and E during the peak hours in 1985. (Refer to Section 3.4.4 and Table 3.4.4-1 for descriptions of LOS letter scores.) Service levels along Trent Avenue vary from B to E along its one-way segment within the CBD, and from B to C along its two-way segment outside of the CBD. Traffic conditions at other principal city streets are free-flowing. The LOSs along Nine Mile Road, Driscoll Boulevard, and U.S. 2 (leading to the base) were rated at A. Based on population projections for the city, traffic volumes on these principal streets are expected to increase slightly, and the resulting LOS ratings would remain the same or at most drop by one level by 1994.

The primary access to the base is provided by U.S. 2, which is an east-west highway that passes just north of the base and connects with Interstate 90 at Spokane. U.S. 2, near the base main gate, had an AADT of 5,900 in 1985. Traffic flowed smoothly at LOS A. The base has two gates: the main gate through north-south Mitchell Street, which connects to U.S. 2, and a west gate through Offutt Drive, north of the base housing area.

During the peak morning hour, over 1,000 vehicles enter the main gate from U.S. 2-East, while about 25 enter from the U.S. 2-West. Approximately 180 vehicles enter the base via the west gate, with over 80 percent coming from the base housing area around the hospital. The evening outbound flow is essentially the reverse of the morning inbound flow. In the morning, 5-minute volumes at the main gate range from 30 to 110 entering vehicles. In the evening, traffic is almost uniform with only two 10-minute peak flows after which traffic congestion quickly clears. Onbase travel conditions are generally good because the base has a relatively low volume of motor vehicle traffic, the roadways are in good condition, and many desirable design features (such as several wide arterials and free-flowing gate facilities) are on the street network.

4.6.3.3 Impacts of the Proposed Action

During the construction phase, an increase in incoming vehicular traffic would occur as a result of the movement of construction workers, materials, and equipment. Construction activities would require an estimated 507 program-related personnel during the peak employment year (1992). Of these, 330 program-related employees would reside in the Spokane area (including about 40 employees that would reside in Medical Lake) and commute daily to the base. They would generate an additional 300 passenger vehicle trips to the base during the peak hours in 1992. This increase in traffic would add to the delays and queues at the main gate to Fairchild AFB. Additional heavy-vehicle trips to the base would also increase traffic volumes at the main gate. However, these movements could occur during off-peak hours and would not cause additional delays at the main gate during the rush hours. Program-related commuters would not cause increased congestion along the principal city streets in Spokane and Medical Lake during the peak hours. However, along U.S. 2, which leads to the base, increases in congestion and delays would occur but without a reduction in the LOS rating.

During the operations phase, an estimated 295 out of 419 program-related employees would reside in the Spokane and Medical Lake area. They are expected to generate 268 passenger vehicle trips to the base and would cause a slight increase in congestion and delays along U.S. 2, but without reducing the LOS rating. Slight increases in queues and waiting times would also occur at the entrance gate. In addition, occasional program-related deliveries of supplies and equipment could also increase traffic volumes at the gates. However, they are expected to occur during off-peak hours and could use other access routes to the base.

Interruptions to vehicular flow along U.S. 2 where the connector spur crosses would also occur. The trains would only move out of the garrison when either major maintenance or

repair necessitates that they be transported to the Main Operating Base or depot facilities, or when directed to disperse during times of national need. In addition, a training train would travel periodically to the garrison installation to accomplish operations, security, and maintenance training. These train interruptions at railroad/road crossings would not cause substantial delays to vehicular traffic. Moreover, these train interruptions would only occur occasionally.

Both short- and long-duration impacts on transportation would be negligible because the LOS rating along U.S. 2, which leads to the base, would not be reduced below A. A slight increase in queues and waiting time at the main gate could occur but this would not continue indefinitely. Employees commuting from Spokane and Medical Lake would not cause a reduction in LOS rating along the principal city streets.

4.6.3.4 Impacts of the Alternative Action

Compared to the Proposed Action (4 TASs), the Alternative Action (6 TASs) would require additional program-related personnel. During the construction phase, an estimated 550 program-related personnel would be needed by 1992 (the peak employment year). Of these employees, 360 are expected to reside in the Spokane area, including about 43 employees expected to reside in Medical Lake. They are estimated to generate 327 passenger vehicle trips to the base during the peak hours in 1992. They would also increase delays and queues at the entrance gate as with the Proposed Action. The LOS rating along U.S. 2 would not be reduced below A.

During the operations phase, an estimated 325 out of 461 program-related personnel would reside in the Spokane and Medical Lake area. They are expected to add 295 passenger vehicle trips (27 more than for the Proposed Action) to the base during the peak hours and would cause additional delays and congestion along U.S. 2 and the main gate. Increased traffic volume along U.S. 2 would not reduce the LOS below A. Peacekeeper and training train impacts on vehicular traffic at road crossings would be about the same as the Proposed Action.

Commuting associated with the Alternative Action would be slightly greater than with the Proposed Action. However, both short- and long-duration impacts on transportation would still be negligible because the LOS rating along U.S. 2 and the main gate would not change. The LOS ratings along the principal city streets in Spokane and Medical Lake would also not change.

4.6.4 LAND USE

4.6.4.1 Region of Influence

The land use ROI includes Fairchild AFB; adjacent private lands located east, south, and southwest of the affected areas of the base; and a connector spur corridor approximately 0.7 mile long (offbase). The connector spur corridor would be located on private land and extends north from the base to the main line of the Burlington Northern (BN) Railroad.

4.6.4.2 Existing and Future Baseline Conditions

Fairchild AFB is located in Spokane County which has adopted a comprehensive plan (currently being revised) and zoning ordinance. The comprehensive plan would permit rural uses around the base with the exception of two industrial designations located southwest and northeast of the base. The rural designation would allow for the development of 10-acre minimum residential lots and agricultural uses. The zoning ordinance has designated the same areas agricultural with the exception of five areas of residential manufactured homes (Fairchild Mobile Home Park) located north across Washington State Highway 902 from Fairchild AFB.

Figure 4.6.4-1 presents a generalized overview of land use onbase and in the surrounding area. The primary land uses are military (associated with Fairchild AFB), agricultural, industrial, commercial, and residential. Agricultural land uses consist of the cultivation of wheat and hay on nonirrigated cropland and the grazing of cattle on rangeland (mixed open space). Some designated prime farmlands exist in the vicinity of the base, but no unique farmlands. Commercial land uses consist of an automobile dismantling yard, an auto parts store on U.S. 2 north of the base, and a dog kennel on Bartholomew Road southwest of the base. Within the ROI, residential land uses are located to the north, east, and south of the base.

North of the base there are approximately 42 residences, 40 of which are in the Fairchild Mobile Home Park. Five residences are located east of the base, and an additional five residences are on Washington State Highway 902, southeast of the base. South of the base and Washington State Highway 902, two residences are located on Welcome Road and one residence on White Road. Inhabited buildings located southwest of the base and north of Washington State Highway 902 consist of 11 residences and 1 dog kennel on Bartholomew Road, and 2 residences on Graham Road.

The public infrastructure within the ROI includes five county roads (Bartholomew, Graham, Hallett, McFarland, and Thorpe); Washington State Highway 902 (a 2-lane highway) and a BN Railroad track (located south of Washington State Highway 902); four low-voltage electrical distribution lines; and one 115-kilovolt (kV) high-voltage transmission line. The public infrastructure within the connector spur corridor includes U.S. 2 (a 4-lane highway); four low-voltage electrical distribution lines; one 115-kV high-voltage electrical transmission line; one railroad communications line; and one oil pipeline.

The visual attributes of the ROI are typical of the northern part of the Columbia-Snake River Plateau Physiographic Province. The area is flat to very gently rolling. Native vegetation was short grassland but the area is now mostly cultivated or in pasture. Tall trees are generally found at farmstead sites. Landscape forms are horizontal to undulating and lines straight to slightly curving. Colors are mostly green and gold, and dark brown and white in winter. Existing onbase structures are visible from Washington State Highway 902 (AADT 5,000), south of the base, but are not obtrusive (their distance is approximately 2.5 mi from the highway); the water towers are the most obvious. The terrain between Washington State Highway 902 and the proposed TAS location is relatively flat and almost devoid of tree and shrub growth. The terrain of the base north of Washington State Highway 902 rises in elevation above the highway. The few residences found along Washington State Highway 902 are at least 3,800 feet east of the proposed TAS location.

4.6.4.3 Impacts of the Proposed Action

The proposed program would require the fee simple acquisition of approximately 275 acres of private nonirrigated cropland. About 225 acres of this area is designated prime farmland. The acquisition for military use would be compatible with the Spokane County general plan. In addition, the proposed program would require the acquisition of approximately 325 acres of restrictive easement. About 245 acres within the explosive safety zone are already in an Air Force easement. There is one inhabited building (residence) located within the proposed easement which may require relocation. It is east of the base on the south side of Washington State Highway 902. The existing agricultural and mixed open-space land within the easement would not be affected. Development of the Rail Garrison program at Fairchild AFB would require onbase relocation of the following existing facilities: entry control facility, explosive ordnance disposal range, grenade range, RT Compound (Air Training Command), and suspect vehicle parking.

About 1.1 miles of an existing 115-kV high-voltage transmission line would also be located within the explosive safety zone. It may require relocation. No additional connector spur would be required. About 0.6 mile of Washington State Highway 902, a

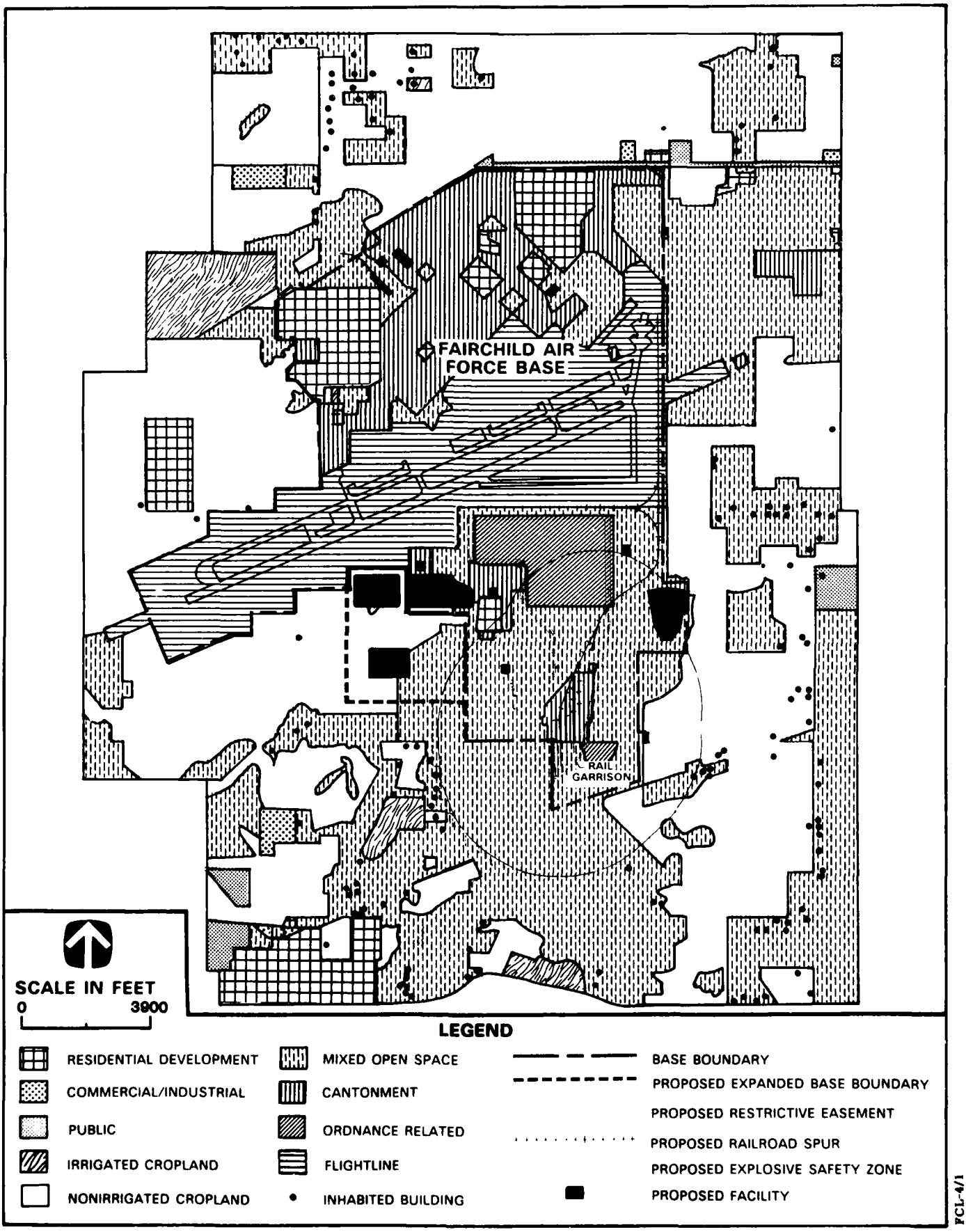


FIGURE 4.6.4-1 LAND USE AT FAIRCHILD AFB, WASHINGTON AND VICINITY

two-lane highway; 0.4 mile trackage of the BN Railroad; and 0.3 mile of Hallett and Welcome roads (combined) are located in the explosive safety zone. Relocation of these facilities may be required.

The TAS would be located only 1,200 feet (at the closest point) from Washington State Highway 902 (the key observation point), with no intervening topography, vegetation, or structures for a distance of about 1.5 miles along that highway. At 1,200 feet, the 1,200-foot-long, 30-foot-high TAS would appear to have the size of an object 300 feet long and 7.5 feet high if the viewer were 100 yards from that same object. The TAS site is 20 to 30 feet above the highway elevation, which means that the TAS facilities would be silhouetted against the sky from the key observation point. The mounded appearance of the TAS igloos would contrast sharply with the rather flat horizon line of the ROI. For these reasons, this facility could be objectionable to some viewers along Washington State Highway 902. Figure 4.6.4-2 is a photograph of the garrison site as viewed from that highway. Superimposed on the photograph is a simulation of the four TAS igloos proposed at Fairchild AFB.

Summary of Impacts. The proposed 275-acre expansion of Fairchild AFB onto nonirrigated cropland would use only 0.07 percent of the inventory of such land use in Spokane County. The acquisition of about 225 acres of prime farmland would be equal to about 0.15 percent of the prime farmland in Spokane County. One inhabited building could require relocation from the restrictive easement. The proximity of the TASs to Washington State Highway 902 would make the visual intrusion objectionable to some viewers and, therefore, a moderate impact on visual attributes. Given the described conditions, short- and long-duration program impacts on the land use would be moderate. Because one inhabited building could require relocation, impacts would be significant.

4.6.4.4 Impacts of the Alternative Action

Impacts of the Alternative Action at Fairchild AFB would be about the same as for the Proposed Action, with three exceptions: 280 acres of nonirrigated cropland would be required in fee simple, the area of the restrictive easement would be about 345 acres, and three inhabited buildings could require relocation from that easement. Impacts on visual attributes would be about the same as for the Proposed Action. With these conditions, short- and long-duration impacts on land use would be moderate. Impacts would be significant because it would be necessary to relocate inhabited buildings.

4.6.5 CULTURAL RESOURCES

4.6.5.1 Region of Influence

The ROI for Fairchild AFB includes the Spokane River drainage from the confluence of the Spokane and Columbia rivers on the west, to the edge of the Columbia-Snake River Plateau on the north and east. The southern boundary of the ROI is the drainage basin for the Spokane River, including all tributaries from the south. The ROI encompasses the regional data base necessary for comparison with the high plateau environment of cultural resources on Fairchild AFB.

4.6.5.2 Existing and Future Baseline Conditions

Prehistoric Resources. Previously recorded prehistoric sites in the ROI include lithic scatters, stone alignments, petroglyphs and pictographs, rockshelters, villages, fishing sites, and burials. Of these, the most important are petroglyphs, pictographs, rockshelters, villages, and burials. These site types tend to be listed on state and national registers because of greater research potential and/or higher visibility. They are also located near major streams and rivers, particularly near the Spokane River. Recent cultural resource survey of the proposed program areas failed to identify any prehistoric sites.



FCL-4/2

FIGURE 4.6.4-2 SIMULATION OF FOUR TRAIN ALERT SHELTER IGLOOS AT FAIRCHILD AFB, WASHINGTON AS VIEWED FROM WASHINGTON STATE HIGHWAY 902

Historic Resources. Known historic sites in the ROI include structures and bridges. Most of these are located in cities (Spokane and Medical Lake) or in the vicinity of the Spokane House, the early North West Fur Company post. Spokane House, located on the Spokane River approximately ten miles north and east of the City of Spokane, was situated near a Native American village and several fishing sites. A recent survey of proposed program areas onbase resulted in the identification of three historic sites, all relating to homesteading activities in the early 1900s. Two farmhouses are indicated by ceramic scatters and rock walls. Remnants of an irrigation ditch system, dating back to at least 1912, were also recorded. The historical importance of the sites have not yet been evaluated but they appear too badly disturbed to qualify for the National Register of Historic Places.

Historically, the Fairchild AFB area was the scene of a battle between the Ninth U.S. Infantry under the command of Colonel George Wright, and the Spokane, Palouse, and Coeur D'Alene Indians in September 1858. The infantry, retaliating for the defeat of Lt Colonel Edward Steptoe the previous spring at the Battle of Rosalia, engaged and routed the Indians at Four Lakes, approximately ten miles south of the present base site. Scattered skirmishes subsequently occurred between Four Lakes and the Spokane River. Although part of the battle may have occurred on lands now occupied by the base, archaeological evidence is not likely to be preserved because of the type of battle and because the Indians immediately removed the wounded and dead. The monument marking the battle is directly across from Fairchild AFB and is listed on the Washington State Register.

Native American Resources. The Fairchild AFB ROI was formerly inhabited by the Spokane, Coeur D'Alene, and Colville tribes. These native groups lived in small semipermanent fishing villages on major streams and rivers and practiced a hunting, fishing, and gathering subsistence economy. The present Fairchild AFB area, located away from major streams, would probably have been used as collecting and hunting locales away from the village bases near major streams. The Spokane and Colville Confederated tribal reservations are located approximately 16 and 48 miles northwest of Fairchild AFB, respectively. The Coeur D'Alene Reservation is approximately 30 miles east of the base. The Washington State Historic Preservation Office archaeologist affirms that the Spokane and Colville Confederated tribes, whose reservations are near the base, have expressed concern over resources important to them in the area. Consultation has been initiated with tribal representatives but no sacred or traditional areas have yet been identified onbase.

Paleontological Resources. Geological deposits onbase are Miocene- to Pliocene-age glaciofluvial and glaciolacustrine sand and gravel deposits of the Latah Formation covered by extensive basalt flows of the Columbia River Group. Floodwaters from glacial Lake Missoula effectively stripped the glacial loess deposits from this area and created the channeled scablands in the basalts. Fossils are not found in basalt, but a varied assemblage of plant fossils have been identified in the Latah Formation. The Latah usually does not form outcrops because it is buried under the basalt flows and is usually found in manmade excavations.

4.6.5.3 Impacts of the Proposed Action

Program impact areas onbase include approximately 245 acres for program-related and relocated facilities and 2.7 miles of new roads and rail access spurs. Program impact areas offbase include approximately 280 acres of acquired land and 0.7 mile of rail access spur. Most of the affected areas onbase and offbase are located on the southern part of the base with some facilities and the rail access spur on the northern part of the base.

Prehistoric Resources. No prehistoric resources would be affected by the Proposed Action.

Historic Resources. Three historic sites would be affected on the base, but they are not likely to be historically important.

Native American Resources. No sensitive resources have been identified onbase and none are expected to be affected by proposed program impact areas.

Paleontological Resources. Paleontological resources are expected to be plant fossils generally not considered important.

Summary of Impacts. Short- and long-duration impacts on cultural resources as a result of the Proposed Action at Fairchild AFB are anticipated to be negligible because no important or sensitive resources would to be affected.

4.6.5.4 Impacts of the Alternative Action

Short- and long-duration impacts on cultural resources as a result of the Alternative Action would be similar to the Proposed Action. With the Alternative Action, the garrison area would be about 22 acres larger, but it would still occur in an area lacking important archaeological sites. Impacts would remain negligible.

4.6.6 BIOLOGICAL RESOURCES

4.6.6.1 Region of Influence

The Region of Influence (ROI) for biological resources at Fairchild Air Force Base (AFB) is defined as the area where these resources would be directly affected by the construction of new facilities, including roads and the rail spur onbase, and construction and upgrade of rail spur offbase (Section 4.6, Figure 4.6-1). In addition, areas that may be disturbed by indirect impacts are those recreational facilities within an approximately 1-hour driving time of Spokane, Washington, including Clear Lake, Medical Lake, Silver Lake, Fish Lake, Willow Lake, Granite Lake, Deep Creek, Coulee Creek, Riverside State Park, and the Spokane River.

4.6.6.2 Existing and Future Baseline Conditions

Biological Habitats. Prior to base construction, the 4,700 acres of land occupied by Fairchild AFB was agricultural. Approximately 2,200 acres of this total have already been developed. This developed area is planted in low, fruit-bearing shrubs and softwood, hardwood, and evergreen trees, which provide some songbird nesting habitat. Open recreational areas with occasional large trees also offer good habitat for burrowing animals. Future baseline conditions onbase are expected to be similar to existing conditions based on current base management plans. Future baseline conditions for the ROI would be similar to existing conditions based on projections for population increase and increased recreational use in the ROI.

A major portion of the undeveloped land on Fairchild AFB supports mixed grass and shrubs (Figure 4.6.6-1). These areas are covered by sagebrush, wheatgrass, sedges, fescue, clover, bluegrass, and a variety of forbs. Pockets of giant hyssop and ponderosa pine also occur onbase. Eighty acres of land in the northeastern corner of the base support a mixture of native grasses and alfalfa, and are used for hay production. Several types of wetlands including meadow, potholes, and low swales occur onbase and in the program area. Most are vegetated by a variety of moisture-dependent plants such as sedges, spike-rush, cattails, bulrush, reed canary grass, and willows. Some areas maintain standing water, either as open or flooded shallow marshes, throughout the year. Marshes near the weapons storage area contain redtop, onions, cattails, rushes, sedges, clover, and a variety of grasses. The undeveloped grass and shrublands provide the best terrestrial habitats for wildlife onbase, and together with the wetlands and pine areas, support a variety of animal species. Birds on Fairchild AFB include swans, geese,

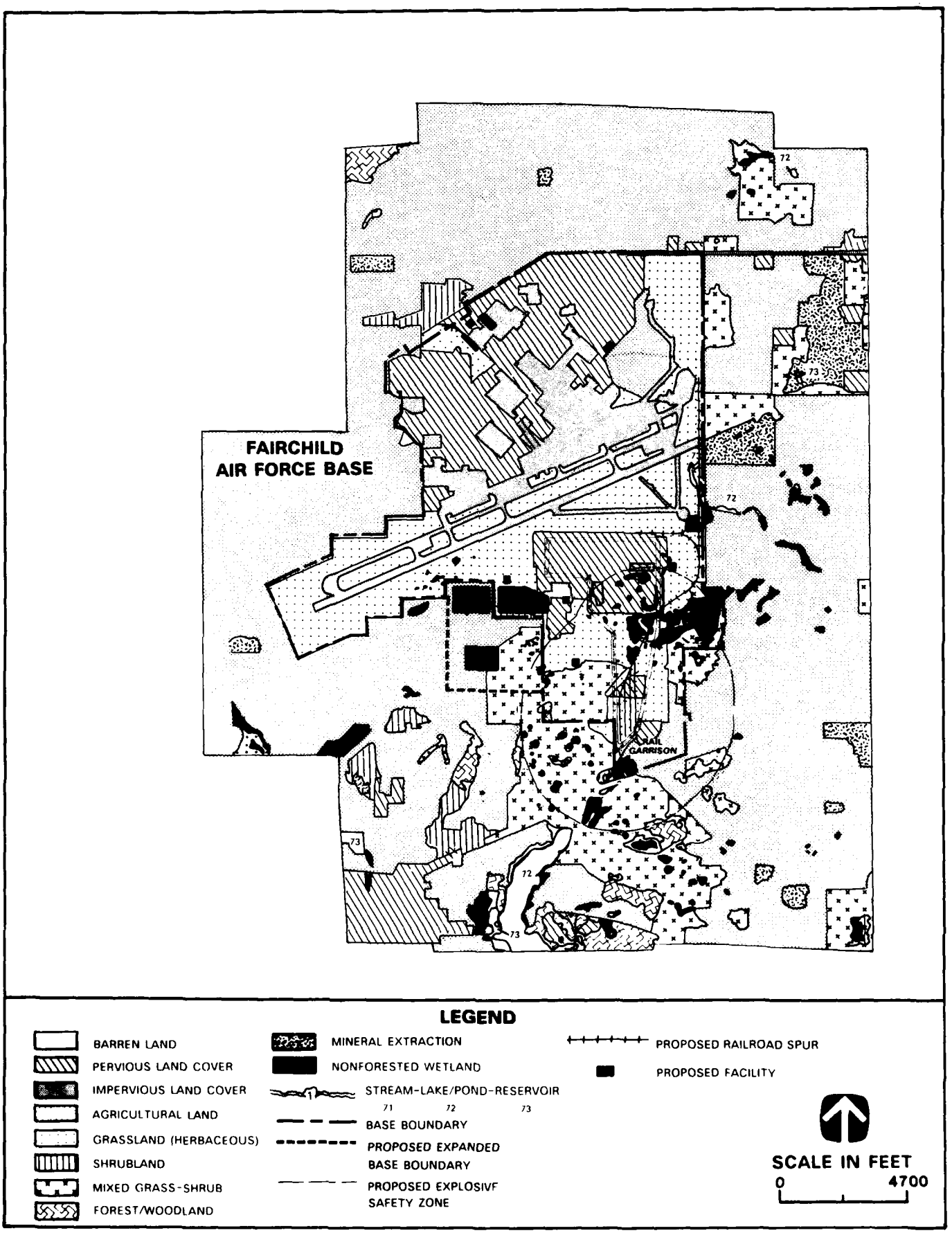


FIGURE 4.6.6-1 HABITAT AND LAND COVER TYPES AND POTENTIAL DISTURBANCE AREAS ON FAIRCHILD AFB, WASHINGTON AND IN THE VICINITY

ducks, hawks, quail, pheasant, owls, falcons, and a number of songbirds. The herptiles onbase include salamanders, toads, frogs, turtles, lizards, and snakes. Large and small mammals, including deer, bobcats, badgers, raccoons, coyotes, skunks, weasels, porcupines, squirrels, chipmunks, bats, rabbits, and several rodents, are also present.

Threatened and Endangered Species. The endangered peregrine falcon may occasionally occur onbase for short periods of time during migration. In addition, two federal-candidate species and four state-recognized special species (which are not federally listed or federal candidates) occur or are likely to occur on Fairchild AFB (Table 4.6.6-1). The threatened bald eagle may occur within a 50-mile radius of the base (Table 4.6.6-1).

4.6.6.3 Impacts of the Proposed Action

Biological Habitats. Installation of garrison facilities on Fairchild AFB would result in the permanent disturbance of 168.6 acres and temporary disturbance of 230.7 acres of land onbase (Section 4.6, Table 4.6-3). Part of this area (18.7 acres) is in agricultural production. Much of the area (201.7 acres) was previously disturbed during construction of facilities for onbase programs. Of the total area to be disturbed, 197.6 acres is dominated by habitat, including 26.6 acres of wetlands (Table 4.6.6-2).

Approximately ten acres of nonforested wetland would be disturbed by relocating the grenade range to the eastern part of the base. This wetland habitat is frequently used by waterfowl. Similar wetland habitat is scarce in the ROI, and loss of the wetland onbase could potentially affect local wildlife populations because of the increased mortality and displacement that would occur. In compliance with Executive Order No. 11990 and according to Section 404 of the Clean Water Act, alternative sites were considered for location of program facilities. In order to collocate facilities of the proposed program with existing facilities, meet engineering and operational constraints, and keep as much of the program within existing base boundaries as possible, it was determined that there is no practicable alternative to the proposed construction of some facilities in wetlands. Furthermore, site-specific program design and construction techniques would include all practicable measures to minimize harm to wetlands. The explosive ordnance disposal range, Air Training Command campus, and Resistance Training Facility would be relocated to land in the southern region of the base and to the newly acquired area. Part of the area is in the agricultural production.

Long-duration impacts on wildlife species in areas that would undergo construction would include increased mortality, permanent loss of habitat, and displacement to adjacent habitats. Construction of several technical and personnel facilities would occur in developed areas of the base, which have already experienced extensive disturbance. The Peacekeeper Rail Garrison program would bring a small number of people to Spokane County and would cause a slight increase in use of recreational resources in the ROI.

Threatened and Endangered Species. Removal of grassland and shrubland on Fairchild AFB would result in the displacement of two federal-candidate species that occur or may occur onbase (Swainson's hawk and the ferruginous hawk). Four state-listed species also occur or may occur in the grassland habitats on Fairchild AFB (Table 4.6.6-1). These species would be displaced as a result of construction activities and some increased mortality may result. Removal of 26.6 acres of wetlands may also affect the great blue heron, which may occur in these habitats (Table 4.6.6-1).

Summary of Impacts. The impacts on wildlife in native areas surrounding the base are expected to be low because disturbance would be confined to a few locations and should not extend far into valuable habitats. These short-duration impacts would not be significant. The disturbances associated with removal of grassland and wetland habitat onbase are of concern because a large number of wildlife species occur in these areas. Also, several federal-candidate and state-recognized sensitive species may be affected. Long-duration impacts (especially to wetlands) would affect local biotic communities,

Table 4.6.6-1

Federally Listed, Federal-Candidate, and State-Sensitive Species Fairchild AFB, Washington and Vicinity

Common Name	Scientific Name	Federal Status	State Status	Distribution
Bald eagle	Haliaeetus leucocephalus	T	T	May occur in region
Burrowing owl	Athene cunicularia	-	Sp	May occur onbase
Ferruginous hawk	Buteo regalis	2	T	May occur onbase
Grasshopper sparrow	Ammodramus savannarum	-	Sp	May occur onbase
Great blue heron	Ardea herodias	-	Sp	Occurs onbase
Long-billed curlew	Numenius americanus	2	Sp	Occurs in region
Peregrine falcon	Falco peregrinus	E	E	May occur onbase as migrant
Prairie falcon	Falco mexicanus	-	Sp	May occur onbase
Sandhill crane	Grus canadensis	-	E	May occur in region
Swainson's hawk	Buteo swainsoni	2	Sp	Occur onbase

Notes: E = Endangered
T = Threatened
2 = Federal candidate, Category 2
Sp = Sensitive species

Sources: Washington Department of Wildlife 1987a; U.S. Air Force 1986e.

Table 4.6.6-2

Habitat and Land Cover Types Potentially Disturbed by the Peacekeeper Rail Garrison Program at Fairchild AFB, Washington

Habitat Type	Garrison, Support and and Relocated Facilities (acres)	Rail Line (acres)	Total (acres)
Proposed Action			
Mixed grass-shrub	26.9	0.5	27.4
Grassland	120.6	1.0	121.6
Nonforested wetland	25.6	1.0	26.6
Shrubland	2.9	0.0	2.9
Agriculture	16.0	2.7	18.7
Streams	0.0	0.1	0.1
Reservoir	0.0	0.3	0.3
Developed land	164.1	37.6	201.7
TOTAL:	356.1	43.2	399.3
Alternative Action			
Mixed grass-shrub	26.9	0.0	26.9
Grassland	129.4	3.7	133.1
Nonforested wetland	25.6	1.0	26.6
Shrubland	2.9	0.0	2.9
Agriculture	16.0	0.1	16.1
Streams	0.0	0.1	0.1
Reservoir	0.0	0.1	0.1
Developed land	177.8	38.2	216.0
TOTAL:	378.6	43.2	421.8

and would therefore be moderate. Long-duration impacts would be significant because of the ecological importance of the habitats that would be disturbed and the level of concern these potential wetland impacts would elicit from natural resource management agencies.

Mitigation Measures. Implementation of mitigation measures would reduce impacts on biological resources at Fairchild AFB; however, residual impacts would still be significant. Mitigation measures which could be effective in substantially compensating for significant impacts on wetlands and other sensitive habitats and the agencies which would be responsible for implementation include:

- Limit the areal extent of construction disturbance in wetlands and other sensitive habitats to the minimum possible. Operate construction equipment only on roads or within designated disturbance areas (U.S. Air Force and U.S. Army Corps of Engineers [COE]).

- Create new wetlands or enhance existing wetlands to substantially reduce impacts on wetlands onbase. A mitigation plan will be developed which will discuss the methods (e.g., grading revegetation) to be used in creating new wetlands or enhancing existing wetlands. Development of the mitigation plan will be coordinated with the COE and the U.S. Environmental Protection Agency (COE and U.S. Environmental Protection Agency).

- Implement offsite habitat (other than wetlands) restoration or increase protection of sensitive species or important habitats if offsite mitigation is considered the only feasible means to compensate for impacts on important habitats (U.S. Air Force and COE).

- Build sediment traps where appropriate on drainages flowing away from construction sites to control impacts from increased erosion in the area. This would reduce the sediment yield to affected streams (U.S. Air Force and COE).

- Build railroad and road embankments at less than the normal angle of repose for the soil type involved. This would minimize long-term erosion and sedimentation (COE and participating railroad companies).

4.6.6.4 Impacts of the Alternative Action

The Alternative Action would result in the disturbance of 421.8 acres of land, including 26.6 acres of wetlands and 179.2 acres of other habitats (Table 4.6.6-2). This does not represent an appreciable increase in disturbance over that which would result from the Proposed Action, and impacts are expected to be very similar to those described in Section 4.6.6.3. Short-duration impacts would be low and not significant; long-duration impacts would be moderate and significant. No additional impacts on threatened and endangered species are expected to occur beyond those identified for the Proposed Action. The mitigation measures discussed for the Proposed Action would be similarly considered for the Alternative Action.

4.6.7 WATER RESOURCES

4.6.7.1 Region of Influence

The ROI for Fairchild AFB includes the Spokane Valley, from west of the Washington-Idaho state border downstream to Deep Creek (Figure 4.6.7-1). It also includes the area draining into the upper portion of Silver Lake. The ROI encompasses Fairchild AFB and its two support communities, Medical Lake and Spokane, and has a total area of 240 square miles.

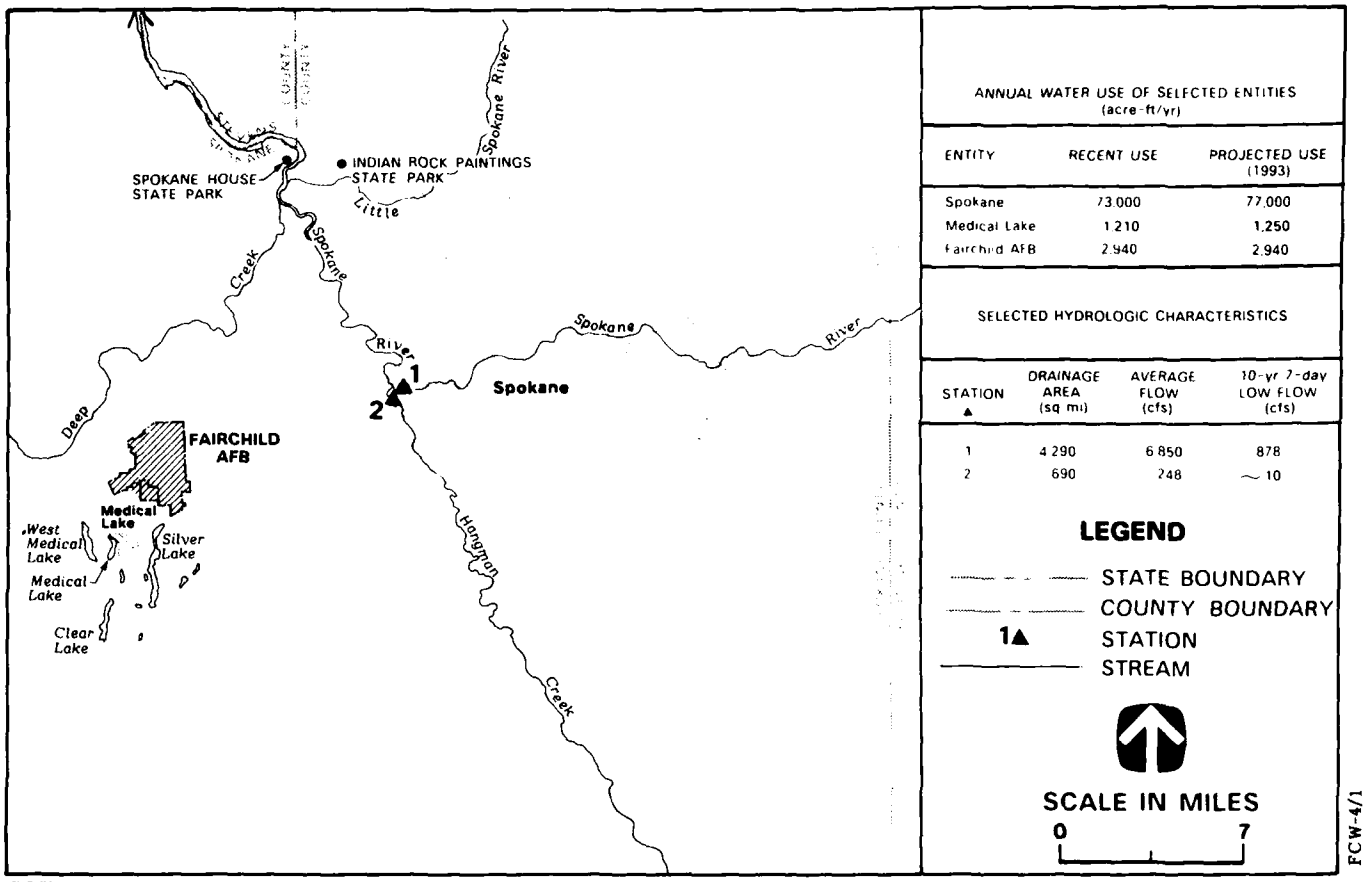


FIGURE 4.6.7-1 HYDROLOGIC FEATURES OF THE FAIRCHILD AFB, WASHINGTON *REGION OF INFLUENCE*

Table 4.6.7-1

Program-Related Water Use
Within the Fairchild AFB Region of Influence
Peacekeeper Rail Garrison Program (Proposed Action)
(values in acre-ft)

	1990	1991	1992	1993 Onwards
Fairchild AFB				
Construction/Operations	6	36	35	23
Domestic	0	7	24	24
Spokane Domestic	18	118	239	220
Medical Lake Domestic	1	8	16	15
Other Towns Domestic	2	12	25	23
TOTAL:	27	181	339	305

4.6.7.2 Existing and Future Baseline Conditions

Major Water Users. Current data on total water use in Spokane County are not available. In 1977, water use in the Spokane Valley was estimated to be 164,000 acre-feet (acre-ft). Water used for municipal purposes by the several cities located in the valley accounted for about 70 percent. Industrial and irrigation uses were about 15 percent each of the total. The City of Spokane is by far the largest municipal supplier in the county, accounting for nearly 60 percent of the municipal category. Recent and projected water use data for Spokane, Medical Lake, and Fairchild AFB are shown in Figure 4.6.7-1. Each of the three entities supplies its own water needs from wells. The water supply sources available to Spokane, Medical Lake, and Fairchild AFB are considered adequate to meet water needs beyond the year 2000.

Surface Water Hydrology and Quality. The dominant surface water feature in the region is the Spokane River, which drains the entire ROI except the Silver Lake drainage. The water quality of this river is good. Approximately 33,900 acre-feet per year (acre-ft/yr) (30 million gallons per day [MGD]) of highly treated wastewater effluent from Spokane is discharged into the river just upstream of its entry into Long Lake Reservoir. The quality of this reservoir has improved considerably in the decade since the city upgraded to tertiary treatment of its wastewater. The northern half of Fairchild AFB drains into Deep Creek, which flows 12 miles downstream from the base before discharging into the Spokane River. This creek has a relatively small drainage and is perennial only in its middle reach, near the base. Both the Spokane River and Deep Creek are designated as Class A (excellent quality) streams suitable for municipal supply, primary contact recreation, and coldwater fishery. Medical Lake, adjacent to the City of Medical Lake, was a eutrophic lake with severe water quality problems a decade ago. Water quality in the lake has improved substantially following a lake restoration project. The southern portion of the base is in the Silver Lake drainage. The lake has a surface area of 490 acres and limited water quality data indicate it is probably mesotrophic. Both lakes are classified as Lake Class with designated uses similar to those identified for the Spokane River. Because of very flat slope and slow drainage, little base runoff reaches Silver Lake. No portion of the base is within a designated floodplain.

Groundwater Hydrology and Quality. The Spokane Aquifer, underlying Spokane Valley, is one of the most productive aquifers in the country. This sand and gravel aquifer is a federally designated sole-source aquifer and it supplies nearly all of the water requirements of Spokane, Fairchild AFB, and many surrounding communities. Hydraulically, the aquifer is closely linked with the Spokane River and increased pumpage has been shown to result in decreased river flow. To the west of the valley, around Fairchild AFB, a soil mantle of varying thickness overlies several thick sequences of basalt. Wells in the basalt yield widely varying amounts of generally good quality water and supply the water needs of the City of Medical Lake. No substantial, long-term declines in groundwater levels have occurred in the ROI. One thousand acre-ft/yr (0.9 MGD) of treated wastewater effluent from the base is discharged to the groundwater via a drainfield located 0.8 mile east of the base.

4.6.7.3 Impacts of the Proposed Action

Major Water Users. The Proposed Action would result in an increase in the peak annual water use in the ROI of about 390 acre-ft by 1992 (Table 4.6.7-1). This would decline slightly to about 350 acre-ft/yr during the operations phase. During this latter phase, 260 acre-ft/yr (0.2 MGD) would be used in the Spokane area, a 0.3-percent increase over the baseline water use of 77,700 acre-ft (69.4 MGD). Program-induced water use in the City of Medical Lake would amount to just 15 acre-ft/yr (0.01 MGD), a 1-percent increase over the baseline water use of 1,250 acre-ft (1.1 MGD). Fairchild AFB would experience an increase of about 50 acre-ft/yr (0.05 MGD), a 2-percent increase over the baseline use of 2,900 acre-ft (2.6 MGD). The three entities possess sufficient water supplies to easily absorb these relatively small increases. Because of the relatively

limited quantities of program water and the large amount of available water supplies, no impacts on existing water users are anticipated.

Surface Water Hydrology and Quality. Wastewater discharges to the Spokane River from the City of Spokane would increase by 0.2 percent (about 80 acre-ft/yr or 0.1 MGD) over the baseline discharge of 38,400 acre-ft (34.2 MGD) in 1993. The Spokane wastewater treatment plant has adequate capacity to treat this wastewater (Section 4.6.2.3) and there should be no noticeable degradation of downstream water quality.

Construction at the garrison site would disturb 225 acres. In addition, 3.3 miles of new connecting rail spur between the garrison and existing track would be constructed. The slope at the garrison site is only about one percent. Although Silver Lake lies less than one mile away, the flat topography and intervening, shallow depressions would prevent site runoff from all but the most intense storms from reaching the lake. Water quality impact on this lake would be minimal. The other program facilities would be constructed in areas of the base which are even more remote from surface water. The potential for local surface water quality degradation due to erosion and sedimentation to either Silver Lake or Deep Creek appears small because of the generally flat terrain and the absence of nearby streams. Therefore, surface water quality degradation due to program construction and operations would be minor.

Groundwater Hydrology and Quality. The 270 acre-ft/yr of program water used in the Spokane area and at Fairchild AFB would be supplied from the Spokane Aquifer. This would increase groundwater extraction from the Spokane Aquifer by less than 0.5 percent and would have no noticeable effect on the aquifer. The small increase in pumpage (15 acre-ft/yr or 0.01 MGD) of the local aquifer at Medical Lake is not expected to have any measurable effects. Wastewater discharges from the Fairchild AFB treatment system would increase by about 30 acre-ft/yr (0.03 MGD) or three percent of the baseline groundwater discharge of 1,040 acre-ft/yr (0.9 MGD) from the wastewater lagoons. This would have minor additional effects on the local groundwater.

Summary of Impacts. The Proposed Action would result in a small increase in water use in an area with adequate water supplies. Surface and groundwater impacts would be minor. The short and long-duration water resource impacts would be low. These impacts would not be significant.

4.6.7.4 Impacts of the Alternative Action

Major Water Users. Total program-related water use during the operations phase would be 380 acre-ft/yr, a 9-percent increase over the Proposed Action. However, the relative increases over baseline water use at Fairchild AFB, Spokane, and Medical Lake would be virtually identical with the Proposed Action. The available water supply is adequate to meet the water needs of this alternative.

Surface Water Hydrology and Quality. With six TASs, the disturbed area at the garrison would increase by ten percent to 247 acres. Given the flat nature of the terrain and lack of rapid drainage locally, water quality impacts are not expected to be substantially different from the Proposed Action.

Groundwater Hydrology and Quality. No additional groundwater impacts are expected as a result of this alternative.

Summary of Impacts. Short- and long-duration impacts are expected to remain about the same as the Proposed Action: low and not significant.

4.6.8 GEOLOGY AND SOILS

4.6.8.1 Region of Influence

The ROI at Fairchild AFB for geology and soils includes the installation and associated program-related areas in the immediate vicinity. The land within a 1-mile radius of the installation and a 1,000-foot-wide corridor along the connecting rail spur was characterized for purposes of establishing the local baseline context. In addition, a regional ROI was established for geologic hazards for the purpose of developing a regional framework for seismicity at the installation.

4.6.8.2 Existing and Future Baseline Conditions

Fairchild AFB lies in the eastern portion of the Columbia River Plateau. It is an area of moderate to flat terrain bounded by the Cascade Range to the west and the Rocky Mountains to the east. Pre-Tertiary basement rocks are overlain by Tertiary Columbia River basalt. Glacial and fluvial deposits locally overlie Tertiary units. The installation lies in seismic zone 2 (Uniform Building Code 1985) in which a maximum credible earthquake with a magnitude of 6.1 is the largest predicted for the area. Maximum horizontal acceleration in rock is expected to be less than 0.04 g, with a 90-percent probability of not being exceeded in 50 years (Algermissen et al. 1982). Active faults have not been identified in the local ROI and the area is not susceptible to liquefaction. Areas susceptible to landslides or terrain failure were not discovered in the ROI. Slopes greater than five percent south of the proposed garrison are not prone to terrain failure because of a thin soil cover and shallow depth to bedrock.

Energy and Mineral Resources. No oil, gas, or coal leases/fields have been identified in the ROI. No uranium mines/leases, Known Geothermal Resource Areas, or metallic/nonmetallic mineral resource mining operations or leasing activities exist in the ROI.

Soil Resources. The U.S. Soil Conservation Service (SCS) has mapped 22 soil types in the ROI. Twelve of these soil types occur in areas where program-related facilities may be located. They occur on level to moderately sloping surfaces with some areas identified as steeply sloping. The soils have a loamy texture and range from poorly to well drained. Soil erosion susceptibility was evaluated for wind and sheet erosion. Wind erosion of unvegetated/disturbed ground in the ROI is not a major concern of the SCS in Washington. However, the prevailing northeasterly winter and southwesterly summer wind directions would make northeast-southwest elongated tracts of land susceptible to wind erosion. The proposed garrison and rail spur would be located on soils with a moderate susceptibility to wind erosion. Other facilities would be located on soils with a low to moderate susceptibility to wind erosion. The garrison and other facilities would be located on soils with a low to moderate susceptibility to sheet erosion, while the rail spur would be located on soils with a low to high susceptibility.

4.6.8.3 Impacts of the Proposed Action

Energy and Mineral Resources. No energy or mineral resources have been identified in the ROI. Therefore, impacts on energy and mineral resources are not expected.

Soil Resources. Program-related wind erosion at the proposed garrison, other facilities, and rail spur is primarily projected to occur at a rate of 0.8 ton per acre per year (T/ac/yr). The application of one ton per acre (T/ac) of straw mulch would temporarily reduce the rate of erosion for all soils affected to less than 0.1 T/ac/yr. During garrison construction, soil would also erode at a rate of 2.7 T/ac/yr for large exposed areas of a soil type. The application of one T/ac of straw mulch would temporarily reduce the rates to less than 0.1 T/ac/yr. Program-induced sheet erosion at the proposed garrison site is projected to occur at rates of 6 T/ac/yr to 16.6 T/ac/yr. Soils are projected to erode at rates of 2.4 T/ac/yr to 16.6 T/ac/yr at the other proposed facility sites and along the rail

spur. The application of one T/ac of straw mulch after construction would temporarily reduce the rates of erosion to 0.5 T/ac/yr to 3.3 T/ac/yr for all soils affected. The range of soil erosion rates identified for the Proposed Program (3.2-19.3 T/ac/yr) are comparable to those determined for general urban development (16-156 T/ac/yr) as supplied by the U.S. Department of Housing and Urban Development (1981).

Soil erosion impacts are based on the combined effects of wind and sheet erosion values and how they compare to the maximum tolerable soil loss for each soil type. Soil erosion rates would exceed the maximum tolerable soil loss (2-5 T/ac/yr) of the affected soil types during construction. Program-induced soil erosion is therefore expected to cause short-duration impacts. Long-duration impacts are not expected because accelerated rates of erosion would occur for only a short period of time prior to mulching and reestablishing a vegetative cover in the disturbed areas.

Summary of Impacts. Overall short-duration impacts from the proposed program on the geology and soils resource are expected to be high because accelerated rates of erosion during program-related construction would exceed the maximum tolerable soil loss of the soils affected. Long-duration impacts are expected to be negligible because accelerated erosion rates would not continue into the operations phase of the program. Short-duration impacts would not be significant because increased rates of erosion would not result in an appreciable net loss of topsoil over the short time period under consideration.

4.6.8.4 Impacts of the Alternative Action

The Alternative Action would slightly increase the size of the garrison. Therefore, impacts on the geology and soils resource would be about the same as for the Proposed Action. Consequently, all levels of impact and significance would remain the same as for the Proposed Action. Short-duration impacts would be high and not significant and long-duration impacts would be negligible.

4.6.9 AIR QUALITY

4.6.9.1 Region of Influence

The ROI for the air quality resource includes Fairchild AFB, the cities of Medical Lake and Spokane, and the interstate highways and principal arterials in Spokane County.

4.6.9.2 Existing and Future Baseline Conditions

The area that may be affected by air emissions from the proposed program includes Fairchild AFB and the cities of Medical Lake and Spokane. The area is included in the Eastern Washington-Northern Idaho Interstate Air Quality Control Region (No. 62). There are no Prevention of Significant Deterioration Class I areas within 50 miles of the base.

No particulate matter (PM_{10}) monitoring was conducted at Fairchild AFB. Ambient concentrations of specific pollutants have been monitored at a number of locations in the City of Spokane, 12 miles west of Fairchild AFB. The air quality measurements in Spokane indicate that the maximum 24-hour total suspended particulates (TSP) observation was 358 micrograms per cubic meter ($\mu g/m^3$) at the U.S. Department of Transportation site. The highest annual TSP geometric average was 93 $\mu g/m^3$ and occurred at the Auto Glass Station site. Both 24-hour and annual standards for TSP were exceeded at the stations. The PM_{10} levels were monitored at four sites in Spokane. The Spokane Auto Glass monitoring site, a representative station for the base, recorded a maximum 24-hour average of 119 $\mu g/m^3$ and an annual arithmetic mean of 45 $\mu g/m^3$; both values are within the PM_{10} standards. However, the other PM_{10} monitoring sites showed violations of standards.

The closest nonattainment area from Fairchild AFB is the City of Spokane. A portion of the City of Spokane exceeded the 8-hour carbon monoxide (CO) standard. Vehicle CO emissions are a major source of air pollution in Spokane. The Spokane area has not achieved the federal secondary standard for TSP, and is designated nonattainment for TSP; however, in July 1987, the U.S. Environmental Protection Agency (EPA) replaced the TSP standard with the PM_{10} standard. Monitored PM_{10} data for Spokane are above the standards, thereby classifying the city into a Group I PM_{10} category, which is or presumed to be in noncompliance with the standards. Fairchild AFB is itself in attainment status for all criteria pollutants.

Future air quality onbase will remain good because construction of only recreational facilities is planned.

The Washington Emission Data System (WEDS) provides information in a computer-compatible format to the National Emission Data System (NEDS). The NEDS data are maintained by the EPA. State reporting of WEDS data (e.g., TSP, CO, SO_x [sulfur oxides], NO_x [nitrogen oxides], and VOC [volatile organic compounds, a measure of reactive hydrocarbons]) into NEDS is conducted annually and is provided in Table 4.6.9-1. Major sources of air pollutants in the county include an aluminum plant, lumber mills, gypsum plant, steam generator, grain mills, and a foundry. Other sources of air pollutants within the region include the wood products industry.

4.6.9.3 Impacts of the Proposed Action

Direct air emissions would result from construction of the rail spur line and support facilities and operation of the proposed program at Fairchild AFB. Emission sources associated with construction include light-duty vehicle traffic, diesel trucks, offsite heavy-duty vehicles, diesel construction equipment, and fugitive dust from ground disturbance.

The highest monthly fugitive dust emissions from proposed program construction activity would be about 31 tons. Fugitive dust calculations assume a 50-percent reduction due to watering of the construction sites. All of the fugitive dust emissions at Fairchild AFB were conservatively assumed to be within the 10-micrometer particle size and

Table 4.6.9-1

Spokane County, Washington Air Emissions Inventory, 1987
(tons per year)

Emission Source	TSP	SO_x	NO_x	VOC	CO
Fuel Combustion	3,087	1,169	1,527	6,213	18,850
Industrial Process	0	0	0	6,828	0
Solid Waste Disposal	1,492	43	216	3,108	9,486
Air/Water Transportation	300	47	407	625	2,422
Land Transportation	4,087	854	11,193	8,801	51,076
Miscellaneous	3,850	3	152	784	5,697
Fairchild AFB	34	37	226	725	1,040
TOTAL:	12,850	2,153	13,721	27,084	88,571

Source: U.S. Environmental Protection Agency 1988e.

referenced against the PM_{10} standard for impact analysis. It is expected that actual PM_{10} emissions would be smaller than the emissions calculated under the EPA guidelines for TSP.

Fugitive dust generated at Fairchild AFB for the peak construction year would have short-duration, negligible impacts on air quality. The City of Spokane nonattainment areas would not be affected. A program-related increase of 3.6 $\mu g/m^3$, which includes particulates from combustion products, would occur, increasing the 24-hour background concentration to 122.6 $\mu g/m^3$. The predicted 24-hour fugitive dust background concentration would not equal or exceed the 24-hour National Ambient Air Quality Standard (NAAQS) of 150 $\mu g/m^3$ (PM_{10}). The annual background concentration would increase to 45.6 $\mu g/m^3$, which would not equal or exceed the PM_{10} standards of 50 $\mu g/m^3$. Fugitive dust generated at Fairchild AFB in the peak construction year would have negligible impacts on regional air quality. The EPA-minimum threshold levels for fugitive dust would not be exceeded, and no violation of the NAAQS would occur.

Overall short- and long-duration air quality impacts would be negligible.

4.6.9.4 Impacts of the Alternative Action

The Alternative Action (6 TASs) would cause a 0.3-percent increase in fugitive dust emissions over the Proposed Action. This would result in a total increase of 4 $\mu g/m^3$ above existing background concentrations, increasing the 24-hour average ambient concentration to 123 $\mu g/m^3$. The Alternative Action impacts would be negligible and would not cause any violation of the NAAQS. Overall short- and long-duration air quality impacts would be negligible.

4.6.10 NOISE

4.6.10.1 Region of Influence

The ROI for the noise resource is broadly defined as the area where program-related noise level increases occur. Specifically, the ROI includes Fairchild AFB, the cities of Medical Lake and Spokane, and the interstate highways and principal arterials in Spokane County.

4.6.10.2 Existing and Future Baseline Conditions

There are three major noise sources in the vicinity of Fairchild AFB: vehicular, air, and railroad traffic.

The principal vehicular noise source in the vicinity of Fairchild AFB is the traffic utilizing U.S. Highway 2. Sensitive receptors (residential areas within 200 ft of the highway) experience noise levels of 50 decibels on the A-weighted scale (dBA) to 60 dBA expressed as day-night equivalent sound level (L_{dn}).

Aircraft noise in the vicinity of the City of Spokane and Fairchild AFB is the result of aircraft operations from both Fairchild AFB and Spokane International Airport, which is about five miles east of the base. Noise levels in the vicinity of Fairchild AFB range from 75 dBA to 85 dBA (L_{dn}) and from 70 dBA to 75 dBA (L_{dn}) in the vicinity of the commercial airport. The western portion of the City of Spokane experiences noise levels ranging from 65 dBA to 70 dBA (L_{dn}), while the community of Airway Heights (about 1.5 mi east of the base) experiences noise levels of 75 dBA to 80 dBA (L_{dn}).

The major source of railroad noise in the vicinity of Fairchild AFB is the Burlington Northern Railroad main line and the onbase rail spur line. The estimated noise levels expected are about 60 dBA (L_{dn}) at the onbase residential receptors within 100 feet of the main line and about 55 dBA (L_{dn}) along the rail spur line.

4.6.10.3 Impacts of the Proposed Action

Temporary impacts resulting from construction-related noise would occur within the immediate vicinity of construction sites. The various activities that would take place include construction of industrial structures, the rail spur, and roadways (grading, compacting, and paving); landscaping; and cleanup at Fairchild AFB.

Construction-related noise during rail spur rehabilitation at Fairchild AFB is anticipated to affect the onbase residential area for very short periods. The increase in noise levels would be negligible.

Construction-related noise at Fairchild AFB is not anticipated to affect offbase or base residential areas because such noise levels from point sources attenuate quickly with distance. Potential construction-related noise levels of 80 dBA to 85 dBA at 100 feet from the source within the TAS construction site would be reduced to about 49 dBA at the offbase inhabited areas, which are located about 6,000 feet from the construction location. The noise levels at the base residential area, which is located about 11,700 feet from the TAS construction site, would be 44 dBA. These noise levels would be masked by ambient noise levels of 65 dBA to 70 dBA (L_{dn}). Once construction activity ceases, noise levels would return to near ambient conditions. The short-duration noise impacts from construction activities would be negligible.

During the operations phase, noise would be generated by vehicular traffic and railroad traffic. Additional traffic due to the proposed program would cause an approximately 0.3-dBA (L_{dn}) increase in noise levels at the sensitive receptors (residential areas) within 200 feet of U.S. 2. Offbase training train activities would cause minor, temporary increases in average noise levels on sensitive receptors along the main railroad line. This increase in noise levels would have negligible impact on the sensitive receptors.

Overall, the short- and long-duration noise impacts would be negligible.

4.6.10.4 Impacts of the Alternative Action

The noise levels resulting from the construction of six TASs at the garrison site would be about the same as for the Proposed Program. The short- and long-duration noise impacts at the onbase residential receptors would be negligible.

4.6.11 Impacts of the No Action Alternative

With the No Action Alternative, the Peacekeeper Rail Garrison system would not be deployed. Activities at Fairchild AFB will continue to support other existing or proposed missions. For the host communities in the vicinity of the base, environmental changes would occur as a result of normal community growth. Future baseline conditions reflecting the No Action Alternative were described in earlier portions of this chapter.

4.6.12 Irreversible and Irretrievable Resource Commitments

Deployment of the Peacekeeper Rail Garrison program at Fairchild AFB would result in the irreversible and irretrievable commitments of some human and natural resources. The affected resources are the following:

- The proposed program requires the use of relatively small amounts of labor, materials, energy, and other economic resources during both the construction and operations phases. The local procurement of building materials (such as cement, sand, and gravel) may alter some resource characteristics in the deployment area. Although these economic factors, once used by the proposed program, generally cannot be recovered for other purposes, the extent of their use would be small in comparison to total resource availability.

- Lands utilized for the program facilities will be irreversibly committed for the duration of the program. Such use of land would not cause an irretrievable commitment because the land can be reclaimed through removal of program facilities and implementation of necessary soil rehabilitation.
- Both irreversible and irretrievable commitments would occur if prehistoric sites eligible for the National Register of Historic Places (NRHP) are destroyed or damaged during construction and operations. While data recovery is possible, avoidance is preferred because technological advances in the discipline will permit future researchers to make more effective use of these resources.
- Irreversible and irretrievable commitments would occur if NRHP-eligible historic sites and architectural resources are destroyed during construction and operations.
- Both irreversible and irretrievable commitments would occur if sacred or ceremonial areas are destroyed during construction and operations. Any impact may destroy the importance of a sacred area.
- Disturbed biological communities, given sufficient time, can recover to a state approximating predisturbance conditions once the disturbance ends. However, filling of wetlands represents for all practicable purposes, an irreversible and irretrievable loss of valuable habitat. In addition, creation of new wetland will not fully compensate the impacts because the newly created habitat is unlikely to have the same ecological value as the habitats lost.
- Implementation of the proposed program is expected to cause irreversible and irretrievable resource commitments for the geology and soils resource. Soils would be permanently disturbed at construction and related sites (e.g., borrow pits, roads, buildings, and rail spur) and may be irreparably damaged during the life of the program if disturbed areas are not mulched or revegetated, especially at the garrison location. Aggregate resources would be used for construction of buildings, roads, and rail spurs.

4.6.13 Relationship Between the Local Short-Term Use of Man's Environment and the Maintenance and Enhancement of Long-Term Productivity

Deployment of the Peacekeeper Rail Garrison program at Fairchild AFB would result in the short-term use of some human and natural resources that may affect the maintenance and enhancement of long-term productivity. The affected resources are the following:

- Short-term program-generated disruptions and delays of traffic would result in a decrease in the comfort, convenience, and safety afforded users of primary roads leading to the base. No effect on long-term productivity is expected.
- Additional information gained during program-related surveys of archaeological and historic resources may contribute to the data base and improve man's knowledge of the area's history. This would enhance the management of remaining cultural resources in the region.
- Areas temporarily disturbed by the construction activities would result in short-term losses of biological habitats. However, recovery rates are expected to be relatively fast and no effect on long-term productivity is expected.
- Soil erosion during construction would increase sedimentation to local streams resulting in a short-term deterioration of surface water quality. However, the additional loss of soil would not affect soil productivity or the long-term quality of streams.

- Reductions in air quality levels would result from fugitive dust during construction. However, no long-term reduction in air quality is expected.

4.6.14 Environmental Concerns Associated With a Possible Future Second Rail Connector

A second rail egress from Fairchild AFB could be achieved by providing a southerly rail connector to the main line of the Burlington Northern Railroad (Figure 4.6.14-1). This connection would require the acquisition of about 2.5 acres of land, the construction of 1.4 miles of new track, and the rehabilitation of 7.4 miles of existing short-line track.

Construction costs for this second rail connector would be approximately $6.0 million (1986 dollars) and would require approximately 40 direct construction workers and 85 secondary workers over a 1-year period. Most of these workers would be from the local area, including Spokane County, Washington and Kootenai County, Idaho. Since inmigration of labor for this construction would be minimal, there would be no major concerns for the socioeconomics, utilities, and transportation resources.

The second rail connector would require 0.2 mile of new track offbase between the south base boundary and the existing track. It would pass through mixed open space where no inhabited buildings are located.

Approximately 1.4 miles of new rail line onbase is located near proposed facilities which have been surveyed for cultural resources. No prehistoric resources are in the vicinity and historic homesteads in the area do not appear eligible for the NRHP.

Construction of the second rail connector would affect wetlands and mixed grass and shrublands onbase. Areas of seasonal wetland on the eastern side of the base would be drained and filled to accommodate the new rail spur, resulting in permanent loss of habitat for some wildlife species. Wildlife species in the grass/shrub habitat affected by the rail construction would also experience varying levels of disturbance. A number of state and federally listed threatened and endangered species occur in the vicinity of the base and some of these could be affected by the construction activities.

The short-term water quality effects of constructing the new track are expected to be minor because the nearest water body, Silver Lake, is one mile away and separated from the disturbed area by flat land almost entirely lacking in natural water courses. Little runoff from the construction corridor is likely to reach the lake. A portion of the 7.4 miles of existing rail line that would be upgraded passes within 0.1 mile of Meadow Lake, a medium sized lake. This rail line also closely parallels Minnie Creek, crossing it twice. However, its upgrade would result in only minor land disturbance and should not affect either water feature. Soil erosion rates would slightly increase during construction.

This area is included in the eastern Washington-Northern Idaho Interstate Air Quality Control Region. The closest nonattainment area to Fairchild AFB is the City of Spokane. A portion of the city exceeds the 8-hour carbon monoxide (CO) standard. Monitored PM_{10} data for Spokane are above the standards, thereby classifying the city into a Group I category, which is or is presumed to be in noncompliance with the standards. Fairchild AFB itself is in attainment status for all criteria pollutants. Construction of the second rail connector would cause temporary local increase in fugitive dust and gaseous pollutant emissions. These emissions would not cause any violations in the National Ambient Air Quality Standards.

Existing noise levels along the second rail connector vary from 60 dBA to 70 dBA (L_{dn}). These noise levels are the result of base aircraft operations. A temporary increase in noise levels to receptors in Four Lakes, Washington would result.

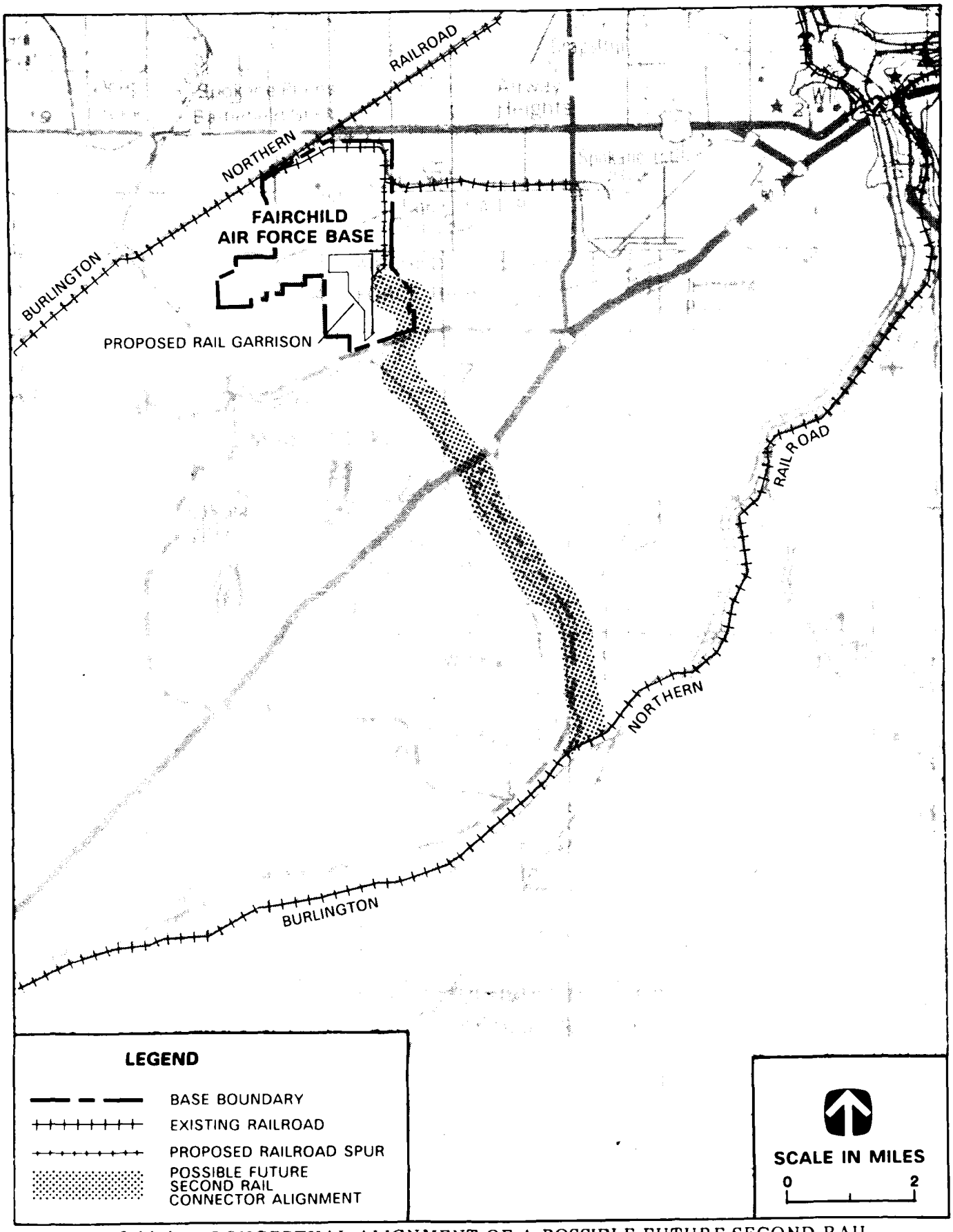


FIGURE 4.6.14-1 CONCEPTUAL ALIGNMENT OF A POSSIBLE FUTURE SECOND RAIL CONNECTOR FOR FAIRCHILD AFB, WASHINGTON

4.7 GRAND FORKS AIR FORCE BASE, NORTH DAKOTA

Grand Forks Air Force Base (AFB), located in Grand Forks County in eastern North Dakota, covers approximately 4,830 acres. The host organizations at this Strategic Air Command base are the 321st Strategic Missile Wing, supporting 150 Minuteman III missiles, and the 319th Bombardment Wing, with B-1B bomber and KC-135A tanker aircraft. The Minuteman III missile launch facilities are dispersed over approximately 7,500 square miles of northeastern North Dakota.

Grand Forks AFB employed 5,352 military personnel (742 officers and 4,610 enlisted), 556 appropriated fund civilian personnel, and 428 other civilian personnel at the end of fiscal year 1987. Approximately 65 percent of the military personnel live on Grand Forks AFB and 35 percent live in communities near the base.

The City of Grand Forks, located approximately 15 miles east of the base, is the host community for Grand Forks AFB (Figure 4.7-1). Most of the personnel living offbase reside in Grand Forks, but some personnel live in East Grand Forks, Minnesota, across the Red River from Grand Forks. In addition, some personnel live in small communities near the base, including Emerado, Arvilla, and Larimore. Grand Forks, located in a predominantly agricultural region, had an estimated 1985 population of 45,752. Grand Forks County had an estimated 1985 population of 68,700. Grand Forks is also a major commercial, trade, and transportation center. Major economic sectors in addition to agriculture include the services, government, manufacturing, and retail sectors. The University of North Dakota (located in Grand Forks), along with Grand Forks AFB, has a major impact on the local economy.

The following sections provide a description of activities associated with the deployment of the Peacekeeper Rail Garrison program at Grand Forks AFB for the Proposed Action (4 Train Alert Shelters [TASs]) and the Alternative Action (6 TASs).

Proposed Action. For the Proposed Action at Grand Forks AFB, the Air Force would construct garrison facilities and provide personnel necessary for the deployment and operation of up to four Peacekeeper missile trains. Approximately $67 million (in 1986 dollars) of construction would occur at the base for the Proposed Action. Construction activities for the purpose of analysis are assumed to begin in 1990 and be completed in 1992, with full operations beginning in 1993. Direct employment requirements would be 89 in 1990, peak at 429 in 1992, and stabilize at 345 during the full operations phase. Peak construction employment of 183 would occur in 1991. Annual direct employment requirements for the Proposed Action are presented in Table 4.7-1 for site activation, construction, assembly and checkout, and operations activities.

The garrison would be located in the southwestern portion of the base (Figure 4.7-1). Seven buildings (including the 4 TASs), roads, utilities, parking, and approximately 1.5 miles of railroad track would be constructed within the garrison. To accommodate the garrison, acquisition of 59 acres adjacent to the western boundary of the base would be required. Acquisition of restrictive easements on 527 acres adjacent to the western boundary of the base would also be required to accommodate the explosive safety zone (Table 4.7-2). Construction of the garrison would disturb approximately 53 acres permanently and 68 acres temporarily (Table 4.7-3).

A 2.3-mile connector rail spur (0.9 mi onbase and 1.4 mi offbase) would be constructed outside the garrison to the Burlington Northern main line south of the base. Approximately 23 acres would be acquired for the offbase portion of the rail spur including a wye where the spur would join the main line (Table 4.7-2). Approximately 12.5 acres would be disturbed permanently and 10 acres temporarily outside the garrison for the connecting spur and wye (Table 4.7-3).

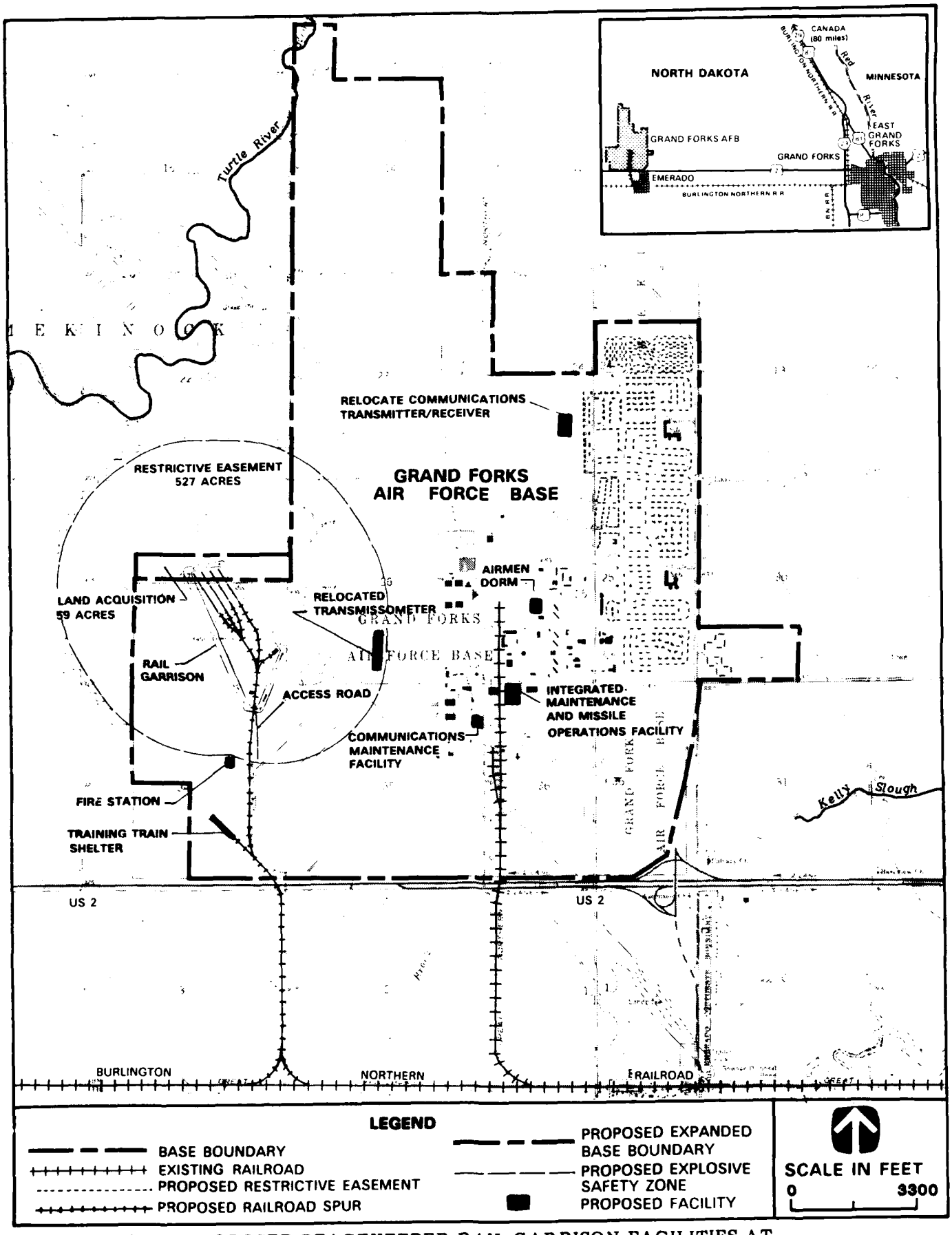


FIGURE 4.7-1 PROPOSED PEACEKEEPER RAIL GARRISON FACILITIES AT GRAND FORKS AFB, NORTH DAKOTA

Table 4.7-1

Annual Direct Employment (Military and Civilian) for the Peacekeeper Rail Garrison Program in the Grand Forks AFB Area by Calendar Year (Full-Time Equivalent Jobs)

	1989	1990	1991	1992	1993[1]
Proposed Action					
Site Activation	1	15	24	11	0
Construction	0	73	183	72	0
Assembly & Checkout	0	1	18	1	0
Operations	0	0	101	345	345
TOTAL:	1	89	326	429	345
Alternative Action					
Site Activation	1	15	24	11	0
Construction	0	91	197	72	0
Assembly & Checkout	0	2	27	2	0
Operations	0	0	111	380	380
TOTAL:	1	108	359	465	380

Note: [1]Employment would continue at these levels for the life of the program.

Table 4.7-2

Offbase Land Acquisition and Easement Requirements Peacekeeper Rail Garrison Program Grand Forks AFB, North Dakota (acres)

	Proposed Action	Alternative Action
Land Acquisition		
Garrison Area	59	96
Rail Spur	23	23
Housing Area	0	0
Relocated Facilities	0	0
TOTAL:	82	119
Restrictive Easements	527	650

Table 4.7-3

**Summary of Area Disturbed by the Peacekeeper Rail Garrison Program
Grand Forks AFB, North Dakota
(Proposed and Alternative Actions)**

Facility Group	Area Disturbed (acres)		
	Permanent	Temporary	Total
Proposed Action			
Garrison Facilities	53.4	67.6	121.0
Rail Spur	12.5	9.8	22.3
Support Facilities	31.2	41.5	72.7
Relocated Facilities	0.7	1.0	1.7
TOTAL:	97.8	119.9	217.7
Alternative Action			
Garrison Facilities	61.5	100.6	162.1
Rail Spur	12.5	9.8	22.3
Support Facilities	31.2	41.6	72.8
Relocated Facilities	0.7	1.0	1.7
TOTAL:	105.9	153.0	258.9

The Proposed Action would require the construction of support facilities with a total floor space of approximately 88,400 square feet. To provide access to the Training Train Shelter, a 0.2-mile rail spur would be constructed from the connector spur (Figure 4.7-1). In addition, about 0.8 mile of new base boundary fencing would be required. Construction of the support facilities, fencing, roads, utilities, and parking would permanently disturb approximately 31 acres and temporarily disturb 42 acres.

The Proposed Action would also require the relocation of several existing base facilities to new locations (Figure 4.7-1). Relocation of these facilities would permanently disturb approximately 0.7 acres and temporarily disturb one acre.

Alternative Action. For the Alternative Action, the Air Force would construct garrison facilities and provide personnel for the deployment and operation of up to six Peacekeeper missile trains. Approximately $80.9 million (in 1986 dollars) of construction would occur at Grand Forks AFB for the Alternative Action. Construction and operations activities are assumed to occur in the same time frame as the Proposed Action. Annual direct employment requirements for the Alternative Action are presented in Table 4.7-1.

The garrison would contain six TASs (instead of 4) and would be constructed in approximately the same location as the Proposed Action (Figure 4.7-2). Nine buildings (including the 6 TASs), roads, utilities, parking, and approximately two miles of track would be constructed within the garrison. To accommodate the garrison, acquisition of 96 acres would be required, 37 acres more than required for the Proposed Action. Acquisition of restrictive easements on an additional 123 acres (total of 650 acres) would be required to accommodate the explosive safety zone (Table 4.7-2). Construction of the six-TAS garrison would disturb approximately 8 additional acres permanently (61.5 acres total) and 33 acres temporarily (100.6 acres total) (Table 4.7-3).

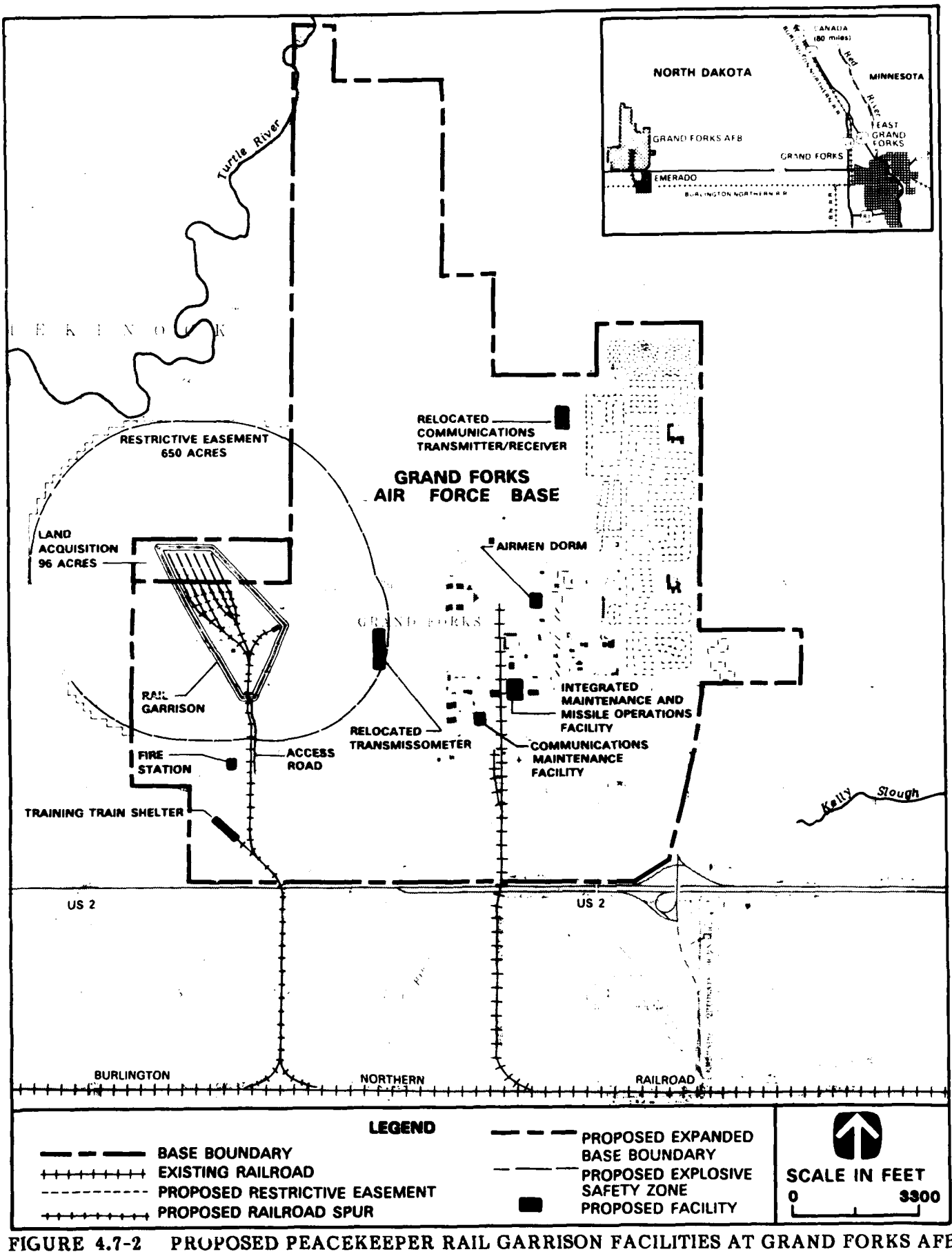


FIGURE 4.7-2 PROPOSED PEACEKEEPER RAIL GARRISON FACILITIES AT GRAND FORKS AFB, NORTH DAKOTA (ALTERNATIVE ACTION)

For the Alternative Action, technical and personnel support facility requirements the rail spur connecting the garrison to the Burlington Northern main line, and the relocation of existing facilities would be similar to the Proposed Action.

Summary of Program Impacts. The Proposed and Alternative Actions at Grand Forks AFB would not result in significant impacts for any resource.

Both short- and long-duration beneficial socioeconomic effects would be generated by the Proposed and Alternative Actions, including increases in employment and income, and greater utilization of temporary and permanent housing.

4.7.1 SOCIOECONOMICS

4.7.1.1 Region of Influence

The Grand Forks AFB Region of Influence (ROI) for the employment and income element includes Grand Forks, Traill, and Walsh counties, North Dakota and Polk County, Minnesota. The ROI for housing are the cities of Grand Forks and East Grand Forks and for the remaining elements includes Grand Forks County and the cities of Grand Forks and East Grand Forks.

4.7.1.2 Existing and Future Baseline Conditions

Employment and Income. Total employment in the ROI increased 3.5 percent, from 64,783 in 1980 to 67,056 in 1984. The services sector experienced the most growth, followed by the government sector. Combined, the government, services, and retail trade sectors accounted for over 66 percent of the total jobs in 1984. The transportation and utilities sector lost 19.5 percent of its jobs from 1980 to 1984, followed by the farm sector with a 9-percent loss. Construction employment was 2,889 in 1984, down slightly from 2,982 registered in 1980.

Total employment in Grand Forks County in 1984 was 37,545, a 6.9-percent increase from the 1980 employment level of 35,117. However, the farm, construction, manufacturing, transportation and utilities, and finance, insurance, and real estate sectors experienced declines in employment. The government sector, with over one-third of the total employment, remained the leading sector, followed by the services and retail trade sectors. In 1984, these three sectors represented 76 percent of the total employment in the county. The total labor force in Polk County in 1985 was 13,513, with a 9.5-percent annual average unemployment rate.

Employment in the ROI is projected to increase to 76,381 in 1990 and to 81,629 in 1995. The ROI unemployment rate is projected to decline from 12.1 percent in 1984 to 11.9 percent in 1990, then increase to 12 percent in 1995.

From 1980 to 1984, total earnings (in 1986 dollars) in the ROI increased from $0.7 billion to $1.1 billion and in Grand Forks County from $446 million to $621 million. Discounting for inflation, these increases in total earnings represented 9.6 percent and 11.3 percent growth, respectively, over the 1980 to 1984 period. Per capita personal income in the ROI increased from $8,129 in 1980 to $11,467 in 1984 and in Grand Forks County from $8,045 in 1980 to $11,060 in 1984.

Total earnings (in 1986 dollars) in the ROI are projected to increase to $1.17 billion in 1990 and $1.25 billion in 1995, from $1.08 billion in 1984.

Per capita personal income (in 1986 dollars) in the ROI is projected at $11,864 for 1990 and $12,013 for 1995, and in Grand Forks County at $11,452 for 1990 and $11,566 for 1995.

Population and Demographics. The population of Grand Forks County in 1985 was estimated at 68,700, a 4-percent increase from the 1980 population of 66,100. The county's population is projected to increase to 75,480 by 1990 and 79,969 by 1995. The City of Grand Forks had a population of 45,752 in 1985, an increase of 1,987 since 1980. The city's population is projected to increase to 48,307 by 1990 and 51,180 by 1995. These projections include 1,004 inmigrants associated with the Over-the-Horizon Backscatter radar program. The 1980 population of East Grand Forks was 8,537, and is projected at 8,422 for 1990 and at 8,473 for 1995. Military personnel and their dependents accounted for 19 percent of the estimated 63,994 population in the Grand Forks area (onbase persons plus Grand Forks and East Grand Forks populations) in 1987.

Housing. The number of permanent year-round housing units in the City of Grand Forks was estimated to be 17,167 in 1980. Total vacancies were estimated to be 1,590 units (9.3%), while available vacancies were estimated to be 1,361 units (7.9%). In 1986, the Grand Forks Urban Development Office estimated that there were 18,554 housing units in the city. Most of this increase was due to the construction of multifamily units which represented approximately 42 percent of all housing in 1986. About 1,073 units were vacant, and 759 (4.1% of the total) of these were available. Grand Forks has 19 hotels/motels with a total of approximately 1,350 rooms. The occupancy rate averages approximately 65 percent, but during the summer and fall can be as high as 95 percent, leaving approximately 70 available rooms.

The number of permanent year-round housing units in the City of East Grand Forks was estimated to be 3,467 units in 1980. Total vacancies numbered 442 units (12.7%) and available vacancies numbered 357 units (10.3%). With the recent decline in population, the number of available vacancies has increased to about 400 units or about 11.5 percent of the total supply.

Grand Forks AFB has a total of 2,277 military family housing units, including 208 two-bedroom, 1,691 three-bedroom, and 378 four-bedroom units. In 1987, the occupancy rate was almost 100 percent, and there were approximately 200 persons on the waiting list. Onbase unaccompanied enlisted personnel housing consists of 1,981 permanent party spaces and 66 transient spaces. These facilities are fully occupied.

It is projected that the permanent year-round housing stock in Grand Forks will have grown to 19,617 by 1990 and to 21,058 by 1995. Available vacancies will number 680 (3.5%) and 740 (3.5%) in those same two years. No new temporary facilities are expected by 1995. In East Grand Forks, the stock of permanent year-round housing units is expected to remain at about 3,470 through the year 1995. Available vacancies will number 398 (11.5%) in the year 1990 and 380 (11.0%) in the year 1995. These projections include the effects of the Over-the-Horizon-Backscatter radar deployment.

Education. Grand Forks School District No. 1 serves the City of Grand Forks and Grand Forks AFB, and had a 1987-88 school year enrollment of approximately 8,800 students. The district operates 12 elementary schools, 4 junior high schools, and 2 senior high schools. Two of the elementary schools are located on Grand Forks AFB and have recently been reorganized into a separate school district. Current overall pupil-to-teacher ratios are 19.2-to-1 at the elementary level, below the weighted average state standard of 27 to 1. Approximately 29 percent of the district's enrollment are dependents of federal employees. Under P.L. 81-874 guidelines, the district is classified as a "Super A" district. Enrollment is projected to increase to about 9,300 for the 1990-91 school year and to 9,860 by the 1995-96 school year, and staffing will increase to maintain existing pupil-to-teacher ratios. Currently, plans are being considered to construct a new elementary school in southwest Grand Forks with an initial capacity for 600 students.

East Grand Forks school district operates three elementary schools, one junior high (7-9), and one high school. Current enrollment is approximately 1,880. The district currently

has a 22.5 to 1 pupil-to-teacher ratio at the elementary level, this is below the state maximum standard of 30 to 1. Enrollment is projected to remain stable.

Public Services. The City of Grand Forks had a total of 378 employees in 1987. The Grand Forks Fire Department has 65 employees located at three fire stations. The Grand Forks Police Department has a total of 82 employees. Overall, the city provides the area with a public service level of 6.9 personnel per 1,000 population. To maintain this level, city staffing would have to increase from 378 to 392 by 1990 and to 412 by 1995. If no additional personnel were hired, the number of city personnel per 1,000 population would drop to 6.7 and 6.3 in those years. Grand Forks County employs 171 people in 30 departments. The Grand Forks County Sheriff's Department has 16 sworn officers. Hospital facilities in Grand Forks include the 325-bed United Hospital and the University of North Dakota Rehabilitation Center. Current county staffing levels provide the area with 2.4 personnel per 1,000 population. To maintain current levels, county staffing would have to increase from 171 to 192 by 1995. If no additional personnel were hired, the number of county personnel per 1,000 population would drop to 2.1.

The City of East Grand Forks employs approximately 75 full-time personnel. The Police Department is staffed by 21 personnel and the Fire Department has 12 employees augmented by 32 volunteers. The city provides residents in the community with 8.9 city personnel per 1,000 population. This level of staffing should be able to accommodate the needs of the community in the near future.

Public Finance. Services provided by the City of Grand Forks are principally funded through the general and special revenue funds. In 1986, expenditures from these funds were $11.7 million with outlays for public safety services accounting for a majority of these expenditures. Revenues in this year totaled $12.2 million. Intergovernmental revenue and property taxes are the principal revenue sources of the city. For the 1990 to 1995 period, expenditures and revenues are projected to be $12.2 million to $12.9 million. The year-end balance of $3.5 million was approximately 30 percent of the city's expenditures from these funds in this year. The city had $5.5 million in bonds outstanding at the end of the year. Net bonded indebtedness totaled $5.2 million, representing 1.1 percent of the city's assessed valuation of $450.2 million. Reserve bonding capacity is estimated at $17.4 million.

Expenditures of Grand Forks Public School District No. 1 were $27.1 million in fiscal year (FY) 1987, representing approximately $3,000 per pupil. Revenues were $26.5 million with property taxes and state-shared revenue accounting for the majority of revenues. Payments from P.L. 81-874 programs are approximately $2 million. For the 1990 to 1995 period, expenditures and revenues are projected to be $27.9 million to $29.6 million. The general fund year-end balance was $7.1 million, representing approximately 26 percent of expenditures in that year.

Revenues and expenditures of Grand Forks County were $9.2 million and $9 million, respectively. Year-end fund balances were $5.5 million, representing approximately 61 percent of expenditures in that year. For the 1990 to 1995 period, revenues and expenditures are projected to be $9.8 million to $10.4 million.

Services provided by East Grand Forks are funded principally through the general and special revenue funds. Expenditures from these funds in 1986 were approximately $4.7 million. Outlays for public safety functions accounted for the majority of expenditures. Revenues in 1986 amounted to approximately $3.9 million. Year-end fund balances amounted to about $2.0 million, representing about 42 percent of expenditures in that year. Over the 1990 to 1995 period, revenues and expenditures are assumed to stabilize at around $4.3 million.

4.7.1.3 Impacts of the Proposed Action

For the Proposed Action, a brief summary of the program-related effects on key socioeconomic indicators is presented in Table 4.7.1-1.

Employment and Income. The Proposed Action would create new jobs ranging from 178 in 1990 to 621 in 1992, and stabilizing at 464 in 1993 and thereafter. During the peak construction year (1991), of the 561 total new jobs, 326 would be direct (235 civilian and 91 military) and 235 would be secondary. All direct and most secondary jobs would occur in Grand Forks County. Local hires would number about 378. During the operations phase (beginning in 1993), direct jobs would number 345 (287 military and 58 civilian), secondary jobs 119, and local hires 136. Of the total baseline jobs in the ROI, the total program-related jobs would range from 0.2 percent in 1990 to 0.8 percent in 1992, and 0.6 percent in 1993 and thereafter.

The with-program unemployment rate would be slightly lower in 1990 and 1991, and higher from 1993 and thereafter than the without-program unemployment rate. The with-program higher unemployment rate would result from an increase in the labor supply from military dependents in the ROI.

The Proposed Action would generate personal income (in 1986 dollars) ranging from $3.9 million in 1990 to $11.7 million in 1991, and stabilizing at $8.4 million in 1993 and thereafter in the ROI. Grand Forks County's share of that income would range from $3.2 million in 1990 to $9.8 million in 1991, and then stabilize at $7.0 million in 1993 and thereafter. Polk County's share of the ROI's personal income would be $0.5 million, $1.4 million, and $1.2 million, respectively. The program-related spending would vary from $4.0 million in 1990 to $11.0 million in 1991, and then stabilize at $6.4 million during the operations phase in the ROI.

Population and Demographics. Program-related inmigration would primarily affect Grand Forks County. The number of inmigrants to the county would range from 84 in 1990 to 816 in 1992, and then stabilize at 741 in 1993 and thereafter. The change in the county population would range from 0.1 percent in 1990 to 1.1 percent in 1992, and 0.9 percent thereafter. Program-related inmigration to Polk County would be limited to 4 in 1990, 116 in 1992, and 113 during operations. The number of weekly commuters would be less than 15 during the construction phase. There would be no weekly commuters during the operations phase.

Of the 885 total inmigrants to the ROI during the operations phase, 75 would live onbase, 667 in the City of Grand Forks, and 113 in East Grand Forks in Polk County.

The inmigration would increase the baseline population of the area (base plus the City of Grand Forks, plus East Grand Forks) by 1.4 percent in 1992 and by 1.3 percent in 1993 and thereafter. However, the number of inmigrants to the City of Grand Forks would constitute only 1.5 percent of the city's baseline population in 1992 and 1.3 percent in 1993 and thereafter. Military personnel and their dependents would still account for 19 percent of the population in the Grand Forks area in 1993.

Housing. Most program-related households would be in privately owned permanent housing units and temporary facilities in Grand Forks and East Grand Forks. The remaining individuals (87 noncommissioned officers and airmen) would be housed onbase in newly constructed unaccompanied enlisted personnel housing facilities.

The offbase program-related housing demand would begin in 1990 when 25 permanent (reducing available vacancies by 1.6%) and 5 temporary facilities (reducing available vacancies by 7.1%) would be required. The peak demand for temporary facilities would occur in 1991. The short-duration demand would be for 20 facilities (28.6% of available vacancies) and would decline to the long-duration demand of 10 facilities (14.3% of

Table 4.7.1-1

Selected Socioeconomic Indicators, Peacekeeper Rail Garrison Program
Grand Forks AFB, North Dakota, 1990-1993
Proposed Action

	1990	1991	1992	1993[1]
Region of Influence				
Employment (Jobs)				
Total Program-Related Jobs	178	561	621	464
Direct Jobs	89	326	429	345
Civilian	83	235	140	58
Military	6	91	289	287
Secondary Jobs	89	235	192	119
Local Hires	142	378	261	136
Program-Related Spending (000s 86$)	$4,022	$11,035	$9,767	$6,418
Personal Income (000s 86$)				
Direct	$ 2,144	$7,322	$8,395	$6,386
Secondary	1,721	4,370	3,414	2,044
Total Personal Income	$3,865	$11,692	$11,809	$8,430
City of Grand Forks[2]				
Population				
Baseline Population	56,787	57,348	57,917	58,491
Program-Related Change	841	421	816	741
Change as % of Baseline	0.1	0.7	1.4	1.3
Housing Demand				
Temporary Units	7	21	17	10
Permanent Units	26	120	225	203
Total Units	33	141	242	213
School District Enrollment				
Elementary	7	34	70	65
Secondary	5	28	58	53
Total Enrollment	12	62	128	118
East Grand Forks				
Population				
Baseline Population	8,422	8,432	8,442	8,453
Program-Related Change	4	42	116	113
Change as % of Baseline	0.0	0.5	1.4	1.3
Housing Demand				
Temporary Units	0	1	2	2
Permanent Units	2	10	30	29
Total Units	2	11	32	31
School District Enrollment				
Elementary	0	3	10	10
Secondary	0	3	8	8
Total Enrollment	0	6	18	18

Notes: [1]Program-related effects would continue at these levels throughout the life of the program.
[2]Includes Grand Forks AFB for population and school enrollment.

available vacancies) by 1993. The peak demand for permanent units would be experienced in 1992. The short-duration demand would be for 225 units (out of 1,098 available or 20.5%) and would decline to the long-duration demand of 205 units (out of 1,108 available or 18.3%) by the following year. The demand for permanent units would decrease the available vacancy rate from 4.8 to 3.8 percent in 1992 and from 4.8 to 3.9 percent during the operations phase.

The short- and long-duration demand for temporary facilities would not cause a shortage even during periods of peak baseline occupancy. Therefore, these demands are considered to be beneficial effects of the proposed program. While the short- and long-duration demand for housing would not remove enough vacant units from the housing stock to cause an overall price escalation, some of the lower ranking military personnel associated with this program would find it difficult to locate suitable affordable housing in Grand Forks and East Grand Forks. Therefore, it is expected that the competition for low-cost housing in the cities would increase and might lead to the use of substandard housing.

Education. Program-related enrollment increases of approximately 120 students are projected for Grand Forks School District No. 1 during the operations phase. These students would be dispersed throughout the district, reducing the possibility of overcrowding at selected schools. The addition of these students to the school district is expected to increase elementary level pupil-to-teacher ratios from 19.2-to-1 to 19.5-to-1. This is still below the weighted average state standard of 27-to-1. The increases in class size are not expected to have a measurable effect on educational service levels in the area. Minor additions to staffing may be needed to accommodate these new pupils.

In addition, it is expected that approximately 20 students will attend schools in the East Grand Forks School District. This increase in enrollments will not increase the pupil-to-teacher ratios from the current levels. This enrollment increase can be easily accommodated with existing staff and facilities.

Public Services. Program-related increases in population would lead to increases in demands for public services provided by the City of Grand Forks of about 1.5 percent over baseline levels in 1993. The increased service demands would be experienced by a majority of the departments now providing service to area residents. To maintain current service levels, as measured by the city's rate of 6.9 personnel per 1,000 population, the city would need 6 additional employees by 1993, increasing city staffing levels from a baseline level of 404 to 410. Most of the additional staffing would be needed in the Police, Fire, and Public Works departments. If no additional personnel were hired, the number of personnel per 1,000 population would drop from 6.9 to 6.8. The reduction in the number of personnel per 1,000 population would not result in an appreciable deterioration from the community's current level of public service provision.

Program-related increases in population would lead to increases in demands for public services provided by Grand Forks County of about 1.1 percent over baseline levels in 1993. To maintain existing service levels, the county would need to hire two additional employees by 1993, increasing county staffing from a baseline level of 188 to 190. Without additional staffing, the number of county personnel per 1,000 population would remain at 2.2. The population increase would not affect the county's ability to deliver public services at current levels to area residents.

Program-related population inmigration into East Grand Forks would lead to minor increases in the demand for public services provided by the city. In order to maintain existing service levels, it is expected that the city would need one additional employee by 1993. Without additional staffing, the number of city personnel per 1,000 population would fall from 8.9 to 8.8, a decline that would not have a measurable effect on public service levels within the community.

Public Finance. Program-related increases in expenditures for the City of Grand Forks and Grand Forks County would be limited to outlays for additional personnel. City expenditure increases would be approximately $170,000 in the peak year and $150,000 during operations. These increases would be about 1.2 percent to 1.3 percent over baseline levels. County expenditure increases would be approximately $50,000 in both the peak year and during operations. These increases would be less than one percent over baseline levels. With reserve funding levels of $11.7 million in the city and $5.5 million in the county, and additional revenues from sales, property taxes, and miscellaneous charges, fines, and fees, existing revenues sources should be able to meet these expected outlays. Expenditure increases in East Grand Forks would be limited to outlays for one additional personnel (less than $30,000). This increase would represent a less than 1-percent increase over projected baseline levels.

Based on an average per pupil cost of $3,000, program-related school district expenditure increases would be approximately $360,000 during operations. This increase would represent about a 1.3-percent increase over projected baseline levels. Because the additional enrollment would be offbase, revenues from P.L. 81-874 programs would be minimal (less than $10,000 during the operations phase). Temporary revenue shortfalls (under $120,000 in 1992) could occur as state foundation program monies lag behind the additional enrollment. Reserve funding levels of approximately $7.1 million should be adequate to cover potential shortfalls. Because the enrollment increases in the East Grand Forks School District could be accommodate with existing staff and facilities, expenditure needs in the district would be minimal.

Summary of Impacts. For the Proposed Action at Grand Forks AFB, short- and long-duration socioeconomic impacts would be low because inmigration would cause population in the Grand Forks area to increase by 1.4 percent over baseline forecasts during the peak inmigration year (1992) and by 1.3 percent during program operations (beginning in 1993). This level of program-induced population growth would result in low impacts on housing, education, public services, and public finance within the Grand Forks area for both the peak and succeeding years. Impacts would not be significant because the increase in demand for housing would be met by available vacancies, existing educational facilities would absorb program-related enrollment increases, no new public service facilities would need to be constructed, and existing revenue sources of the jurisdictions would be adequate to meet program-related expenditures.

Both short- and long-duration beneficial socioeconomic effects would result from the Proposed Action, including an increase in employment and income in the ROI and greater utilization of temporary and permanent housing vacancies within the Grand Forks AFB area.

4.7.1.4 Impacts of the Alternative Action

For the Alternative Action, a brief summary of the program-related effects on key socioeconomic indicators is presented in Table 4.7.1-2.

Employment and Income. Impacts of the Alternative Action on employment and income in the ROI would be higher than for the Proposed Action. During the construction phase, the Alternative Action would create new jobs ranging from 210 in 1990 to 669 in 1992, 32 to 48 more jobs than those created by the Proposed Action. Of the 610 new jobs during the peak construction year (1991), 359 would be direct (260 civilian and 99 military) and 251 would be secondary. The number of local hires would be 409, which is 31 more than for the Proposed Action. During the operations phase, total new jobs created by the Alternative Action would number 511, which is 47 more than those created by the Proposed Action. Of these 511 new jobs, 380 would be direct (64 civilian and 316 military) and 131 would be secondary. Local hires would number 150 or 14 more than local hires for the Proposed Action.

Table 4.7.1-2

Selected Socioeconomic Indicators, Peacekeeper Rail Garrison Program
Grand Forks AFB, North Dakota, 1990-1993
Alternative Action

	1990	1991	1992	1993[1]
Region of Influence				
Employment (Jobs)				
Total Program-Related Jobs	210	610	669	511
Direct Jobs	108	359	465	380
Civilian	102	260	147	64
Military	6	99	318	316
Secondary Jobs	102	251	204	131
Local Hires	169	409	276	150
Program-Related Spending (000s 86$)	$4,677	$11,889	$10,437	$7,069
Personal Income (000s 86$)				
Direct	$ 2,595	$8,097	$9,071	$7,034
Secondary	1,982	4,671	3,627	2,252
Total Personal Income	$4,577	$12,768	$12,698	$9,286
City of Grand Forks[2]				
Population				
Baseline Population	56,787	57,348	57,917	58,491
Program-Related Change	98	466	892	816
Change as % of Baseline	0.2	0.8	1.5	1.4
Housing Demand				
Temporary Units	9	23	18	11
Permanent Units	29	135	246	224
Total Units	38	158	264	235
School District Enrollment				
Elementary	8	37	77	72
Secondary	6	29	63	58
Total Enrollment	14	68	140	130
East Grand Forks				
Population				
Baseline Population	8,422	8,432	8,442	8,453
Program-Related Change	5	46	128	125
Change as % of Baseline	0.1	0.5	1.5	1.5
Housing Demand				
Temporary Units	0	1	2	2
Permanent Units	2	12	33	32
Total Units	2	13	35	34
School District Enrollment				
Elementary	0	4	11	11
Secondary	0	3	9	9
Total Enrollment	0	7	20	20

Notes: [1]Program-related effects would continue at these levels throughout the life of the program.
[2]Includes Grand Forks AFB for population and school enrollment.

During the construction phase, the Alternative Action would generate personal income (in 1986 dollars) ranging from $4.6 million in 1990 to $12.8 million in 1991 in the ROI, $0.7 million to $1.1 million more than generated by the Proposed Action. Grand Forks County's share of that personal income would range from $3.8 million in 1990 to $10.7 million in 1991. During the operations phase, the Alternative Action would generate $9.3 million of personal income for the ROI, $7.7 million of which would go to Grand Forks County. Polk County's share of the ROI's personal income would range from $0.5 million in 1990 to $1.5 million in 1991 and than stabilize at $1.3 million during operations. In the ROI, the program-related spending would range from $4.7 million in 1990 to $11.9 million in 1991, and then stabilize at $7.1 million during the operations phase.

Population and Demographics. In the ROI, the population increase would range from 103 in 1990 to 1,021 in 1992, which is 14 to 88 more persons than for the Proposed Action. During the operations phase, total inmigrants to the ROI would number 941, which is 86 more than for the Proposed Action. During the construction phase, Grand Forks County's share of the inmigration would range from 98 in 1990 to 892 in 1992. Of the 941 total inmigrants during operations, 816 would move to Grand Forks County. These additional inmigrants would raise the total baseline population of the county by 1.0 percent during the operations phase. The Alternative Action would generate inmigration to Polk County ranging from 5 in 1990 to 128 in 1992 and then stabilizing at 125 during operations.

Of the 941 inmigrants moving to the ROI during the operations phase, 80 would live onbase, 736 in the City of Grand Forks, and 125 in East Grand Forks in Polk County. In the Grand Forks area, military personnel and their dependents would be about 19 percent of the population in 1993.

The inmigration would increase the baseline population of the area (base plus the City of Grand Forks plus East Grand Forks) by 1.5 percent in 1992 and by 1.4 percent in 1993 and thereafter.

Housing. The Alternative Action would not change the expected program-related occupancy patterns within two cities. An additional nine unaccompanied military personnel would live in newly constructed unaccompanied enlisted personnel housing.

The initial demand for housing in the area would increase by five permanent units and five temporary facilities in 1990. The short-duration demand for temporary facilities would peak in 1991 at 25 facilities out of an estimated 70 available or 35.7 percent. The added workers would need an additional 20 permanent units in 1992 for a total of 245 (out of 1,098 available or 22.3%), and an additional 20 units during the operations phase (1993 and thereafter) for a total of 225 (out of 1,108 available or 20.3%). This demand would decrease the available vacancy rate from 4.8 percent to 3.7 percent in 1992, and from 4.8 percent to 3.8 percent during operations.

The increased demand for temporary units would still be a beneficial effect of the program. The additional demand for permanent units, especially low-cost units, would further increase the likelihood that substandard units would be used to house lower ranking personnel and may therefore have a negative effect on lower income households.

Education. During the operations phase, the Alternative Action would bring in an additional 15 students above those levels identified for the Proposed Action. The majority of these students are expected to enroll in schools in the Grand Forks School District No. 1. Pupil-to-teacher ratios for both districts would remain essentially the same as those identified for the Proposed Action.

Public Services. The slightly higher population inmigration associated with this alternative would result in slightly higher service demands but would not result in a

measurable increase in city or county personnel levels over what is projected for the Proposed Action. Personnel per 1,000 population rates, for both the city and the county, would not differ from levels identified for the Proposed Action.

Public Finance. Because staffing levels in the local jurisdictions would remain essentially unchanged with this alternative, expenditure increases would not vary greatly from levels estimated for the Proposed Action.

Summary of Impacts. For the Alternative Action at Grand Forks AFB, short- and long-duration socioeconomic impacts would be low because immigration would cause population in the Grand Forks area to increase by 1.5 percent over baseline forecasts during the peak inmigration year (1992) and by 1.4 percent during program operations (beginning in 1993). This level of program-induced population growth would result in low impacts on housing, education, public services, and public finance within the Grand Forks area for both the peak and succeeding years. Impacts would not be significant because the increase in demand for housing would be met by available vacancies, existing educational facilities would absorb program-related enrollment increases, no new public service facilities would need to be constructed, and existing revenue sources of the jurisdictions would be adequate to meet program-related expenditures.

Both short- and long-duration beneficial socioeconomic effects would be generated by the Proposed Action, including an increase in employment and income in the ROI and greater utilization of temporary and permanent housing vacancies within the Grand Forks AFB area.

4.7.2 UTILITIES

4.7.2.1 Region of Influence

The utilities ROI for Grand Forks AFB includes the host communities of Grand Forks, North Dakota and East Grand Forks, Minnesota and the base.

4.7.2.2 Existing and Future Baseline Conditions

Potable Water Treatment and Distribution. The City of Grand Forks supplies potable water for its residents and Grand Forks AFB. Raw water is diverted from Red Lake River and the Red River of the North. In 1987, the average daily potable water demand was seven million gallons per day (MGD) or 78 percent of the existing treatment capacity. An expansion to increase the treatment capacity from 9.0 MGD to 16.5 MGD will be completed by mid-1988. The city has 12 million gallons (MG) of potable water storage which is adequate to handle increased summer demands. Estimated average daily potable water demand for 1990 and 1994 is 7.4 MGD and 7.7 MGD, respectively. The City of East Grand Forks had an average daily potable water demand of 1.25 MGD for 1987. Existing treatment capacity is 4.0 MGD and the city is interconnected with the City of Grand Forks for emergency supplies. Average daily demands for potable water are estimated to increase to 1.26 MGD in 1990 and 1.27 MGD in 1994. The city has a total of 4.1 MG of storage capacity to meet peak summer demands.

Grand Forks AFB has a potable water contract with the city for 2.59 MGD. The onbase average daily potable water demand for 1987 was 1.09 MGD. Water rationing has occasionally been necessary during peak summer periods, but additional water storage is scheduled for late 1988 which will increase the total from 1.4 MG to 1.9 MG, and should help solve this problem. Potable water demands onbase, without the program, are expected to remain constant.

Wastewater. Wastewater from the City of Grand Forks and Grand Forks AFB is treated at separate aerated lagoon systems. The city's average daily wastewater flow for 1987 was six MGD or 92 percent of the lagoon's capacity, and there are plans to increase the

capacity of the city's system. The average daily wastewater flows for 1990 and 1994 are expected to be 6.3 MGD and 6.58 MGD, respectively. The city's lagoon is discharged into the Red River of the North. Wastewater from the City of East Grand Forks is treated in stabilization lagoons with a capacity of 2.0 MGD. Average daily flows are one MGD and discharges to the Red River meet effluent standards. Wastewater flows to the onbase lagoon equal 0.75 MGD and this facility is operating at capacity. The lagoon system is being studied for possible expansion. The base lagoon is discharged into Kelly Slough and the effluent has occasionally exceeded state standards for pH and total suspended solids. The wastewater flows onbase, without the program, are expected to remain constant.

Solid and Hazardous Waste. Solid waste in the City of Grand Forks is collected by the city and private contractors and the City of East Grand Forks contracts with Grand Forks for waste disposal. Solid waste generated by both cities is estimated at 153 tons per day (T/day); it is expected to generate 169 T/day in 1990 and 177 T/day in 1994. Solid waste from Grand Forks AFB is collected by a private contractor. It is estimated that the base generates 33 T/day and this amount is expected to remain constant without the program. The solid waste from the city and the base is disposed of at a landfill operated by the city with an expected lifespan of 20 years.

Onbase hazardous wastes are managed by Grand Forks AFB; the Defense Reutilization and Marketing Office (DRMO) is responsible for providing for the proper handling of the waste and arranging for transport to treatment and disposal facilities. The base stores the waste in a conforming storage facility located near the DRMO. The wastes included sodium chromate, batteries and battery acid, oils, paints, thinners, solvents, and other regulated materials.

Energy Utilities. Northern States Power (NSP) Company provides electricity to a four-state area including customers in the Grand Forks/East Grand Forks area. Peak demand for the entire NSP system in 1986 was 6,012 megawatts (MW), while system capacity was 6,889 MW. Peak demand for the Grand Forks division of the NSP was 135 MW in 1987. The company has adequate capacity to meet existing and future demands. In fiscal year (FY) 1987, Grand Forks AFB purchased 84,477,000 kilowatt-hours from the Nodak Rural Electric Cooperative. The base is served by a 20-megavolt-ampere (MVA) substation, while a 10-MVA substation services the housing area. Peak demands on these substations reached a new high in February 1988 with base demands equaling 9.2 MW and housing demands equaling 9.8 MW. The cooperative obtains its power from the Minnkota Power Cooperative, which also provides power to the base electric boiler plant. Total generating capacity of Minnkota Power Cooperative is 600 MW.

The NSP also provides natural gas to the Grand Forks/East Grand Forks area. In 1986, it sold 71,234 million cubic feet (MMcf) of natural gas, which was the lowest amount in the last five years. Average annual use per customer equaled 122 thousand cubic feet (Mcf). The company has adequate supplies to meet projected demands. In FY 1987, Grand Forks AFB consumed 131,653 Mcf of natural gas to provide heat to the residential portion of the base. The remainder of the cantonment area is heated by the high-temperature hot water heating system. Expansions to the electric boiler plant are currently under consideration because the existing plant is operating near capacity.

Fuel oil for Grand Forks AFB is delivered by truck, while JP-4 fuel is delivered by rail or by a 9-inch transfer line from Grand Forks. Bulk storage for fuel oil is provided by three aboveground tanks with a total storage capacity of 1,820,000 gallons. Bulk storage for JP-4 consists of two storage tanks with a total capacity of 2,310,000 gallons and sixteen 50,000-gallon (total capacity 800,000 gal) tanks for operational storage. Grand Forks uses approximately 32 MG per year of JP-4 fuel.

4.7.2.3 Impacts of the Proposed Action

Potable Water Treatment and Distribution. Average daily requirements for the Grand Forks system would increase from a baseline level of 7.58 MGD to a peak of 7.7 MGD in 1992. Program-related demands for the city and the base would equal 0.13 MGD or a 1.7-percent increase. The city's treatment facilities, with a 16.5-MGD capacity, would be operating at 47 percent and storage would be adequate to meet summer demands. Average daily requirements for the East Grand Forks system would increase from a baseline level of 1.27 MGD to a peak of 1.29 MGD in 1992. Program-related demands would be 0.02 MGD or a 1.4-percent increase. The city's system, with a 4-MGD capacity, would be operating at 32 percent and be able to service the increased demand. Daily requirements at Grand Forks AFB would increase from a baseline level of 1.13 MGD to 1.16 MGD, or 2.7 percent in the same year. Average daily demands would be met through the 2.59-MGD water contract with the city. The existing contract with the city should provide an adequate supply of water, but the capacity of the interconnection and its associated infrastructure would require investigation.

Wastewater. Average daily flows for the City of Grand Forks would increase from a baseline level of 6.43 MGD to a peak of 6.50 MGD in 1992 because of a 0.07-MGD or 1.1-percent program-related increase. The existing lagoon system, with a 6.5-MGD capacity, would be operating at capacity. Additional capacity is currently under consideration and would be available to adequately treat the increased flows. Wastewater flows to the East Grand Forks system would increase from a baseline level of 1.01 MGD to 1.02 MGD in 1992. Program-related flows would be 0.01 MGD or a 1.4-percent increase. The city's treatment system, with a 2-MGD capacity, would be operating at 52 percent and be able to adequately process the increased flow. Wastewater flows at Grand Forks AFB would increase from a baseline level of 0.77 MGD by 0.02 MGD (or 2.8%) to 0.79 MGD in 1992. The existing onbase lagoon system is operating at capacity and no expansions or upgrades are scheduled prior to 1992. While the program-related increase is relatively small, it may increase the frequency of effluent standard violations. The base will continue monitoring the quality of its effluent and if necessary implement changes in operational procedures and/or upgrade the wastewater treatment system.

Solid and Hazardous Waste. Solid waste generation would increase by 3.3 T/day or less than two percent for both cities and Grand Forks AFB in 1992. Solid waste generation onbase would increase by 0.3 T/day or one percent in 1992 (the peak year). With the city and private haulers already adequately disposing of 200 T/day, the program-related increase would require no additional equipment or personnel. The city's landfill has a projected lifespan of 20 years and would be able to handle the increased flow without a discernible effect on their lifespan. Program-related hazardous waste generation onbase would be incorporated into the existing management system, stored onbase, and then transported out-of-state to treatment and disposal facilities.

Energy Utilities. Program-related electricity demands for the Grand Forks/East Grand Forks area would peak in 1992 with an increase of 0.5 MW. This demand would increase the projected peak demand of 143 MW for the NSP system by 0.35 percent. The NSP system has adequate power supplies to meet this increase. Electrical requirements at Grand Forks AFB would increase by 2.9 MW to 21.3 MW in 1993. The collective capacity of the base substations is 30 megavolt-amperes and this should be adequate to handle the increased demand. Nodak Rural Electric Cooperative supplies electricity onbase and has adequate supplies to meet the increases. Natural gas consumption in the region would increase by 38.7 MMcf or 0.5 percent. The NSP has an adequate infrastructure and reserves to meet the new demand. Natural gas use onbase would increase from a projected demand of 132 MMcf to 137 MMcf, or by 4.08 percent. The NSP has adequate capacity to supply the base. Diesel fuel consumption at Grand Forks AFB would increase as a result of the program. Supplies would continue to be filled by the Defense Fuels Supply Center through contracts with local and regional suppliers.

Summary of Impacts. Utility requirements associated with the Peacekeeper Rail Garrison program would increase demands on the utility systems of the cities of Grand Forks and East Grand Forks by less than two percent in 1992 (the peak year). During the operations phase, the increases would be reduced slightly, but would remain above one percent. Both peak year and operations requirements on energy utilities providing service to both cities would be less than one percent. Because the peak year requirements would not be substantially greater than the impacts associated with the operations requirements, all utility impacts would be of long duration. The long-duration impacts associated with increased demand for utility service in the cities of Grand Forks and East Grand Forks would be low because the increases are greater than one percent. These impacts would not be significant because each utility system has or is developing adequate capacity to meet the new demands.

4.7.2.4 Impacts of the Alternative Action

Potable Water Treatment and Distribution. With the additional construction associated with six Train Alert Shelters (TASs) and the operations personnel to support the program, potable water requirements would be 0.15 MGD, which is 0.02 MGD greater than the Proposed Action. Adequate capacity is available in the City of Grand Forks treatment and distribution system to process the additional demand. Program-related demands for the City of East Grand Forks would remain at 0.02 MGD. Revisions to the existing contract between the base and Grand Forks would have to be considered.

Wastewater. Program-related flows to the City of Grand Forks treatment plant would peak in 1992 at 0.09 MGD, which is 0.02 MGD greater than the flows identified for the Proposed Action. Program-related flows to the City of East Grand Forks' system would be 0.02 MGD, which is 0.01 MGD greater than the Proposed Action. Grand Forks AFB program-related flows would peak in the same year at 0.02 MGD, which is the same as the Proposed Action. The requirement on the city's system would slightly increase the baseline capacity problem.

Solid and Hazardous Waste. Solid waste generation from the increased construction and operations activities of the Alternative Action would be slightly greater than for the Proposed Action. Solid waste generation for both the cities and base would be 0.4 T/day greater during the construction and operations phases. These increases would not adversely affect city or private haulers. Adequate landfill space would continue to be available. Hazardous waste generation would be slightly greater than the Proposed Action as a result of the maintenance activities associated with the additional trains. These wastes would be incorporated into the existing management system and transported to treatment and disposal facilities.

Energy Utilities. Demands for electricity in Grand Forks/East Grand Forks would be 0.05 MW greater for the Alternative Action than the Proposed Action. The current generation and transmission system of the NSP has adequate capacity to meet the increased demands. Onbase electricity demands would be 0.6 MW greater than the Proposed Action. Nodak has adequate supplies to meet the demand. Demands for natural gas would be 3.8 MMcf greater for the Alternative Action than the Proposed Action. The NSP has an adequate infrastructure and reserves to meet these increased demands. Diesel fuel consumption would be greater than the Proposed Action. Supplies would continue to be filled by the Defense Fuels Supply Center through contracts with local and regional suppliers.

Summary of Impacts. Utility requirements associated with the Alternative Action would be slightly greater than those identified for the Proposed Action. Because the peak year requirements would not be substantially greater than the impacts associated with the operations requirements, all utility impacts would be of long-duration. These impacts would remain low because the increases would be approximately two percent. Impacts would not be significant because each utility system has or is developing adequate capacity to meet the new demands.

4.7.3 TRANSPORTATION

4.7.3.1 Region of Influence

The ROI for transportation includes the principal city streets in Grand Forks, North Dakota and East Grand Forks, Minnesota and the primary highways leading to Grand Forks AFB.

4.7.3.2 Existing and Future Baseline Conditions

The principal city streets in Grand Forks consist of segments of the primary highways that pass through the city. Washington Street, part of U.S. 81, had segments with an average annual daily traffic (AADT) ranging between 19,000 to 33,300 within the central business district (CBD) in 1985. Gateway Drive, part of U.S. 2, had an AADT of 17,400 to 24,600 within the CBD. The divided section of U.S. 2, within the city limits, had an AADT of 13,400 to 19,200. The other principal city streets include Demers Avenue, which had an AADT of 10,100 to 23,250; 32nd Avenue South, which had an AADT of 6,700 to 11,200; and North 5th Street, which had an AADT of 6,400 to 8,200 in 1985. Interstate 29, which passes north-south on the west side of the city, had an AADT of 8,000 in 1985. U.S. 2, through East Grand Forks, had an AADT of 4,000.

Current level of service (LOS) ratings at these principal city streets vary from free-flowing to unstable flow conditions. Traffic flow along sections of Washington Street were rated at LOS C and D during the peak hours in 1985. (Refer to Section 3.4.4 and Table 3.4.4-1 for descriptions of LOS letter scores.) Along Gateway Drive, the LOS was rated at B to D. Sections of U.S. 2 were providing service at LOS A and B, and sections of Demers Avenue at LOS A to C. The other principal city streets in Grand Forks and East Grand Forks were providing service at LOS A. Based on population projections for the city, including the Over-the-Horizon-Backscatter radar program at Grand Forks AFB, traffic volumes on these principal streets are expected to increase slightly and the resulting LOS ratings would remain the same, or at most drop by one level (along Washington Street) by 1994.

The primary access to the base is provided by east-west highway U.S. 2, which borders the south side of the base. An AADT of 9,400 was estimated in 1985 on this section of U.S. 2 between the City of Grand Forks and the base. Traffic flow was rated at LOS A during the peak hours in 1985. The main gate is located at Eielson Road, which is accessible from U.S. 2. Traffic flow along the main gate is free-flowing except for short delays occurring during the morning and evening rush hours. The LOS is rated at A.

4.7.3.3 Impacts of the Proposed Action

During the construction phase, an increase in incoming vehicular traffic would occur as a result of the movement of construction workers, materials, and equipment. Construction activities would require an estimated 429 program-related personnel during the peak employment year (1992). Of these, 105 program-related employees would reside in Grand Forks and East Grand Forks and commute daily to the base. They would generate an additional 95 passenger vehicle trips to the base during the peak hours in 1992. This increase in traffic would add to delays and queues at the main gate of Grand Forks AFB. Additional heavy-vehicle trips to the base would also increase traffic volumes at the gate. However, these movements could occur during off-peak hours and would not cause additional delays at the main gate during the rush hours. Program-related commuters would not increase congestion along the principal city streets in Grand Forks and East Grand Forks during the peak hours. However, traffic would increase along U.S. 2, which leads to the base, but without reducing the LOS rating of A.

During the operations phase, an estimated 72 out of the 345 program-related employees would reside in Grand Forks and East Grand Forks. They are expected to add 65 passenger vehicle trips to the base and would slightly increase vehicular traffic along U.S. 2 without reducing the LOS rating. Operations personnel commuting from Grand Forks and East Grand Forks would not increase congestion or delays along the principal city streets. Increased queues and waiting times would also occur at the entrance gate. In addition, occasional program-related deliveries of supplies and equipment could also increase traffic volumes at the gates. However, deliveries are expected to occur during off-peak hours and could use other access routes to the base.

Interruptions to vehicular flow along U.S. 2 where the connector spur crosses would also occur. The trains would only move out of the garrison when major maintenance or repair necessitates that they be transported to the Main Operating Base or depot facilities, or when directed to disperse during times of national need. In addition, a training train would travel periodically to the garrison installation to accomplish operations, security, and maintenance training. These train interruptions at railroad/road crossings would not substantially delay vehicular traffic.

Both short- and long-duration impacts on transportation would be negligible because the LOS rating along U.S. 2, which leads to the base, would not be reduced below A. Employees commuting from Grand Forks and East Grand Forks would also not cause a reduction in LOS rating along the principal city streets.

4.7.3.4 Impacts of the Alternative Action

Compared to the Proposed Action (4 TASs), the Alternative Action (6 TASs) would require slightly more program-related personnel. During the construction phase, an estimated 465 program-related personnel would be needed by 1992 (the peak employment year). Of these employees, 112 are expected to reside in Grand Forks and East Grand Forks. They are estimated to add 102 passenger vehicle trips to the base during the peak hours in 1992. They would also increase delays and queues at the entrance gate as with the Proposed Action. The LOS rating along U.S. 2 would not be reduced below A. Program-related personnel commuting from Grand Forks and East Grand Forks would not reduce the LOS ratings along the principal city streets.

During the operations phase, an estimated 80 out of 380 program-related personnel may reside in Grand Forks and East Grand Forks. They are expected to generate 72 passenger vehicle trips (7 more than that for the Proposed Action) to the base during the peak hours and would cause additional congestion along U.S. 2 and the main gate. However, the increase in vehicular traffic along U.S. 2 would not reduce the LOS below A. Peacekeeper and training train impacts on vehicular traffic at road crossings would be about the same as the Proposed Action.

Commuting associated with the Alternative Action would be slightly greater than for the Proposed Action. However, both short- and long-duration impacts on transportation would still be negligible because the LOS rating along U.S. 2 and the main gate would not change. The LOS ratings along the principal city streets in Grand Forks and East Grand Forks would also not change.

4.7.4 LAND USE

4.7.4.1 Region of Influence

The land use ROI includes Grand Forks AFB, adjacent private lands located northwest and west of the affected areas of the base, and a connector spur corridor approximately 1.3 miles long (offbase). The corridor would be located on private land and extends south from the base to the main line of the Burlington Northern (BN) Railroad.

4.7.4.2 Existing and Future Baseline Conditions

Grand Forks AFB is located in the unincorporated area of Grand Forks County, west of the City of Grand Forks. The county has adopted a comprehensive plan but has no zoning ordinance. The comprehensive plan indicates agricultural uses for all areas around the base.

Figure 4.7.4-1 presents a generalized overview of land use onbase and in the surrounding areas. The primary land uses for public and private lands are military (associated with Grand Forks AFB) and rural. The cultivation of spring wheat, barley, and sunflowers occurs on nonirrigated private cropland. Hay is grown on nonirrigated cropland onbase, west of the flightline. The University of North Dakota owns formerly cultivated land west of the base, which is used for research purposes. The land consists of a mixture of grassland, shrubs, and some trees. The soils within the ROI have been classified by the U.S. Soil Conservation Service as being prime farmland or farmland of statewide importance.

The rural land outside the base is characterized by low-density farmland with farmsteads generally scattered along the local roadways, Turtle River, and BN Railroad. The small Town of Emerado is the only nearby urbanized area and is located about 1.5 miles east of the base.

Offbase, the ROI contains one 69-kilovolt high-voltage transmission line, parallel with U.S. 2 south of the base; five low-voltage electrical distribution lines; two underground cable telephone lines; and one railroad communications line. The ROI also contains four county roads and U.S. 2, a four-lane highway.

The visual attributes of the ROI are typical of the northern portion of the Central Lowlands Physiographic Province. The area has flat to very gently rolling terrain. While the original native vegetation was mixed grasslands, most of the area is now cultivated. Trees and shrubs are found only in riparian areas. Landscape forms are flat to gently undulating, and lines are horizontal. Colors are mostly light green and gold, with dark browns and white in winter. Textures are smooth to medium and well ordered. Existing onbase facilities appear very low on the horizon north of U.S. 2 (AADT 8,800), the key observation point for Grand Forks AFB. More obvious onbase are aircraft parked on the alert area about 1,000 feet north of U.S. 2, about one mile west of the base main gate. There are no offbase structures along U.S. 2 in the vicinity of the base.

4.7.4.3 Impacts of the Proposed Action

The garrison would be located in the west-central portion of Grand Forks AFB. The program would require the expansion of the base westward to include approximately 60 acres of nonirrigated cropland to be acquired in fee simple. The land is currently utilized as nonirrigated agriculture and is used to cultivate sunflowers. About 47 acres of this area are designated prime farmland. Base expansion would be compatible with the Grand Forks County comprehensive plan. The proposed program would also require the acquisition of approximately 525 acres of restrictive easement west of the base. No inhabited buildings are located on this easement. The easement would not adversely affect the existing agricultural uses but would preclude new habitable buildings for the duration of the program. The 1.3-mile connector spur and wye would require the acquisition of approximately 23 acres of nonirrigated cropland, about 8 acres of which is prime farmland. The program would require the relocation of the existing communication transmitter/receiver and the transmissiometer.

The TASs are proposed to be located about 4,000 feet from U.S. 2, the key observation point, and would not be noticeable to highway users at that distance. The proposed Training Train Shelter (TTS), however, would be located on the southwestern corner of the base, about 1,200 feet from U.S. 2 with no intervening vegetation, structures, or

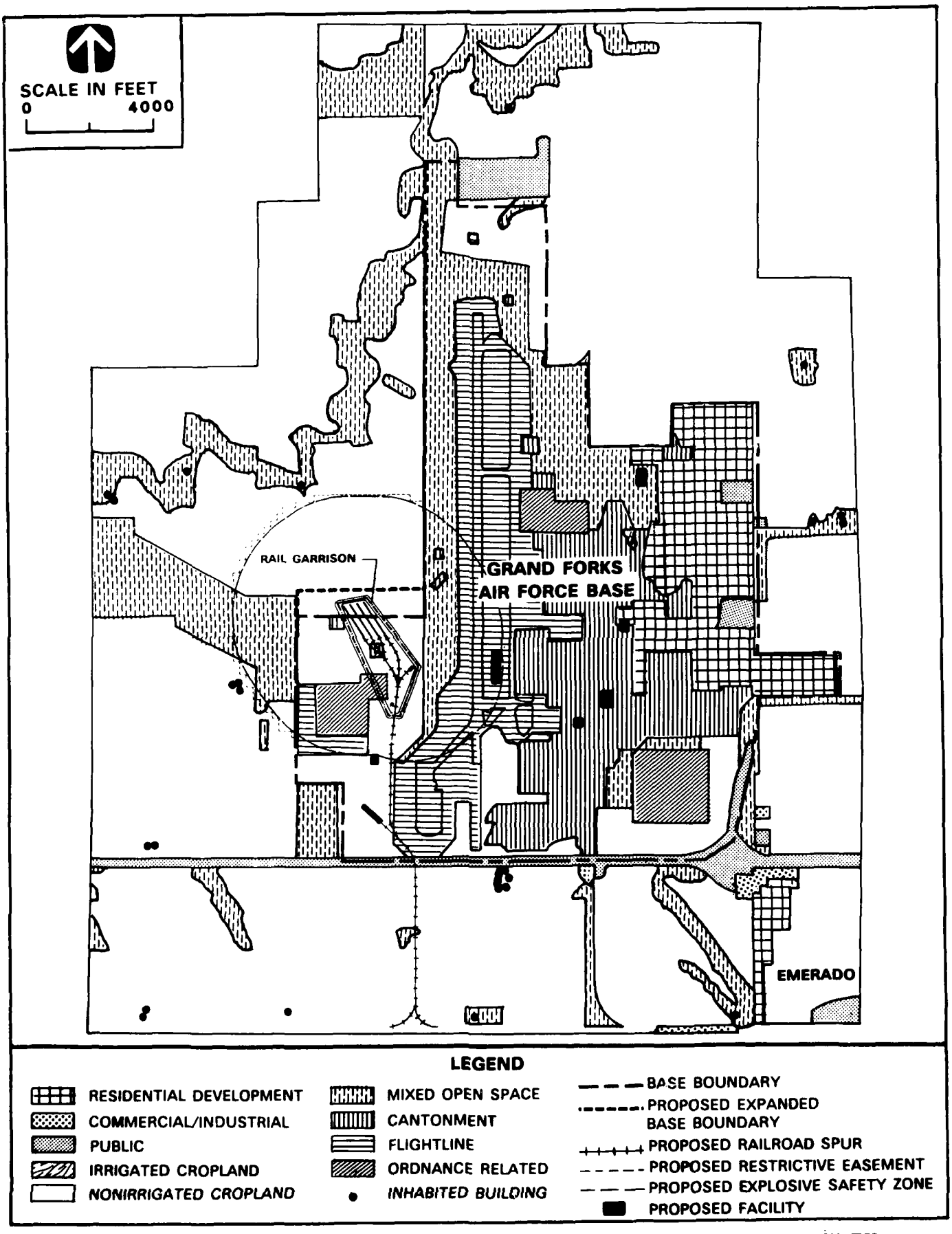


FIGURE 4.7.4-1 LAND USE AT GRAND FORKS AFB, NORTH DAKOTA AND VICINITY

terrain. That building would be 800 feet long and 30 feet high. At 1,200 feet, the TTS would be obvious to highway users, but because of its proximity to smaller but similar buildings in the same onbase area, contrasts would be low and are not expected to be objectionable.

Summary of Impacts. The proposed base expansion and connector spur acquisition would remove about 80 acres of nonirrigated cropland, or 0.01 percent of the Grand Forks County inventory of that type of land use. The use of about 55 acres of prime farmland is also about 0.01 percent of that resource. No inhabited buildings would need to be relocated. The proposed location and size of the TTS would make it noticeable to users of U.S. 2 but not objectionable. Therefore, the short- and long-duration impacts of the program on land use at Grand Forks AFB would be low. Impacts would not be significant because no inhabited buildings would require relocation and visual impacts are not projected to be objectionable to viewers using U.S. 2.

4.7.4.4 Impacts of the Alternative Action

Impacts of the Alternative Action at Grand Forks AFB would be about the same as for the Proposed Action except that the restrictive easement would be 650 acres. In addition, land acquisition would be about 95 acres for the garrison and 23 acres for the connector spur; about 80 acres of this area is designated prime farmland. No inhabited buildings would require relocation. The view of the TTS would be noticeable but is not expected to be objectionable to users of U.S. 2. Therefore, the short- and long-duration impacts on land use would be low. Impacts would not be significant.

4.7.5 CULTURAL RESOURCES

4.7.5.1 Region of Influence

The ROI for Grand Forks AFB consists of that portion of the Red River Valley in North Dakota and Minnesota between the Park and Goose rivers. The eastern and western boundaries are the valley margins formed by the Pembina Escarpment in North Dakota and the Eskine and Holt moraines in Minnesota. Major tributaries consist of the Park, Forest, Turtle, Goose, Sand Hill, and Snake rivers. This region is characterized by resource types similar to those expected to occur near Grand Forks AFB.

4.7.5.2 Existing and Future Baseline Conditions

Prehistoric Resources. Several small cultural resource surveys recently conducted along the beachstrand areas four miles west of the base resulted in the documentation of two lithic scatters and one site associated with burial mounds. Studies along the Red River Valley indicate the presence of buried prehistoric materials in spite of a lack of surface indications. Some cultural resources in North Dakota have not been fully documented and are considered site leads by the State Historic Preservation Officer (SHPO). The North Dakota state site files list 8 prehistoric sites and 13 prehistoric site leads within six to eight miles of the base. Nine of the 21 prehistoric resources are listed as mounds.

The prehistoric resources most often recorded in the area are Woodland period burial mounds (A.D. 500-A.D. 900). The Arvilla Complex is characterized by linear and circular mounds, and both primary and secondary inhumation. Utilitarian and ornamental grave goods (including shell beads and gorgets, eagle talons, and bear claws and incisors) are commonly included in the burials. The type site for the Arvilla Complex is located three miles west of Grand Forks AFB on the Turtle River. This site consists of three low mounds containing several hundred burials. Few habitation sites have been identified in association with the burial mounds. Archaeological survey has been initiated in proposed impact areas at the base, but no cultural resources have yet been identified.

Historic Resources. Historic resources recorded in the study area consist mainly of structures such as churches, schools, farmsteads, barns, townsites, and post offices. Ten historic sites and 19 historic site leads are recorded in the North Dakota state site files. All ten documented historic sites are churches, most of which are small town or rural clapboard churches built in the early twentieth century. Most historic sites have not received detailed evaluation of their eligibility for the National Register of Historic Places. No military structures onbase are expected to be considered eligible because the base was constructed within the last 35 years.

Native American Resources. Native American groups traditionally associated with the Red River Valley include the Cheyenne, the Yanktonai Dakota, and the Metis. Two Native American sites have been identified about 70 miles west of the base, near Devils Lake; however, no sites have yet been identified near Grand Forks AFB.

Paleontological Resources. Paleontological resources identified in the study area represent flora and fauna deposited in lagoons adjacent to Glacial Lake Agassiz during the late Pleistocene and early Holocene. A narrow stratum (10 inches thick) of fossiliferous sediments containing freshwater gastropods and pelecypods has been identified in Turtle River State Park, three miles west of Grand Forks AFB. This deposit is located six feet below the Campbell beach sand. At least seven invertebrate fossil localities and four plant fossil outcrops have been recorded as site leads in the SHPO files. According to those records, at least two localities are onbase, but they may occur at a depth of 50 feet. They are reportedly in the southeastern portion of the base outside the proposed program area.

4.7.5.3 Impacts of the Proposed Action

Program impact areas consist of 217.7 acres of new and relocated facilities, fee acquisition lands, and new railroad spurs. The majority of the area to be affected occurs along the southwestern portion of the base, west of the flightline.

Prehistoric Resources. The most sensitive areas for prehistoric resources onbase occur north of the flightline in areas adjacent to the Turtle River; however, no program-related disturbance would occur in this area.

Historic Resources. No historic resources have been identified adjacent to the base and existing military structures are too recent to be considered important for their historical context or architectural integrity.

Native American Resources. No Native American resources have been identified near Grand Forks AFB. Consultations are being undertaken with Native American groups in the region, but it is not anticipated that sensitive areas would be identified onbase.

Paleontological Resources. Glacial deposits cover the base to a depth of 50 feet. Two paleontological site leads were recorded onbase at depth and the fossiliferous deposits would not be affected by the proposed construction.

Summary of Impacts. Long-duration impacts on cultural resources as a result of the Proposed Action are considered negligible because no important or sensitive resources are likely to be affected. No short-duration impacts would occur.

4.7.5.4 Impacts of the Alternative Action

Ground disturbance from the Alternative Action would be similar to the Proposed Action except that an additional 41.1 acres would be acquired for the garrison. Long-duration impacts on cultural and paleontological resources as a result of the Alternative Action would be negligible. No short-duration impacts would occur.

4.7.6 BIOLOGICAL RESOURCES

4.7.6.1 Region of Influence

The ROI for biological resources at Grand Forks AFB is defined as the areas where these resources would be directly affected by the construction of new facilities onbase and 1.4 miles of rail spur offbase (Section 4.7, Figure 4.7-1). Areas of indirect disturbance in the ROI where program-induced impacts may occur are defined as those recreational areas within an approximately 1-hour driving time of Grand Forks, North Dakota, and include the Turtle and Red rivers, Kellys Slough and Ardoch national wildlife refuges, and Turtle River State Park.

4.7.6.2 Existing and Future Baseline Conditions

Biological Habitats. Native grassland species (e.g., big bluestem, switchgrass, Indian grass, dropseed, needlegrass, and sideoats grama) were dominant in eastern North Dakota prior to settlement and the introduction of agriculture. Grand Forks AFB has undergone extensive development; consequently, very little native vegetation exists onbase. Introduced tree species such as Russian olive, spruce, and juniper occur throughout the base in windbreaks and landscaping. Several small prairie potholes supporting nonforested wetlands also occur onbase. These seasonal wetlands provide important habitat for waterfowl. The majority of the area surrounding the base has been converted to agriculture (Figure 4.7.6-1). The area within one mile of the base supports cropland, native grassland, and prairie pothole wetlands. Wildlife species occurring in the habitats onbase and in the surrounding area include the red fox, white-tailed jackrabbit, white-footed mice, Richardson's and thirteen-lined ground squirrels, and numerous bird species. Future baseline conditions onbase are expected to be similar to existing conditions based on current base management plans.

The remaining ROI includes agricultural land, native grasslands, prairie potholes, and riparian woodlands along rivers and streams. Major rivers in the region include the Red and Turtle, which support important wetland and fisheries resources. Riparian habitats along these two rivers also provide habitat for numerous species of birds, mammals, amphibians, and reptiles. The many potholes that occur in the ROI are part of the Central Flyway and provide important habitat for waterfowl. Other unique and sensitive areas that occur in the ROI include Kellys Slough, Ardoch, and Hobart Lake national wildlife refuges; the Prairie Chicken State Game Management Area; and numerous national wildlife production areas. The primary recreational areas in the ROI include Turtle River State Park, the Red and Turtle rivers, and the national wildlife refuges in the region. Future baseline conditions would be similar to existing conditions based on projections for population increases and increased recreational use in the ROI.

Threatened and Endangered Species. No threatened, endangered, federal-candidate, or state-sensitive species are known to occur on Grand Forks AFB. Several federally listed threatened and endangered species, federal-candidate species, and state-sensitive species occur in the ROI (Table 4.7.6-1). Suitable habitats for these species do not occur in areas proposed for construction.

4.7.6.3 Impacts of the Proposed Action

Biological Habitats. A total of 217.7 acres of land on Grand Forks AFB would be disturbed as a result of the Peacekeeper Rail Garrison Program; 97.8 acres permanently and 119.9 acres temporarily. Of the total acreage that would be disturbed, 182.7 acres are in agricultural use, 6.8 acres support grassland habitat, and 0.7 acre supports nonforested wetlands (Table 4.7.6-2). Construction of garrison facilities would potentially result in the destruction of plants and plant cover, increased small mammal mortality, disruption of wildlife daily/seasonal behavior, and minor displacement of wildlife. However, most of the area that would be disturbed is in agricultural use and

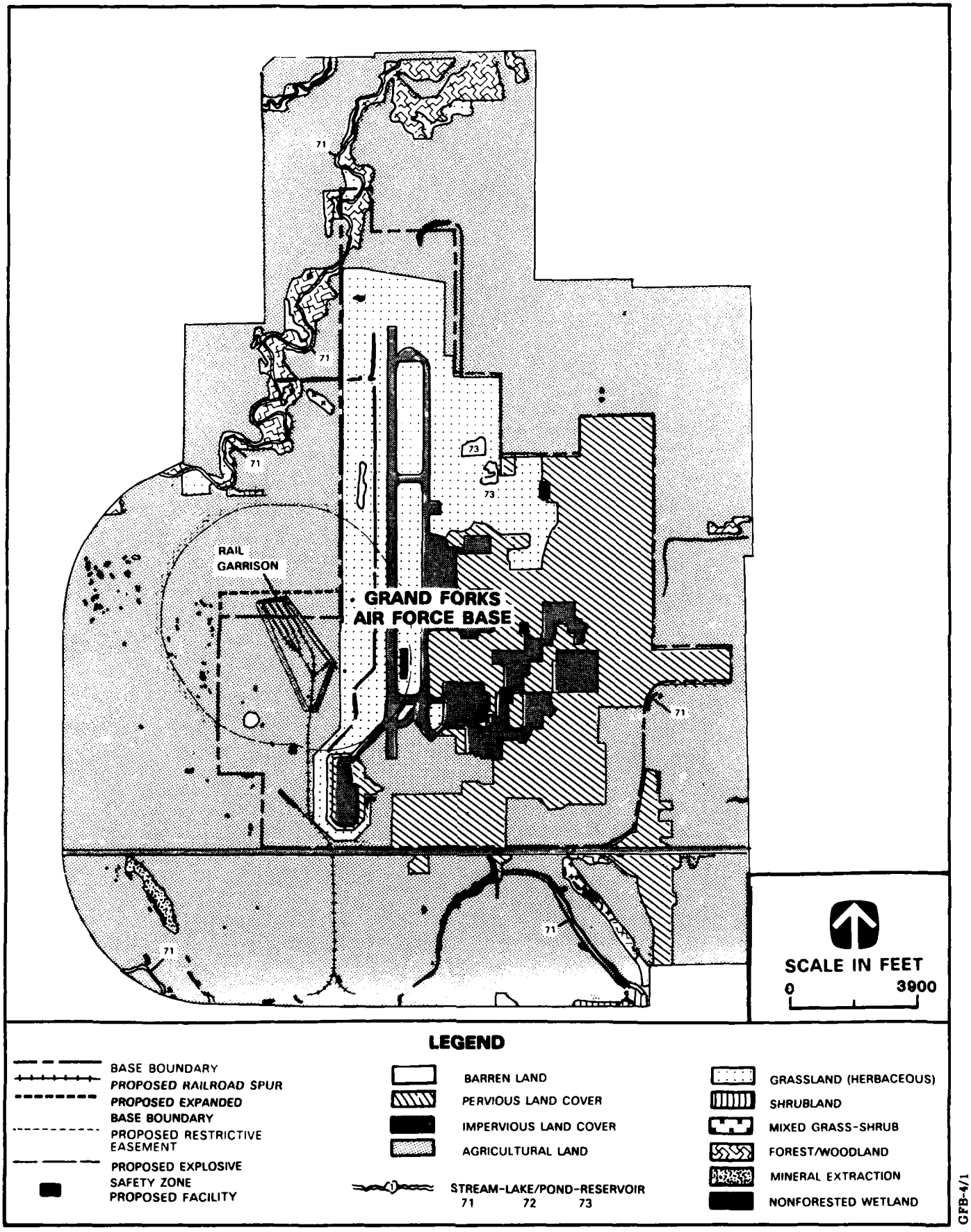


FIGURE 4.7.6-1 HABITAT AND LAND COVER TYPES AND POTENTIAL DISTURBANCE AREAS ON GRAND FORKS AFB, NORTH DAKOTA AND IN THE VICINITY

Table 4.7.6-1

Federally Listed, Federal-Candidate, and State-Sensitive Species Grand Forks AFB, North Dakota and Vicinity

Common Name	Scientific Name	Federal Status	State Status	Distribution
Bald eagle	Haliaeetus leucocephalus	E	E	May occur in region as migrant
Ferruginous hawk	Buteo regalis	2	-	Occurs in region
Golden eagle	Aquila chrysaetos		T	Occurs in region
Greater prairie chicken	Tympanuchus cupido	-	T	May occur in region
Long-billed curlew	Numenius americanus	2	T	Occurs in region
Merlin	Falco columbarius	-	E	May occur in region as migrant
Northern swift fox	Vulpes velox hebes	E	E	May occur in region
Peregrine falcon	Falco peregrinus	E	E	May occur in region
Prairie falcon	Falco mexicanus	-	T	May occur in region as migrant
Sagebrush lizard	Sceloporus graciosus	-	P	May occur in region
Sandhill crane	Grus canadensis	-	E	May occur in region
White-winged scoter	Melanitta fusca	-	E	May occur in region
Whooping crane	Grus americana	E	-	May occur in region during migration

Notes: E = Endangered
2 = Federal candidate, Category 2
T = Threatened
P = Peripheral

Sources: U.S. Fish and Wildlife Service 1984; State of North Dakota 1986c.

provides limited habitat for wildlife. One small drainage onbase would be affected by construction of the rail line, and several small prairie potholes would be disturbed by the Train Alert Shelter (TAS) (Table 4.7.6-2). The prairie potholes are seasonal wetlands in agricultural areas, but provide some nesting habitat for waterfowl and shorebirds. These seasonal wetlands may not meet the technical criteria for wetlands specified in the Corps of Engineers Wetlands Delineation Manual (1987). In compliance with Executive Order No. 11990 and according to requirements of Section 404 of the Clean Water Act, alternative sites were considered for program facilities. In order to collocate facilities of the proposed program with existing facilities, meet engineering and operational constraints, and keep as much of the program within existing base boundaries as possible, it was determined that there is no practicable alternative to the proposed construction of some facilities in wetlands. Furthermore, the site-specific program design and construction techniques would include all practicable measures to minimize harm to wetlands. Overall, construction impacts on Grand Forks AFB would be minor and would not substantially diminish biological diversity because most of the areas that would be affected provide only minimal habitat for wildlife.

Program-related population growth in Grand Forks County would result in increases in recreational activities (e.g., hunting, fishing, snowmobiling, and hiking); however, degradation of biological resources is not expected to occur because the recreational

Table 4.7.6-2

Habitat and Land Cover Types Potentially Disturbed by the Peacekeeper Rail Garrison Program at Grand Forks AFB, North Dakota

Habitat Type	Garrison, Support, and Relocated Facilities (acres)	Rail Line (acres)	Total (acres)
Proposed Action			
Agriculture	160.4	22.3	182.7
Nonforested wetland	0.7	0.0	0.7
Grassland	6.8	0.0	6.8
Developed land	27.5	0.0	27.5
TOTAL:	195.4	22.3	217.7
Alternative Action			
Agriculture	201.6	22.3	223.9
Nonforested wetland	0.7	0.0	0.7
Grassland	6.8	0.0	6.8
Developed land	27.5	0.0	27.5
TOTAL:	236.6	22.3	258.9

impacts would be very small. Recreational areas that would receive the greatest increase in use include the Red and Turtle rivers, Turtle River State Park, and the national wildlife refuges in the ROI. Biological resources in these recreational areas are protected by natural resource management agencies.

Threatened and Endangered Species. No impacts on threatened and endangered species are expected to result from the program at Grand Forks AFB.

Summary of Impacts. Biological resources on Grand Forks AFB would experience some minor impacts because of the proposed program. Direct disturbance of 217.7 acres of land would not adversely affect wildlife populations or biological diversity because most of the areas that would be affected provide only minimal habitat for wildlife. Indirect impacts resulting from program-related recreation would be minor because only a slight increase is expected. Therefore, short- and long-duration program impacts would be low. These impacts would not be significant.

4.7.6.4 Impacts of the Alternative Action

The Alternative Action would result in the loss of an additional 41.2 acres of agricultural land (Table 4.7.6-2). This is poor quality wildlife habitat and impacts would be similar to the Proposed Action. Short- and long-duration impacts would be low and not significant. No additional impacts on wetland or grassland habitats, or to threatened and endangered species would occur as a result of this alternative.

4.7.7 WATER RESOURCES

4.7.7.1 Region of Influence

The approximate boundaries of the water resources ROI for Grand Forks AFB are the Turtle River to the north and west; the Burlington Northern Railroad line passing through the Town of Emerado to the south; and the support communities of Grand Forks, North Dakota and East Grand Forks, Minnesota to the east (Figure 4.7.7-1). The ROI is located in the Red River of the North basin and covers an area of about 180 square miles.

4.7.7.2 Existing and Future Baseline Conditions

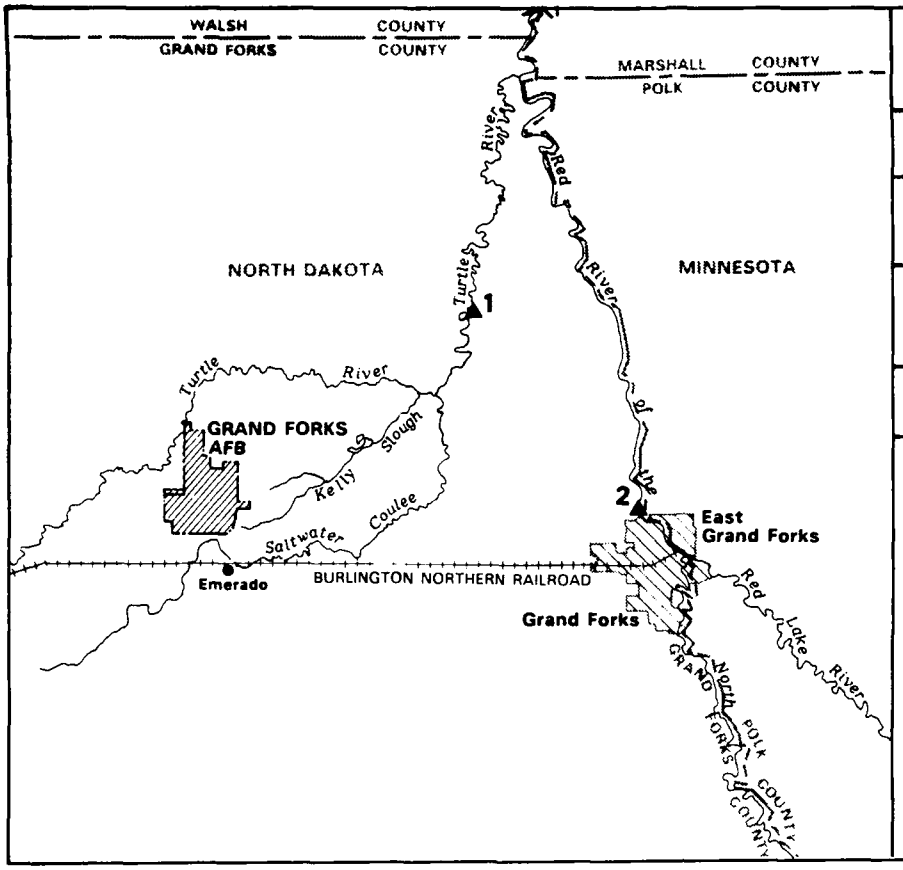
Major Water Users. Total water use in Grand Forks County plus the City of East Grand Forks amounted to approximately 13,910 acre-feet (acre-ft) in 1985. Municipal water use accounted for 67 percent of the total, most of which was supplied by the City of Grand Forks. Rural-domestic use accounted for 11 percent, agricultural use accounted for 13 percent, and military use was 9 percent. Grand Forks and East Grand Forks obtain their water from surface water sources. Grand Forks supplies water to Grand Forks AFB. Current and projected water use for the three entities is presented in Figure 4.7.7-1. The water supplies of the cities are adequate to meet all anticipated needs and no major water resources developments are expected to occur during the projected period.

Surface Water Hydrology and Quality. The Red River of the North is the principal hydrologic feature of the ROI. It provides potable water to the City of Grand Forks and receives about 7,830 acre-feet per year (acre-ft/yr) (7 million gallons per day [MGD]) of treated wastewater effluent from the Grand Forks metropolitan area. Grand Forks supplements its supply with water from the Red Lake River, a tributary from Minnesota. The Red Lake River serves as the sole water supply for East Grand Forks. Surface water quality in the ROI is fair. Nutrient levels tend to be elevated and seasonally high total dissolved solids concentrations make the water marginally acceptable for domestic and irrigation uses. Grand Forks and East Grand Forks are subject to severe flooding by the Red River of the North during spring snowmelt. At Grand Forks AFB, slow-draining areas and ponding in natural potholes are common. The extreme northwestern corner of the base occupies the 100-year floodplain of the Turtle River, which is a meandering stream that joins the Red River of the North approximately 30 miles downstream of the base. The Turtle River receives the stormwater runoff from the western part of the base (including the proposed garrison site). Drainage from the eastern part of the base and about 840 acre-ft/yr (0.75 MGD) of onbase-treated effluent are discharged to Kelly Slough. This is an intermittent tributary to the Turtle River that occupies a wide, marshy floodplain with a poorly defined stream channel.

Groundwater Hydrology and Quality. Groundwater in the ROI is abundant, though much of it is highly mineralized. The Dakota Sandstone is the only bedrock aquifer that is pumped in the vicinity of the base. However, its high salinity limits its use to stock watering and for domestic consumption at locations where no other source is available. The Emerado Aquifer, which underlies the base, is formed in a typical glacial deposit. This aquifer can yield large amounts of water, but its quality is poor because of upward leakage from underlying bedrock aquifers.

4.7.7.3 Impacts of the Proposed Action

Major Water Users. Total program-related water use would peak at about 160 acre ft/yr in 1992, and stabilize at about 140 acre-ft/yr during the operations phase (Table 4.7.7-1). Most of this water would be supplied by the City of Grand Forks Water Department. The Proposed Action would increase baseline water use at Grand Forks by a maximum of about two percent. Baseline-plus-program water requirements at Grand Forks (including Grand Forks AFB) would increase to approximately 8,030 acre-ft (7.12 MGD) in 1993. The city has water rights to the Red River of the North and the Red River



ANNUAL WATER USE OF SELECTED ENTITIES (acre-ft/yr)

ENTITY	RECENT USE	PROJECTED USE (1993)
Grand Forks AFB	1,190	1,190
Grand Forks*	7,420	7,910
East Grand Forks	1,400	1,420

SELECTED HYDROLOGIC CHARACTERISTICS

STATION ▲	DRAINAGE AREA (sq mi)	AVERAGE FLOW (cfs)	10-yr 7-day LOW FLOW (cfs)
1	613	51	0.04
2	30,100	2,612	74

LEGEND

- STATE BOUNDARY
- COUNTY BOUNDARY
- 1 ▲ STATION
- STREAM

Note: *Includes Grand Forks AFB

SCALE IN MILES 0 7

GFW-4/1

FIGURE 4.7.7-1 HYDROLOGIC FEATURES OF THE GRAND FORKS AFB, NORTH DAKOTA REGION OF INFLUENCE

Table 4.7.7-1

Program-Related Water Use
Within the Grand Forks AFB Region of Influence
Peacekeeper Rail Garrison Program (Proposed Action)
(values in acre-ft)

	1990	1991	1992	1993 Onwards
Grand Forks AFB				
Construction/Operations	16	26	27	19
Domestic	0	3	10	10
City of Grand Forks Domestic	11	54	100	90
East Grand Forks Domestic	1	7	19	19
TOTAL:	28	90	156	138

amounting to 44,100 acre-ft/yr. Therefore, the city's current water supply is adequate to accommodate the proposed program. East Grand Forks would experience a 1-percent increase over baseline to a total of 1,400 acre-ft/yr (1.3 MGD) in 1993. The city has virtually no restrictions to withdraw water from the Red Lake River and therefore has an ample supply to serve program needs. Baseline-plus-program water use at Grand Forks AFB would peak at about 1,230 acre-ft/yr (1.1 MGD) in 1992. The base has a contract with the City of Grand Forks for an annual supply of 2,900 acre-ft/yr (2.6 MGD), which would be adequate to meet program needs. The small increase in ROI water use would not interfere with existing major water users.

Surface Water Hydrology and Quality. Program-related withdrawals from the Red Lake River would be relatively small and would be near the mouth of the river. Therefore, withdrawals should have a minimal effect on the hydrology of the river. The combined maximum program-related withdrawals of about 160 acre-ft/yr amount to less than 0.01 percent of the average annual flow of the Red River of the North, and should have a negligible effect on its flow. Program-related increases in treated wastewater discharge to the Red River from the two wastewater treatment plants in the Grand Forks metropolitan area would peak at about 130 acre-ft (0.1 MGD) in 1992, a less than 2-percent increase over the baseline discharge of 8,330 acre-ft/yr (7.4 MGD). Wastewater discharge from the two municipal wastewater treatment plants would constitute about 16 percent of the 10-year, 7-day landflow of the Red River, with or without the program. Thus the small increases in wastewater discharge resulting from the program would have only a minor effect on the existing water quality of the river.

Construction of the garrison site would result in land disturbance and associated erosion on approximately 121 acres in the Turtle River drainage. Approximately 2.5 miles of new rail spur would also be constructed in this drainage to connect the garrison site to an existing rail line. The Turtle River is classified for municipal supply and primary contact recreation. However, its low average flow and occasional periods of no flow, as well as elevated concentrations of several contaminants (e.g., ammonia, boron, chloride, phosphorus, and sulfate), make this stream of questionable value for the previously mentioned uses during most of the year. The proposed garrison site and the connecting rail spur are located on a relatively flat area that generates little stormwater runoff. In addition, they are fairly distant (about 1 mi) from the Turtle River (Section 4.7, Figure 4.7-1). Therefore, program-induced erosion and associated sediment transport to the river is expected to be limited, and to have only minor and intermittent effects on its water quality.

Kelly Slough would receive the program-induced wastewater effluent that is generated onbase. The base's existing wastewater treatment system is operating nearly at its hydraulic design capacity (Section 4.7.2.3), principally due to a groundwater inflow problem. The additional wastewater effluent would be about 20 acre-ft/yr (0.02 MGD) for the duration of the proposed program. This represents a 3-percent increase over the baseline discharge to the slough of 840 acre-ft/yr (0.75 MGD). Water quality in the slough may decline slightly as a result of increased wastewater discharge from the base.

Groundwater Hydrology and Quality. The groundwater resources would not be affected by the proposed program because no groundwater use or program-related hydrogeologic changes are expected to occur.

Summary of Impacts. The water supply of the ROI is adequate to meet program-related water requirements. Only small hydrologic changes and minor degradation of water quality would occur. The short- and long-duration impacts on water resources would therefore be low. None of these impacts would be significant.

4.7.7.4 Impacts of the Alternative Action

Major Water Users. Total program-related water use during the operations phase would be about 150 acre-ft/yr, a 10-percent increase over the Proposed Action. However, the additional increase in water use by the three entities over that of the Proposed Action would be minimal. The available water supply is adequate to meet the water needs of the Alternative Action with no effects on existing major water users.

Surface Water Hydrology and Quality. With six TASs, the disturbed area at the garrison would increase by 34 percent to about 162 acres. Short-term sediment yield could be expected to increase by a similar percentage. However, the water quality effects on the nearest perennial stream, the Turtle River, are not expected to be substantially different from the Proposed Action.

Groundwater Hydrology and Quality. No groundwater impacts are expected as a result of this alternative.

Summary of Impacts. Short- and long-duration impacts on water resources are expected to remain essentially the same as for the Proposed Action: low and not significant.

4.7.8 GEOLOGY AND SOILS

4.7.8.1 Region of Influence

The ROI at Grand Forks AFB for geology and soils includes the installation and associated program-related areas in the immediate vicinity. The land within a 1-mile radius of the installation and a 1,000-foot-wide corridor along the connecting rail spur were characterized for purposes of establishing the local baseline context. In addition, a regional ROI was established for geologic hazards for the purpose of developing a regional tectonic framework for seismicity at the installation.

4.7.8.2 Existing and Future Baseline Conditions

Grand Forks AFB lies in the Central Lowland Plains Physiographic region. It is an area of generally flat terrain with undulating topography. Precambrian rocks are underlain by Paleozoic and Mesozoic sediments. Quaternary glacial deposits overlie the older sediments at the surface. The installation lies in seismic zone 1 (Uniform Building Code 1985) in which a maximum credible earthquake with a magnitude of 6.1 is the largest predicted for the area. Maximum horizontal acceleration in rock is expected to be less than 0.04 g, with a 90-percent probability of not being exceeded in 50 years (Algermissen et al. 1982). Active faults have not been identified in the local ROI and the area is not susceptible to liquefaction. Areas susceptible to landslides or terrain failure were not discovered in the ROI.

Energy and Mineral Resources. Oil and gas resources have been identified in the ROI. Oil and gas leases occur in the north portion of the proposed garrison facility. No uranium or coal mines/leases, Known Geothermal Resource Areas, or metallic/non-metallic mineral resource mining operations or leasing activities exist in the ROI.

Soil Resources. The U.S. Soil Conservation Service (SCS) has mapped 38 soil types in the ROI. Seven of these soil types occur in areas where program-related facilities may be located. They occur on level to gently sloping surfaces, have a loamy texture, and range from poorly to somewhat poorly drained or moderately to well drained. Saline soils have also been identified in several mapping units. Soil erosion susceptibility was evaluated for wind and sheet erosion. Wind erosion of unvegetated/disturbed ground in the ROI is a major concern of the SCS in North Dakota and has been identified as a potential problem for soils in the ROI. The prevailing northerly wind direction would make north-south elongated tracts of land susceptible to wind erosion. The proposed garrison, rail spur,

and other facilities would all be located on soils with a moderate susceptibility to wind erosion and low to moderate susceptibility to sheet erosion.

4.7.8.3 Impacts of the Proposed Action

Energy and Mineral Resources. The proposed location of the garrison facility is currently under oil and gas lease agreements which would result in long-duration impacts because leases would be terminated for the life of the program. Impacts on mineral resources are not expected because mineral resources have not been identified in the ROI.

Soil Resources. Program-related wind erosion at the proposed garrison, other facilities, and rail spur is projected to occur at a rate of 3.9 tons per acre per year (T/ac/yr). The application of one ton per acre (T/ac) of straw mulch would temporarily reduce the rates of erosion for all soils affected to less than 0.1 T/ac/yr. During garrison construction, soil would also erode at a rate of 11.5 T/ac/yr for large exposed areas of a soil type. The application of one T/ac of straw mulch would temporarily reduce this rate to less than 0.1 T/ac/yr. Program-related sheet erosion at the proposed garrison site and along the rail spur is projected to occur at rates of 1.7 T/ac/yr to 2.7 T/ac/yr. Soils are projected to erode at rates of 2.3 T/ac/yr to 6.6 T/ac/yr at the other proposed facility sites. The application of one T/ac of straw mulch after construction would temporarily reduce the rates of erosion to 0.3 T/ac/yr to 1.3 T/ac/yr for all soils affected. The range of soil erosion rates identified for the proposed program (5.6 to 18.1 T/ac/yr) are comparable to those determined for general urban development (16 to 156 T/ac/yr) as supplied by the U.S. Department of Housing and Urban Development (1981).

Soil erosion impacts are based on the combined effects of wind and sheet erosion values and how they compare to the maximum tolerable soil loss for each soil type. Soil erosion rates would exceed the maximum tolerable soil loss (4-5 T/ac/yr) of the affected soil types during construction. Program-induced soil erosion is therefore expected to cause short-duration impacts. Long-duration impacts are not expected because accelerated rates of erosion would occur for only a short period of time prior to mulching and reestablishing a vegetative cover in the disturbed areas.

Summary of Impacts. Overall short-duration impacts of the proposed program on the geology and soils resource are expected to be high because accelerated rates of erosion during program-related construction would exceed the maximum tolerable soil loss of the soils affected. Long-duration impacts are expected to be moderate because offbase oil and gas leases in the ROI would be terminated for the life of the program. These impacts would not be significant because increased rates of erosion would not result in an appreciable net loss of topsoil over the short period of time under consideration and the potential oil and gas resources of the leases do not appear to represent a major contribution to state or local reserves.

4.7.8.4 Impacts of the Alternative Action

The Alternative Action would slightly increase the size of the garrison. Therefore, impacts on the geology and soils resource would be about the same as for the Proposed Action. Consequently, all levels of impact and significance would be the same as for the Proposed Action. Short-duration impacts would be high while long-duration impacts would be moderate. These impacts would not be significant.

4.7.9 AIR QUALITY

4.7.9.1 Region of Influence

The ROI for the air quality resource includes Grand Forks AFB, the Town of Emerado, the City of Grand Forks, and the interstate highways and principal arterials in Grand Forks County.

4.7.9.2 Existing and Future Baseline Conditions

Grand Forks AFB is located in North Dakota Intrastate Air Quality Control Region (No. 172), which encompasses the State of North Dakota with the exception of Fargo. There are no Prevention of Significant Deterioration Class I areas within 50 miles of the base. Ambient air quality at Grand Forks AFB has not been monitored. However, ambient concentrations of total suspended particulates (TSP) and particulate matter (PM_{10}) have been monitored in the City of Grand Forks, 15 miles from Grand Forks AFB. No other criteria pollutants are monitored because of the lack of either point or area sources.

Air quality measurements in Grand Forks indicate that the maximum 24-hour TSP observation was 92 micrograms per cubic meter ($\mu g/m^3$), and the annual geometric average was 35.6 $\mu g/m^3$, both within the standards. The maximum recorded particulate matter (PM_{10}) 24-hour average was 125 $\mu g/m^3$ and the annual arithmetic mean was 22.8 $\mu g/m^3$, both within the standards. The entire State of North Dakota is in attainment for all criteria pollutants. Grand Forks AFB and vicinity have good air quality.

The stationary and mobile source emissions for Grand Forks County are summarized in Table 4.7.9-1 for TSP, sulfur oxides (SO_x), nitrogen oxides (NO_x), volatile organic compounds (VOC, a measure of reactive hydrocarbons), and carbon monoxide (CO).

The sources data summarized in Table 4.7.9-1 include significant pollutant sources, including but not limited to domestic heating, industrial processes, fuel storage and transfer operations, civilian and government motor vehicle operations, and waste disposal.

Based on the air quality inventory, emissions of NO_x, CO, and hydrocarbons are attributable primarily to transportation-related sources. Evaporation of petroleum products and solvents is an additional source of hydrocarbons. Power generation is an additional source of NO_x.

Emissions of SO_x are mostly from coal and oil combustion and petroleum industry processes. The TSP emissions occur primarily as fugitive dust resulting from vehicular traffic on unpaved roads.

An increase in fugitive dust during construction of the Over-The-Horizon-Backscatter radar project at Grand Forks AFB will cause a small, temporary increase of baseline particulate concentrations. A slight increase in CO gaseous emissions will result from the traffic associated with the operation of the project. However, these emissions will not contribute to the violation of the National Ambient Air Quality Standards (NAAQS).

4.7.9.3 Impacts of the Proposed Action

Direct air emissions would result from construction of the rail spur line and support facilities, and operation of the proposed program at Grand Forks AFB. Emission sources associated with construction include light-duty vehicle traffic, diesel trucks, offsite heavy-duty vehicles, diesel construction equipment, and fugitive dust from ground disturbance.

The highest monthly fugitive dust emissions from proposed program construction activity is approximately 11 tons. Fugitive dust calculations assume a 50-percent reduction due to watering of the construction sites. All of the fugitive dust emissions at Grand Forks AFB were conservatively assumed to be within the 10-micrometer particle size and referenced against the PM_{10} standard for impact analysis. It is expected that actual PM_{10} emissions would be smaller than the emissions calculated under the U.S. Environmental Protection Agency (EPA) guidelines for TSP.

Table 4.7.9-1

Grand Forks County, North Dakota Air Emissions Inventory, 1987
(tons per year)

Emission Source	TSP	SO_x	NO_x	VOC	CO
Fuel Combustion	603	2,451	1,707	224	1,057
Industrial Process	--	--	--	1,051	--
Solid Waste Disposal	117	4	17	247	750
Air/Water Transportation	183	19	159	303	1,713
Land Transportation	1,093	270	3,073	2,005	12,437
Miscellaneous	48,300	0	7	33	226
TOTAL:	50,296	2,744	4,963	3,863	16,183

Source: U.S. Environmental Protection Agency 1988d.

Construction-related impacts were calculated for 24-hour and annual averaging periods. A program-related increase of 0.3 $\mu g/m^3$ would occur, increasing the 24-hour average background concentration to 125.3 $\mu g/m^3$. The predicted 24-hour average background concentration would not equal or exceed the 24-hour NAAQS of 150 $\mu g/m^3$ (PM_{10}). The annual background concentration would increase to 23.1 $\mu g/m^3$, which would not equal or exceed the PM_{10} standards of 50 $\mu g/m^3$. Fugitive dust generated at Grand Forks in the peak construction year would have negligible impacts on Grand Forks air quality. The EPA-minimum threshold levels for fugitive dust would not be exceeded, and no violation of the NAAQS would occur.

Overall short- and long-duration air quality impacts would be negligible.

4.7.9.4 Impacts of the Alternative Action

The Alternative Action (6 TASs) would cause a 0.2-percent increase in fugitive dust emissions over the Proposed Action. This would result in a total increase of 0.5 $\mu g/m^3$, increasing the 24-hour average ambient concentration to 125.5 $\mu g/m^3$. The Alternative Action impacts would be negligible and would not cause any violation of the NAAQS. Overall short- and long-duration air quality impacts would be negligible.

4.7.10 NOISE

4.7.10.1 Region of Influence

The ROI for the noise resource is broadly defined as the area where program-related noise level increases occur. Specifically, the ROI includes Grand Forks AFB, the Town of Emerado, the City of Grand Forks, and the interstate highways and principal arterials in Grand Forks County.

4.7.10.2 Existing and Future Baseline Conditions

The principal noise source in the vicinity of Grand Forks AFB is base aircraft operations. Noise contours have been prepared for flight operations at Grand Forks AFB. These contours were revised in an environmental assessment in support of B-1 bomber wing basing at Grand Forks AFB (U.S. Air Force 1984). The predicted noise

levels in the vicinity of the base range between 50 decibels on the A-weighted scale (dBA) and 66 dBA expressed as day-night equivalent sound level (L_{dn}).

4.7.10.3 Impacts of the Proposed Action

Temporary impacts resulting from construction-related noise would occur within the immediate vicinity of construction sites. The various activities that would take place include construction of industrial structures, the rail spur, and roadways (grading, compacting, and paving); landscaping; and cleanup at Grand Forks AFB.

Construction-related noise from the TAS area and the rail spur at Grand Forks AFB is not anticipated to affect offbase or base residential areas because such noise levels from point sources attenuate quickly with distance. Potential construction-related noise levels of 80 dBA to 85 dBA at 100 feet from the TAS and rail spur construction activity would be reduced to 45 dBA at the base residential areas which are located two miles from the construction location. The offbase residential areas are farther than two miles from the construction activity sites, thereby reducing the noise levels further than base residential areas. The short-duration noise impacts from all construction activities would be negligible. Once construction activity ceases, noise levels would return to near ambient conditions. During the operations phase, noise would be generated from the program-related increase in training train activities. Offbase training train activities would cause minor, temporary increases in average noise levels on sensitive receptors along the main rail line. The increase in noise levels would have a negligible impact on sensitive receptors.

Overall short- and long-duration noise impacts would be negligible.

4.7.10.4 Impacts of the Alternative Action

The noise levels resulting from the construction of six TASs at the garrison site would be about the same as the Proposed Program. The short- and long-duration noise impacts at the base and offbase residential receptors would be negligible.

4.7.11 Impacts of the No Action Alternative

With the No Action Alternative, the Peacekeeper Rail Garrison system would not be deployed. Activities at Grand Forks AFB will continue to support other existing or proposed missions. For the host communities in the vicinity of the base, environmental changes would occur as a result of normal community growth. Future baseline conditions reflecting the No Action Alternative were described in earlier portions of this chapter.

4.7.12 Irreversible and Irretrievable Resource Commitments

Deployment of the Peacekeeper Rail Garrison program at Grand Forks AFB would result in the irreversible and irretrievable commitments of some human and natural resources. The affected resources are the following:

- The proposed program requires the use of relatively small amounts of labor, materials, energy, and other economic resources during both the construction and operations phases. The local procurement of building materials (such as cement, sand, and gravel) may alter some resource characteristics in the deployment area. Although these economic factors, once used by the proposed program, generally cannot be recovered for other purposes, the extent of their use would be small in comparison to total resource availability.

- Land utilized for the program facilities will be irreversibly committed for the duration of the program. Such use of land would not cause an irretrievable

commitment because the land can be retrieved through removal of program facilities and implementation of necessary soil rehabilitation.

- Disturbed biological communities, given sufficient time, can recover to a state approximating predisturbance conditions once the disturbance ends. Therefore, few of the temporary biological impacts expected from the proposed program would be irreversible and irretrievable. The wetland areas which would be disturbed and the permanently disturbed areas represent irreversible and irretrievable commitments of biological resources for all practical purposes.

- Soils would be permanently disturbed at construction and related sites (e.g., borrow pits, roads, buildings, and rail spur) and may be irreparably damaged during the life of the program if disturbed areas are not mulched or revegetated, especially at the garrison location. Aggregate resources would be used for construction of buildings, roads, and rail spurs.

4.7.13 Relationship Between the Local Short-Term Use of Man's Environment and the Maintenance and Enhancement of Long-Term Productivity

Deployment of the Peacekeeper Rail Garrison program at Grand Forks AFB would result in the short-term use of some human and natural resources that may affect the maintenance and enhancement of long-term productivity. The affected resources are the following:

- Short-term program-generated disruptions and delay of traffic would result in a decrease in the comfort, convenience, and safety afforded users of primary roads leading to the base. No effect on long-term productivity is expected.

- Additional information gained during program-related surveys of archaeological and historic resources may contribute to the data base and improve man's knowledge of the area's history. This would enhance the management of remaining cultural resources in the region.

- Areas temporarily disturbed by construction activities would result in short-term losses of biological habitats. However, recovery rates are expected to be fast and no effect on long-term productivity is expected.

- Soil erosion during construction would increase sedimentation to local streams resulting in a short-term deterioration of surface water quality. However, the additional loss of soil would not affect soil productivity or the long-term quality of streams.

- Reductions in air quality levels would result from fugitive dust during construction. However, no long-term reduction in air quality is expected.

4.7.14 Environmental Concerns Associated With a Possible Future Second Rail Connector

A second rail access to Grand Forks AFB could be achieved by providing a northerly rail connector to the Soo Line branch of the Burlington Northern (BN) Railroad (Figure 4.7.14-1). This connector would require the acquisition of about 90 acres of land, the construction of 8 miles of new track, and the rehabilitation of 12.5 miles of existing BN branch line. Additionally, two 50-foot bridges would be needed to cross Turtle River.

Construction costs for this second rail connector would be approximately $15.2 million (1986 dollars) and would require approximately 115 direct construction workers and 115 secondary workers over a 1-year period. Most of these workers would be from the

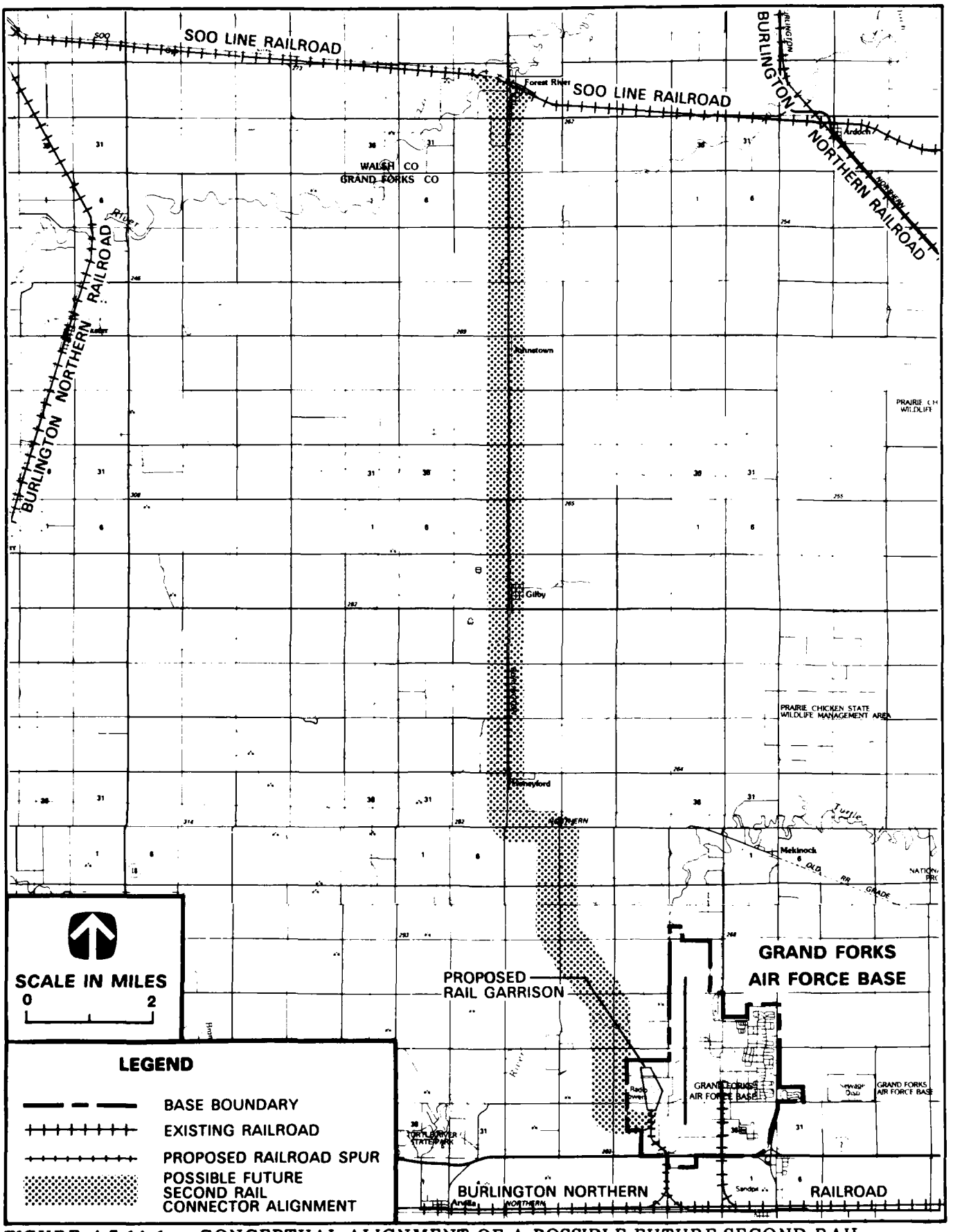


FIGURE 4.7.14-1 CONCEPTUAL ALIGNMENT OF A POSSIBLE FUTURE SECOND RAIL CONNECTOR FOR GRAND FORKS AFB, NORTH DAKOTA

local area, including Grand Forks, Traill, and Walsh counties, North Dakota and Polk County, Minnesota. Because inmigration of labor for this construction would be minimal, there would be no major concerns for the socioeconomics, utilities, and transportation resources.

The eight miles of new track right-of-way (ROW), located west and northwest of the base, would pass through a rural area with scattered farmhouses. The ROW would use mostly nonirrigated cropland with some mixed open space including about six acres owned by the University of North Dakota. The final alignment could probably avoid the scattered farmhouses in the area. There could, however, be a conflict with structures or roads where the wye would connect with the main line of the Soo Line at Forest River.

Construction of the second rail connector would affect several river and drainage crossings and Glacial Lake Agassiz beachstrands. The rail connector would cross the Turtle River through an area known to contain a concentration of prehistoric sites. The sites belong to the Arvilla Complex, which includes Woodland period burial mounds, earthworks, and associated campsites. Similar types of sites have been recorded along the Forest River as well. Historic homesteads and churches may also be located along the spur because it follows existing section lines. Any disturbance to prehistoric or historic resources would result in a loss to the regional data base. Native American concerns would be expressed if any burial mounds were encountered. Additionally, paleontological materials may be located along the Turtle River.

Construction activities along the Turtle River would affect wildlife species in riparian habitats along the river. Wildlife in other habitats along intermittent stream drainages crossed by the new track would also be adversely affected. The wildlife species affected by the construction activities could include state- and federally listed threatened and endangered species that occur in the general vicinity of the base.

Rehabilitation of existing track could require upgrades to approximately five existing bridges over intermittent drainages. Some short-term water quality degradation would probably result.

Oil and gas production/leases would need to be investigated to determine any offbase conflicts. Aggregate (rail ballast) production may be an issue because of the substantial requirement. Soil erosion and sedimentation rates would increase during construction and may affect the Turtle River. Soils that have a moderate shrink-swell potential would also be encountered.

This area currently experiences excellent air quality because of many factors favorable to atmospheric dispersion of air pollutants, such as neutral atmospheric stability, high wind speed, and relatively few sources of air pollutants in the immediate area. The entire state of North Dakota is in attainment for all criteria pollutants. Construction of the rail connector would cause local increases in fugitive dust and gaseous pollutant emissions. These emissions should not cause any violations of the National Ambient Air Quality Standards.

Existing noise levels along the second rail connector range from 50 dBA to 66 dBA (L_{dn}) near the base and from 45 dBA to 50 dBA (L_{dn}) in the rural areas. Temporary increases in noise levels would result from construction and rehabilitation of the rail line in the vicinity of sensitive residential noise receptors in small towns along the route.

4.8 LITTLE ROCK AIR FORCE BASE, ARKANSAS

Little Rock Air Force Base (AFB), with an area of approximately 6,688 acres (5,556 acres are fee owned, 109 acres are leased, and 1,023 acres are public domain lands), is located in Pulaski County in central Arkansas. The host organization at this Military Airlift Command base is the 314th Tactical Airlift Wing, with C-130E transport aircraft. Major tenant organizations include the Arkansas Air National Guard 189th Tactical Airlift Group and the U.S. Army Joint Readiness Training Center. The Strategic Air Command 308th Strategic Missile Wing, the last Titan II missile wing, was officially deactivated in August 1987.

Little Rock AFB employed 5,728 military personnel (910 officers and 4,818 enlisted), 817 appropriated fund civilian personnel, and 707 other civilian personnel at the end of fiscal year 1987. The base is also host to approximately 400 trainees/cadets and 100 international students each month. The deactivation of the 308th Strategic Missile Wing decreased the base population by approximately 1,200. Approximately 48 percent of the military personnel live on Little Rock AFB and 52 percent live in the communities near the base.

The City of Jacksonville, located adjacent to the base, is the host community for Little Rock AFB (Figure 4.8-1). Jacksonville is located in the Little Rock metropolitan area. Little Rock, the state capital, is located approximately 17 miles southwest of the base. Most of the personnel living offbase reside in Jacksonville; however, some personnel live in the communities of Cabot, Sherwood, North Little Rock, and Little Rock. Jacksonville had an estimated 1985 population of 28,847, while Pulaski County had a population of approximately 353,700. The region's economic base is highly diversified. Major sectors include manufacturing, transportation and utilities, wholesale and retail trade, professional services, and government.

The following sections provide a description of activities associated with the deployment of the Peacekeeper Rail Garrison program at Little Rock AFB for the Proposed Action (4 Train Alert Shelters [TASs]) and the Alternative Action (6 TASs).

Proposed Action. For the Proposed Action at Little Rock AFB, the Air Force would construct garrison facilities and provide personnel necessary for the deployment and operation of up to four Peacekeeper missile trains. Approximately $75 million (in 1986 dollars) of construction would occur at Little Rock AFB for the Proposed Action. Construction activities, for the purpose of analysis, are assumed to begin in 1990 and be completed in 1992, with full operations beginning in 1993. Direct employment requirements in 1990 would be 182, peak at 515 in 1993, and stabilize at 426 during the full operations phase. Peak construction employment of 215 would occur in 1991. Annual direct employment requirements for the Proposed Action are presented in Table 4.8-1 for site activation, construction, assembly and checkout, and operations activities.

The garrison would be located in the eastern portion of the base (Figure 4.8-1). Seven buildings (including the 4 TASs), roads, utilities, parking, and approximately 1.5 miles of railroad track would be constructed within the garrison. Construction of the garrison would disturb approximately 53 acres permanently and 90 acres temporarily (Table 4.8-2).

The rail spur connecting the garrison to the Union Pacific (UP) main line south of the base would use 3.6 miles of an existing U.S. government-owned spur (0.2 mi onbase and 3.4 mi offbase) and require the construction of 1.5 miles of new track onbase from the garrison to the existing spur (Figure 4.8-1). The 3.6 miles of existing track would require upgrading. Approximately 8 acres would be disturbed permanently and 22 acres temporarily outside the garrison for the connector spur (Table 4.8-2).

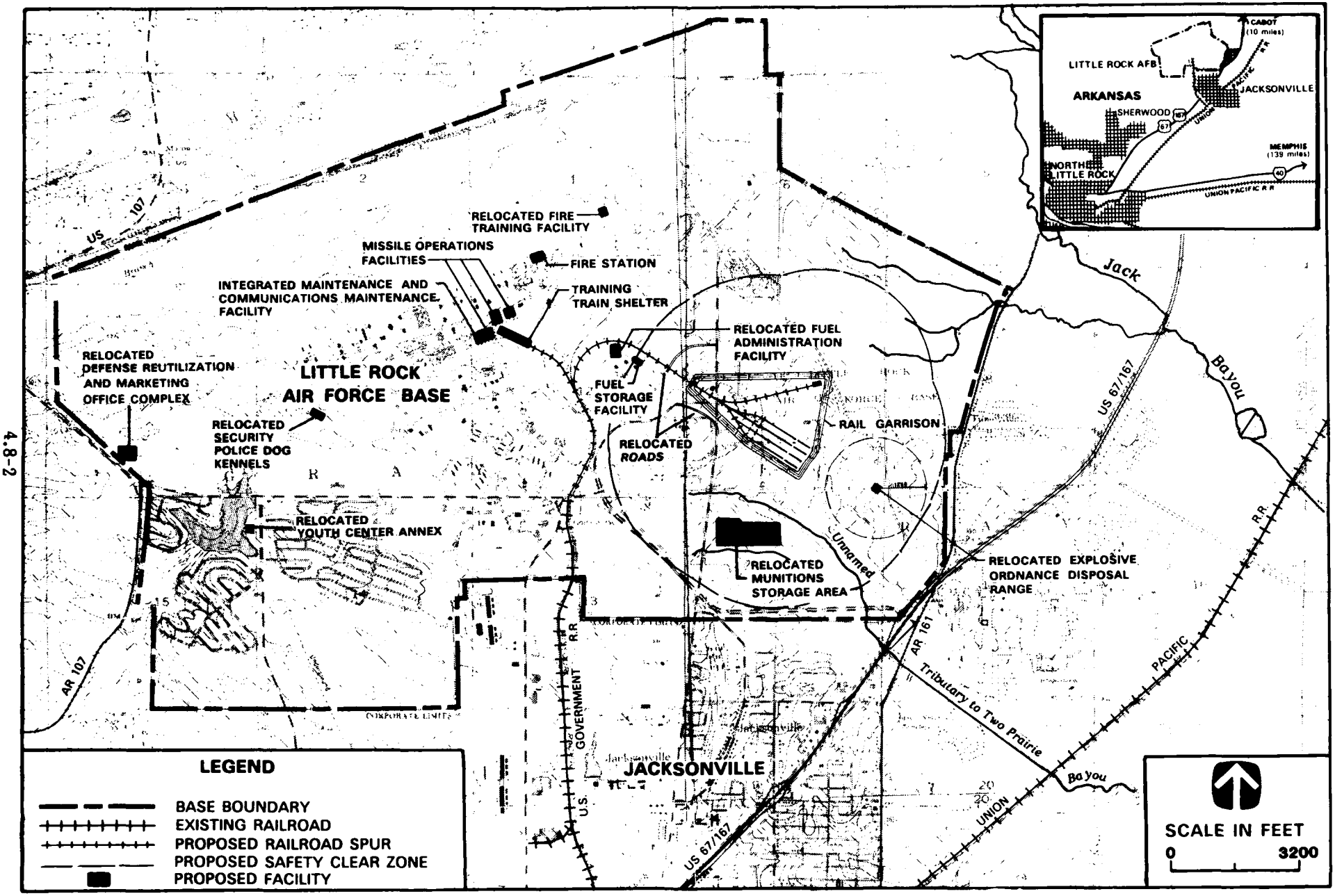


FIGURE 4.8-1 PROPOSED PEACEKEEPER RAIL GARRISON FACILITIES AT LITTLE ROCK AFB, ARKANSAS

Table 4.8-1

Annual Direct Employment (Military and Civilian) for the Peacekeeper Rail Garrison Program in the Little Rock AFB Area by Calendar Year (Full-Time Equivalent Jobs)

	1989	1990	1991	1992	1993[1]
Proposed Action					
Site Activation	1	15	24	11	0
Construction	0	166	215	77	0
Assembly & Checkout	0	1	18	1	0
Operations	0	0	125	426	426
TOTAL:	1	182	382	515	426
Alternative Action					
Site Activation	1	15	24	11	0
Construction	0	184	229	77	0
Assembly & Checkout	0	2	27	2	0
Operations	0	0	138	468	468
TOTAL:	1	201	418	558	468

Note: [1]Employment would continue at these levels for the life of the program.

Table 4.8-2

Summary of Area Disturbed by the Peacekeeper Rail Garrison Program Little Rock AFB, Arkansas (Proposed and Alternative Actions)

Facility Group	Area Disturbed (acres)		
	Permanent	Temporary	Total
Proposed Action			
Garrison Facilities	52.9	90.1	143.0
Rail Spur	8.2	21.6	29.8
Support Facilities	15.6	15.7	31.3
Relocated Facilities	23.9	15.8	39.7
TOTAL:	100.6	143.2	243.8
Alternative Action			
Garrison Facilities	61.5	114.5	176.0
Rail Spur	7.6	21.2	28.8
Support Facilities	15.6	15.7	31.3
Relocated Facilities	38.9	15.8	54.6
TOTAL:	123.6	167.2	290.7

The Proposed Action would require the construction of support facilities with a total floor space of approximately 67,200 square feet. To provide access to the Training Train Shelter, a 0.4-mile rail spur would be constructed from the connector spur (Figure 4.8-1). Construction of the support facilities, roads, utilities, and parking would permanently disturb approximately 16 acres and temporarily disturb 16 acres (Table 4.8-2).

The Proposed Action would also require the relocation of several existing facilities, including some roads and utilities, to new locations (Figure 4.8-1). Relocation of these facilities would permanently disturb approximately 24 acres and temporarily disturb 16 acres (Table 4.8-2).

No offbase land acquisition or restrictive easements would be required at Little Rock AFB for the Proposed Action.

Alternative Action. The Alternative Action would provide garrison facilities and personnel for the deployment and operation of up to six Peacekeeper missile trains. Approximately $86.2 million (in 1986 dollars) of construction would occur at Little Rock AFB for the Alternative Action. Construction and operations activities are assumed to occur in the same time frame as the Proposed Action. Annual direct employment requirements for the Alternative Action are presented in Table 4.8-1.

The garrison would contain six TASs (instead of 4) and would be constructed in approximately the same location as the Proposed Action (Figure 4.8-2). Nine buildings (including the 6 TASs), roads, utilities, parking, and approximately 2.1 miles of track would be constructed within the garrison. Construction of the six-TAS garrison would disturb approximately 9 additional acres permanently (61.5 acres total) and 24 acres temporarily (114.5 acres total) (Table 4.8-2). The Alternative Action would not require offbase land acquisition or restrictive easements.

The rail spur connecting the garrison to the Union Pacific main line would require construction of 1.4 miles of new track onbase and upgrading of the 3.6 miles of existing track (0.2 mi onbase and 3.4 mi offbase). Technical and personnel support facility requirements for the Alternative Action would be similar to the Proposed Action.

For the Alternative Action, one additional facility (the Air Base Ground Defense security police training facility) would require relocation (Figure 4.8-2). Relocation of existing base facilities for the Alternative Action would permanently disturb approximately 39 acres and temporarily disturb 16 acres (Table 4.8-2).

Summary of Program Impacts. The Proposed and Alternative Actions at Little Rock AFB would not result in significant impacts for any resource.

Both short- and long-duration beneficial socioeconomic effects would be generated by the Proposed and Alternative Actions, including increases in employment and income, and greater utilization of temporary and permanent housing.

4.8.1 SOCIOECONOMICS

4.8.1.1 Region of Influence

The Little Rock AFB Region of Influence (ROI) for the employment and income element includes Faulkner, Jefferson, Lonoke, Pulaski, and White counties in Arkansas. The ROI for housing is the City of Jacksonville, and for the remaining elements includes Pulaski County and the City of Jacksonville.

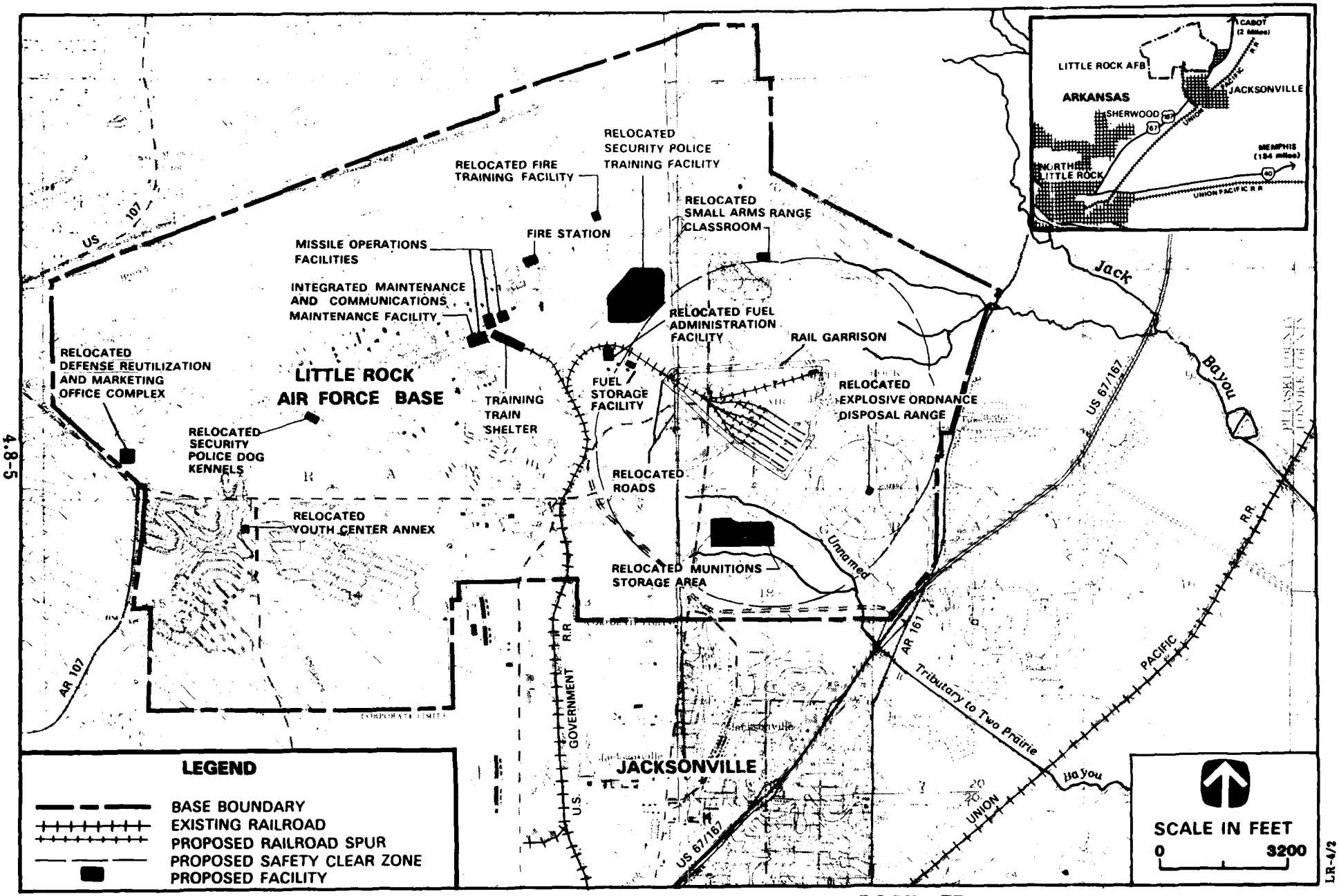


FIGURE 4.8-2 PROPOSED PEACEKEEPER RAIL GARRISON FACILITIES AT LITTLE ROCK AFB, ARKANSAS (ALTERNATIVE ACTION)

4.8.1.2 Existing and Future Baseline Conditions

Employment and Income. Total employment in the ROI was 312,500 in 1984, an increase of about 5.4 percent from the 1980 level of 296,623. The services sector was the largest employer with 23 percent of the total employment in 1984, followed by the government, retail trade, and manufacturing sectors. Between 1980 and 1984, major gains in employment occurred in the services; finance, insurance, and real estate; and retail trade sectors. The farm and manufacturing sectors incurred the largest decreases. Compared to the state's average unemployment rate of 8.8 percent, the ROI unemployment rate was 7.4 percent in 1986. Pulaski County's economy moved in the same general direction as that of the ROI. However, construction sector employment in the ROI decreased between 1980 and 1984 from 17,838 to 16,701, whereas it increased in the county.

Total employment in the ROI is projected to increase to 342,267 in 1990 and to 372,686 in 1995. The unemployment rate in these years is projected at 7.0 percent and 6.5 percent, respectively.

From 1980 to 1984, total earnings (in current dollars) in the ROI increased from $3.9 billion to $5.3 billion and in Pulaski County from $2.9 billion to $4.0 billion. Discounting for inflation, these increases in total earnings represented, respectively, 8.9 percent and 11.6 percent growth over the 1980 to 1984 period. Per capita personal income in the ROI increased from $8,389 in 1980 to $11,350 in 1984 and in Pulaski County from $9,252 in 1980 to $12,630 in 1984.

Total earnings (in 1986 dollars) in the ROI are projected to increase to $6.2 billion in 1990 and $6.8 billion in 1995, from $5.6 billion in 1984. The corresponding per capita personal income is projected at $12,042 for 1990 and $12,410 for 1995. Per capita personal income in Pulaski County is projected at $13,310 for 1990 and $13,710 for 1995.

Population and Demographics. The 1985 population of Pulaski County was estimated at 353,700, an increase of 3.8 percent over the 1980 population of 340,597. The county's population is projected to increase to 379,499 by 1990 and 404,365 by 1995. The City of Jacksonville had a population of 28,847 in 1985, an increase of 1,258 since 1980. Jacksonville's population is projected to increase to 30,360 by 1990 and to 32,349 by 1995. Military personnel and their dependents accounted for 40 percent of the estimated 29,366 population of Jacksonville in 1987.

Housing. The permanent year-round housing stock in the City of Jacksonville was 9,172 units in 1980. Of these units, 562 (5.7%) were reported as vacant and 420 (4.6%) were available. The Jacksonville Real Estate Council estimates that there are currently about 900 vacant apartments, houses, and mobile homes, or almost ten percent of the total housing stock. There are 340 hotel/motel rooms in Jacksonville with plans to add 70 in the near future. During the summer months (the peak occupancy period) about 50 of these rooms are vacant.

Little Rock AFB family housing consists of 556 two-bedroom, 654 three-bedroom, and 325 four-bedroom units. The current wait for onbase housing is about 45 days for officers and 80 days for enlisted personnel. Onbase unaccompanied enlisted personnel housing facilities consist of 2,042 permanent party enlisted spaces, 176 transient enlisted spaces, and 200 (79 substandard) officer transient spaces. In 1987, the permanent party enlisted had 628 vacancies, the transient enlisted had 74 vacancies, and the transient officer had 60 vacancies.

The supply of permanent year-round housing units in Jacksonville is expected to increase to 10,093 by 1990 and to 10,755 by 1995. Available vacancies are projected to be 462 (4.6%) in 1990 and 492 (4.6%) in 1995.

Education. Pulaski County Special School District, serving portions of Pulaski County including the City of Jacksonville, had a 1987-88 school year enrollment of 22,200 students. The district employed approximately 1,280 classroom teachers. Approximately 16 percent of the district's enrollment are dependents of federal employees. District schools located in Jacksonville include eight elementary schools (2 of which are located on Little Rock AFB), two junior high schools, and two high schools, with an enrollment of approximately 7,500 students and 410 teachers. The two elementary schools serving onbase students, Arnold and Tolleson, currently have room for about 120 additional students. The current overall pupil-to-teacher ratio is 18.4-to-1 for elementary schools, below the weighted average state standard of 23.4-to-1. Enrollment is projected to increase to 23,225 by 1990 and to 24,750 by 1995, and staffing may increase to maintain existing pupil-to-teacher ratios.

Public Services. The City of Jacksonville employs approximately 190 persons in 19 departments. The Police Department has 42 sworn officers and a total of 56 personnel. The Fire Department has 47 personnel and is augmented by 14 volunteers. These staffing levels provide the area with a public service level of 6.5 personnel per 1,000 population. To maintain these levels, city staffing would have to increase from 190 to 197 by 1990 and to 210 by 1995. If no additional personnel were hired, the number of personnel per 1,000 population would drop to 6.3 and 5.9 for those corresponding years. In addition, Pulaski County offers a full range of public services, employing approximately 830 people in 21 departments. These staffing levels provide the area with 2.3 personnel per 1,000 population. To maintain these levels, county staffing would have to increase from 830 to 873 by 1990 and to 930 by 1995. Without additional hires, the number of county personnel per 1,000 population would drop to 2.1 by 1995.

Public Finance. Services provided by the City of Jacksonville are funded principally through the general and special revenue funds. In 1986, revenues from these funds were $6.4 million. Property taxes, franchise taxes, and sales taxes are the city's principal revenue sources. Expenditures amounted to $6.3 million in 1986. Over the 1990 to 1995 period, revenues and expenditures are projected to be $6.6 million to $7 million. Year-end fund balances in 1986 were $630,000, representing approximately ten percent of expenditures in that year. General obligation bond indebtedness was $105,000 at the end of 1986.

In 1987, the Pulaski County Special School District expenditures amounted to $83.4 million, up from $80.9 million the previous year, representing approximately $3,750 per student. Revenues amounted to $83.4 million, up from $79.4 million the previous year. Over the 1990 to 1995 period, revenues and expenditures are projected to be $85.9 million to $91.6 million. In 1987, total bonded indebtedness of the district was $39.6 million. Because of recent boundary changes, approximately $11.4 million of the total year-end indebtedness has been transferred to the Little Rock School District. Year-end fund balances amounted to $4.8 million, representing about six percent of expenditures in that year.

Pulaski County revenues and expenditures were approximately $28.1 million in 1986. Year-end fund balances were $7.8 million, representing approximately 28 percent of expenditures in that year. Over the 1990 to 1995 period, revenues and expenditures are projected to be $30 million to $31.9 million.

4.8.1.3 Impacts of the Proposed Action

For the Proposed Action, a brief summary of the program-related effects on key socioeconomic indicators is presented in Table 4.8.1-1.

Employment and Income. The Proposed Action would create new jobs ranging from 382 in 1990 to 820 in 1992, and then stabilizing at 634 in 1993 and thereafter. During the peak construction year (1991), of the 729 total new jobs, 382 would be direct

Table 4.8.1-1

Selected Socioeconomic Indicators, Peacekeeper Rail Garrison Program
Little Rock AFB, Arkansas, 1990-1993
Proposed Action

	1990	1991	1992	1993[1]
Region of Influence				
Employment (Jobs)				
Total Program-Related Jobs	382	729	820	634
Direct Jobs	182	382	515	426
Civilian	176	269	150	63
Military	6	113	365	363
Secondary Jobs	200	347	305	208
Local Hires	318	514	379	226
Program-Related Spending (000s 86$)	$7,073	$12,707	$11,663	$8,161
Personal Income (000s 86$)				
Direct	$ 4,228	$ 8,377	$ 9,910	$ 7,829
Secondary	4,044	6,941	5,952	4,012
Total Personal Income	$8,272	$15,318	$15,862	$11,841
City of Jacksonville[2]				
Population				
Baseline Population	30,360	30,748	31,140	31,538
Program-Related Change	77	395	996	956
Change as % of Baseline	0.3	1.3	3.2	3.0
Housing Demand				
Temporary Units	9	11	6	2
Permanent Units	118	254	261	251
Total Units	127	265	267	253
School District Enrollment				
Elementary	10	42	98	92
Secondary	8	35	80	76
Total Enrollment	18	77	178	168

Notes: [1]Program-related effects would continue at these levels throughout the life of the program.
[2]Includes Little Rock AFB for population and school enrollment.

(113 military and 269 civilian) and 347 would be secondary. The number of local hires would be 514. All direct and most secondary jobs would occur in Pulaski County. Of the 634 new jobs created during the operations phase beginning in 1993, 426 would be direct (363 military and 63 civilian) and 208 would be secondary. The number of local hires would be 226 during the operations phase.

The Proposed Action would generate personal income (in 1986 dollars) ranging from $8.3 million in 1990 to $15.9 million in 1992, and stabilizing at $11.8 million during the operations phase in the ROI. Pulaski County's share of that personal income would vary from $6.4 million in 1990 to $14.0 million in 1992, and then stabilize at $10.9 million in 1993 and thereafter. Program-related spending in the ROI would range from $7.1 million in 1990 to $12.7 million in 1991, then stabilize at $8.2 million in 1993 and thereafter.

Population and Demographics. Although the Proposed Action would affect population in both the ROI and Pulaski County, only Pulaski County would experience major effects. The total number of inmigrants in the ROI would range from 157 in 1990 to 1,148 in 1992, then stabilize at 1,066 in 1993 and thereafter. Pulaski County's share of that inmigration would range from 140 in 1990 to 1,123 in 1992, and to 1,050 in 1993 and thereafter. As a result of the Proposed Action, the county's population increase would range from 0.1 percent in 1991 to 0.3 percent in 1992 and thereafter. The number of weekly commuters would be less than 20 during the 1990 to 1992 period.

Of the 1,050 inmigrants in Pulaski County during the operations phase, 841 are projected to live onbase, 115 in Jacksonville, 27 in North Little Rock, 25 in Little Rock, 21 in Cabot, and the remaining 21 in Sherwood. Military personnel and their dependents would account for 39 percent of the population of Jacksonville in 1993.

Inmigration into Jacksonville (within whose boundaries the base is located) would increase the baseline population by 3.2 percent in the peak inmigration year (1992) and 3.0 percent during the operations phase. Inmigration-related change in the combined baseline populations of Little Rock, North Little Rock, Cabot, and Sherwood would be less than one percent in 1993 and thereafter.

Housing. Most program-related civilian households would be housed in privately owned permanent housing units and temporary facilities in Jacksonville. Some additional civilian households would elect to live in Little Rock, North Little Rock, Cabot, and Sherwood. Because of existing vacancies of family houses and unaccompanied enlisted personnel housing at Little Rock AFB, most military personnel, accompanied and unaccompanied, would live in these onbase units. The remaining military personnel would live in the various communities previously mentioned. Because the total housing demand in Cabot, Little Rock, North Little Rock, and Sherwood is very small compared to the existing supply, this section deals with the effects of program-related housing demand in Jacksonville.

The offbase program-related housing demand is expected to begin in 1990. In that year, 120 permanent units (25.8% of available vacancies) and 10 temporary facilities (20% of available vacancies) would be required in Jacksonville. The peak demand for temporary facilities would occur in 1991. This short-duration demand would be for ten facilities (20% of available vacancies). This demand would fall to near zero by 1993. There would be no long-duration demand. The peak demand for permanent units would be experienced in 1992. This short-duration demand would be for 260 units (out of 474 available or 54.8%) and would decline to the long-duration demand of 250 units (out of 480 available or 52.1%) by 1993. The demand for permanent units would reduce the available vacancy rate in Jacksonville from 4.6 percent to 2.1 percent in 1992 and from 4.6 percent to 2.2 percent during operations.

The short-duration demand for temporary facilities in Jacksonville would not cause a shortage even during periods of peak baseline occupancy. Therefore, these demands are considered to have beneficial effects of the program. Similarly, the demand for permanent units in Jacksonville would remove excess vacancies without adversely affecting the local market, and beneficial effects would result.

Education. The program is expected to bring an additional 170 students to the area, the majority of whom are expected to live in Jacksonville and therefore enroll in the Pulaski County Special School District. The addition of a majority of these students to the Pulaski County Special School District is expected to increase elementary level pupil-to-teacher ratios from 18.4-to-1 to 18.5-to-1 during the operations years. This ratio would be below the weighted aver ge state standard of 23.4-to-1.

Because of the availability of onbase family housing, a large number of students (approximately 135) are expected to reside on Little Rock AFB. The two elementary schools serving onbase students are expected to receive 75 additional students. These two schools, currently with room for about 120 additional students, could probably absorb the baseline and program-related enrollment increases. The concentration of these additional students at the two elementary schools onbase, as well as at North Pulaski High School, would result in measurable increases in classroom size at these schools. Program-related enrollment increases alone would increase the current combined pupil-to-teacher ratio at those two schools from 21.9-to-1 to 23.7-to-1. This ratio would be above the weighted state standard of 23.4-to-1. Additional teachers may be required to accommodate these students. Schools in Cabot, Sherwood, North Little Rock, and Little Rock are expected to receive inappreciable enrollment increases.

Public Services. Program-related increases in population would lead to increases in demands for public services provided by the City of Jacksonville of 3 percent over baseline levels in 1993. The increased service demands would be experienced by the majority of the departments now providing service to area residents. To maintain the current service level of 6.5 personnel per 1,000 population, the city would need 6 additional employees by 1993, increasing city staffing from a baseline level of 205 to 211. Most of the additional staffing would be needed in the Police, Fire, and Public Works departments. If no additional personnel were hired, the number of personnel per 1,000 population would drop from 6.5 to 6.3. This reduction in the number of personnel per 1,000 population would not result in an appreciable deterioration from the community's current public service levels.

Program-related increases in population would lead to increases in demands for public services provided by Pulaski County of 0.3 percent over baseline levels in 1993. To maintain existing service levels, the county would need to hire 2 additional employees by 1993, an increase in county staffing from a baseline level of 907 to 909. Even without additional staffing, however, the number of county personnel per 1,000 population would remain at 2.3. This level of population increase would not affect the county's ability to deliver public services at current levels to area residents.

Inmigration into other communities in the area (North Little Rock, Little Rock, Cabot, and Sherwood) would represent a less than 1-percent increase over baseline levels. Existing staff would be able to accommodate these demands.

Public Finance. Program-related expenditure increases in Jacksonville would be approximately $100,000 in the peak year (1992) and $80,000 during the operations phase. This would be a 1.5-percent increase over projected baseline levels in 1992 and a 1.2-percent increase in 1993. With reserve funding levels of approximately $630,000 and additional revenues from sales taxes and miscellaneous charges for services, fines, and fees, existing revenue sources would be adequate to meet these increases.

Based on an average per pupil cost of $3,750, program-related school district expenditure increases would reach $450,000 in the peak year (1992) and $430,000 during the operations phase. These increases would be a less than 1-percent increase over projected baseline levels. Entitlements from P.L. 81-874 programs would amount to about $95,000 during the operations phase. Temporary revenue shortfalls (under $190,000 in 1992) could occur as state foundation program monies generally lag behind e additional enrollment. Reserve funding levels of approximately $4.8 million would be adequate to cover potential shortfalls.

Because inmigration into the other communities in the area would result in little or no increases in city or county personnel, the expenditure impacts would be inappreciable.

Summary of Impacts. For the Proposed Action at Little Rock AFB, short- and long-duration socioeconomic impacts would be low since inmigration would cause population in the Jacksonville area to increase by 3.2 percent over baseline forecasts during the peak inmigration year (1992) and by 3.0 percent during program operations (beginning in 1993). This level of program-induced population growth would result in low impacts on housing, education, public services, and public finance within the Jacksonville area for both the peak and succeeding years. Impacts would not be significant because the increase in demand for housing would be met by available vacancies, existing educational facilities would absorb program-related enrollment increases, no new public service facilities would need to be constructed, and existing revenue sources of the jurisdictions would be adequate to meet program-related expenditures.

Both short- and long-duration beneficial socioeconomic effects would be generated by the Proposed Action, including increases in employment and income in the ROI and greater utilization of temporary and permanent housing vacancies within the Little Rock AFB area.

4.8.1.4 Impacts of the Alternative Action

For the Alternative Action, a brief summary of the program-related effects on key socioeconomic indicators is presented in Table 4.8.1-2.

Employment and Income. Impacts of the Alternative Action on employment and income in the ROI would be higher than those of the Proposed Action. During the construction phase, the Alternative Action would create new jobs ranging in number from 416 in 1990 to 884 in 1992, which is 34 to 64 more jobs than the Proposed Action. Of the 790 new jobs during the peak construction year (1991), 418 would be direct (294 civilian and 124 military) and 372 would be secondary. The number of local hires would be 552, which is 38 more than the Proposed Action. During the operations phase, total new jobs created by the Alternative Action would number 696, which is 62 more than the Proposed Action. Of these, 468 would be direct jobs (69 civilian and 399 military) and 228 secondary. Local hires would number 248, which is 22 more than the Proposed Action.

During the construction phase, the Alternative Action would generate personal income (in 1986 dollars) ranging from $9.0 million in 1990 to $17.1 million in 1992 in the ROI; $0.7 million to $1.2 million more than the Proposed Action. Pulaski County's share of that personal income would range from $7.0 million in 1990 to $15.1 million in 1992. During operations, the Alternative Action would generate $13.0 million personal income for the ROI and $12.0 million of that personal income would go to Pulaski County. In the ROI, the program-related spending would range from $7.6 million in 1990 to $13.6 million in 1991, and then stabilize at $9.0 million during the operations phase.

Population and Demographics. The population increase associated with the Alternative Action in the ROI would range from 172 in 1990 to 1,255 in 1992, which is 15 to 107 more persons than the Proposed Action. During the operations phase, total inmigrants to the ROI would be 1,171, which is 105 more than the Proposed Action. During the construction

Table 4.8.1-2

Selected Socioeconomic Indicators, Peacekeeper Rail Garrison Program
Little Rock AFB, Arkansas, 1990-1993
Alternative Action

	1990	1991	1992	1993[1]
Region of Influence				
Employment (Jobs)				
Total Program-Related Jobs	416	790	884	696
Direct Jobs	201	418	558	468
Civilian	195	294	157	69
Military	6	124	401	399
Secondary Jobs	215	372	326	228
Local Hires	346	552	402	248
Program-Related Spending (000s 86$)	$7,634	$13,652	$12,488	$8,964
Personal Income (000s 86$)				
Direct	$4,669	$9,196	$10,709	$8,600
Secondary	4,340	7,418	6,357	4,407
Total Personal Income	$9,009	$16,614	$17,066	$13,007
City of Jacksonville[2]				
Population				
Baseline Population	30,360	30,748	31,140	31,538
Program-Related Change	84	434	1,092	1,051
Change as % of Baseline	0.3%	1.4%	3.5%	3.3%
Housing Demand				
Temporary Units	9	12	6	2
Permanent Units	123	259	266	253
Total Units	132	271	272	255
School District Enrollment				
Elementary	11	47	107	102
Secondary	9	38	88	83
Total Enrollment	20	85	195	185

Notes: [1]Program-related effects would continue at these levels throughout the life of the program.
[2]Includes Little Rock AFB for population and school enrollment.

phase, Pulaski County's share of the inmigration would range from 153 in 1990 to 1,227 in 1992. Of the 1,171 total inmigrants during operations, 1,154 would move to Pulaski County. The percentage change in the population of Pulaski County for both the Proposed and Alternative Actions would remain almost identical in each case.

Of the 1,154 inmigrants in Pulaski County during the operations phase, 925 would live onbase, 126 in Jacksonville, 30 in North Little Rock, and 23 each in Cabot and Sherwood. The few additional military personnel and their dependents would not appreciably change the total share of military in Jacksonville's population in 1993. Inmigration into Jacksonville associated with the Alternative Action would increase its baseline population by 3.5 percent in 1992 and by 3.3 percent in 1993 and thereafter.

Housing. The Alternative Action would not change the expected program-related occupancy patterns within the area surrounding Little Rock AFB. An additional 11 unaccompanied personnel are expected to live in unaccompanied enlisted personnel housing onbase.

The initial demand for housing in Jacksonville would increase by five permanent units in 1990. The additional workers would not change the demand for temporary facilities appreciably but would require an additional five units in Jacksonville in 1992, reducing available vacancies by a total of 56.1 percent. The long-duration demand (1993 and thereafter) would not change in Jacksonville. The available vacancy rate in 1992 would fall from 4.6 percent to 2.0 percent. The long-duration available vacancy rate would remain identical to the Proposed Action.

The additional demand for permanent units can be easily met from the projected vacancies in Jacksonville. Therefore, the effects of the Alternative Action would be beneficial.

Education. The Alternative Action is expected to bring an additional 15 students to the area during the operations phase. The large majority of these students would reside in the Jacksonville area, with 145 expected to live onbase. Overall districtwide pupil-to-teacher ratios for Pulaski County Special School District at both the elementary and secondary levels would not differ from those identified for the Proposed Action. Attendance at those schools located onbase would lead to increased classroom sizes. Pupil-to-teacher ratio at the two elementary schools serving onbase students would increase from 23.7-to-1 to 23.8-to-1 with the Alternative Action. Other districts in the area would receive minor enrollment increases and, therefore, experience negligible effects on their ability to provide educational services.

Public Services. The slightly higher population inmigration for this alternative would not result in a measurable increase in city personnel levels over what is projected for the Proposed Action. The number of personnel per 1,000 population for both the city and the county would remain the same as identified for the Proposed Action. Increases in other communities in the area would remain under one percent and no additional personnel would be required.

Public Finance. Because public service staffing levels would remain essentially unchanged for this alternative, expenditure increases would remain at levels estimated for the Proposed Action. The slightly higher population may result in slightly higher revenues from sources such as charges for services, fines, and fees, but these amounts would be inappreciable.

Summary of Impacts. For the Alternative Action at Little Rock AFB, short- and long-duration socioeconomic impacts would be low since inmigration would cause population in the Jacksonville area to increase by 3.5 percent over baseline forecasts during the peak inmigration year (1992) and by 3.3 percent during the program operations (beginning in 1993). This level of program-induced population growth would result in low impacts on

housing, education, public services, and public finance within the Jacksonville area for Both the peak and succeeding years. Impacts would not be significant because the increased demand for housing would be met by available vacancies, existing educational facilities would absorb program-related enrollment increases, no new public service facilities would need to be constructed, and existing revenue sources of the jurisdictions would be adequate to meet program-related expenditures.

Both short- and long-duration beneficial socioeconomic effects would be generated by the Alternative Action, including increases in employment and income in the ROI and greater utilization of temporary and permanent housing vacancies within the Little Rock AFB area.

4.8.2 UTILITIES

4.8.2.1 Region of Influence

The utilities ROI for Little Rock AFB includes the host community of Jacksonville and the base.

4.8.2.2 Existing and Future Baseline Conditions

Potable Water Treatment and Distribution. Potable water is provided to Little Rock AFB and the residents of Jacksonville, Furlow, and Cabot by the City of Jacksonville through an interconnection with the City of North Little Rock and from groundwater supplies. The City of Little Rock provides water to the City of North Little Rock as identified in Section 4.8.7.2. Currently, average daily demands for the City of Jacksonville, including the base, equal 4.06 million gallons per day (MGD) or 45 percent of the 9-MGD treatment capacity. It is estimated that average daily use will increase to 4.3 MGD by 1990 and reach 4.5 MGD in 1994. Little Rock AFB uses approximately 1 MGD with a contract limitation of 2.08 MGD or 430 million gallons (MG) annually. Potable water demands onbase, without the program, are expected to remain constant.

Wastewater. Wastewater generated by the City of Jacksonville and Little Rock AFB is processed by the city at a newly constructed 6-MGD activated sludge treatment plant. Currently, wastewater flows equal 4.3 MGD, and the average daily flows for 1990 and 1994 are expected to be 4.6 and 4.8 MGD, respectively. The base presently contributes an average daily wastewater flow of 1.3 MGD to the city's treatment facility and this is expected, without the program, to remain constant.

Solid and Hazardous Waste. Solid waste for the City of Jacksonville and the base is collected by private haulers and disposed of in a 130-acre private landfill with an estimated lifespan of ten years. The landfill is accepting about 600 tons per day (T/day), of which 16 T/day are from the base. An additional 170 acres is available adjacent to the existing site for future expansion.

Onbase hazardous wastes are managed by Little Rock AFB and the Defense Reutilization and Marketing Office (DRMO) is responsible for providing for the proper handling of wastes and arranging for transport to treatment and disposal facilities. The base stores the wastes in a storage yard located adjacent to the DRMO. The wastes include oils, paints, thinners, solvents, and other regulated materials. In 1989, a conforming storage facility will be constructed and wastes will be stored until transported to treatment and disposal facilities.

Energy Utilities. Arkansas Power and Light (AP&L) provides electric power to Little Rock AFB, the majority of Arkansas, and a portion of Missouri. As part of the Middle South Utilities System, AP&L is interconnected into a system that provides service to a four-state region. In 1986, peak demand reached 3,804 megawatts (MW) with the company having a total capability of 6,101 MW. In 1990, AP&L projects peak demand to

increase to 4,468 MW and to 5,431 MW in 1994. Additional demands will be met by increasing purchased power and maintaining current generating facilities. Little Rock AFB consumed 90,030,493 kilowatt-hours in 1987 and onbase power systems are adequate to meet existing demands and provide additional power to new facilities.

Arkansas-Louisiana Gas (ALG) Company provides natural gas to 730,000 customers in a five-state area, including Little Rock AFB. Sales equaled 210,213 million cubic feet (MMcf) in 1987 and the company expects sales to increase by 1.5 percent to 2 percent annually. Currently, there is a 17-year supply of natural gas and ALG is attempting to increase the number of customers it serves. Little Rock AFB receives natural gas through an 8-inch line. While family housing is heated by electricity, other facilities consumed 208,361 thousand cubic feet of natural gas for heating.

Since 1985, diesel fuel consumption has averaged 18,500 gallons annually. Bulk storage for diesel oil is provided by 21 storage tanks with a total capacity of 69,610 gallons. Jet fuel for Little Rock AFB is delivered by supply pipeline, while other liquid fuels are delivered by tanker truck. Bulk storage for jet fuel consists of two 1,680,000-gallon aboveground tanks and one 840,000-gallon aboveground tank. In addition, there are 34 underground 50,000-gallon (total capacity 1,700,000 gal) tanks for jet fuel.

4.8.2.3 Impacts of the Proposed Action

Potable Water Treatment and Distribution. Program-related requirements of 0.16 MGD, including onbase demands, would increase average daily demands for the City of Jacksonville by 3.6 percent. Average daily demands would increase from a baseline level of 4.36 MGD to 4.52 MGD in 1992. The city's treatment facilities, with a 9-MGD capacity would be operating at 50 percent and storage would be adequate to meet summer demands. Daily requirements at Little Rock AFB would increase from a baseline level of 1 MGD by 0.14 MGD or 13.6 percent in the same year. Average daily demands of 1.14 MGD would be met through the interconnection with the city. The existing contract with the city allows 430 MG annually or 1.18 MGD.

Wastewater. In 1992, average daily flows for the City of Jacksonville would increase from a baseline level of 4.67 MGD to a peak of 4.8 MGD. Wastewater flows from the base and the city would equal 0.12 MGD or a 2.6-percent program-related increase. The existing treatment plant, with a 6-MGD capacity, would be operating at 80 percent and would be able to adequately treat the increased flows. Wastewater flows at Little Rock AFB would increase 0.1 MGD or 7.8 percent in 1992. Average daily flows would increase from a baseline level of 1.3 MGD to 1.4 MGD. The existing main from the base has adequate capacity to handle the increased flow.

Solid and Hazardous Waste. Solid waste generation for both Jacksonville and the base would increase by 2.3 T/day in the peak year (1992). Solid waste generation onbase would account for 1.9 T/day. With the city and private haulers already adequately disposing of 600 T/day, the program-related increase would require no additional equipment or personnel. The existing landfill has a projected lifespan of 15 years and would be able to handle the increased flow without a discernible effect on their lifespan. Program-related hazardous waste generation at the base would be incorporated into the existing management system, stored onbase, and then transported to treatment and disposal facilities.

Energy Utilities. Program-related electricity demands would peak in 1992 with an increase of 3.3 MW. This demand would increase the projected peak demand of 4,926 MW for the AP&L system by less than one percent. This system has adequate power supplies to meet this increase. Electrical demands at Little Rock AFB would require a 3.2-MW increase at the existing substation. Adequate capacity is available from this substation to meet these demands. Natural gas consumption would increase by 27 MMcf or 0.01 percent. The ALG has an adequate infrastructure and reserves to meet the new

demand. Natural gas use at the base would increase from a projected demand of 208 MMcf to 215 MMcf, or 3.3 percent. The ALG has adequate capacity to supply the base. Diesel fuel consumption onbase would increase as a result of the program. Supplies would continue to be filled by the Defense Fuels Supply Center through contracts with local and regional suppliers.

Summary of Impacts. Utility requirements associated with the Peacekeeper Rail Garrison program would increase demands on the City of Jacksonville systems by less than four percent in 1992 (peak year). During the operations phase, the increases would decrease slightly but remain above two percent. Both peak year and operations requirements on energy utilities would be less than one percent. Because the peak year requirements would not be substantially greater than the impacts associated with the operations requirements, all utility impacts would be of long duration. The long-duration impacts associated with the increased demand for utility service in Jacksonville would be low because the increases are greater than one percent and less than five percent. These impacts would not be significant because each utility system has adequate capacity to meet the new demands without increasing personnel or expanding existing facilities.

4.8.2.4 Impacts of the Alternative Action

Potable Water Treatment and Distribution. With the additional construction associated with six Train Alert Shelters (TASs) and the operations personnel to support the program, potable water requirements would equal 0.17 MGD, which is 0.01 MGD greater than the Proposed Action. Adequate capacity is available in the City of Jacksonville treatment and distribution system to process the additional demand.

Wastewater. Average daily flows to the City of Jacksonville treatment plant would peak in 1992 at 0.13 MGD, which is 0.01 MGD greater than the flows identified for the Proposed Action. The City of Jacksonville has adequate capacity to treat the additional flows, and the sewer from the base can transmit the new onbase flows.

Solid and Hazardous Waste. Solid waste generation of the increased construction and operations activities associated with the Alternative Action would be slightly greater than the Proposed Action. Solid waste generation for both the city and the base would be 0.24 T/day greater during the construction and operations phases. These increases would not adversely affect the city or private haulers. Adequate landfill space would continue to be available. Hazardous waste generation would be slightly greater than the Proposed Action as a result of the maintenance activities associated with the additional trains. These wastes would be incorporated into the existing management system and transported to treatment and disposal facilities.

Energy Utilities. Demands for electricity would be 0.71 MW greater than for the Proposed Action. The current generation and transmission system of the AP&L has adequate capacity to meet the increased demands. Demands for natural gas would be eight MMcf greater than the Proposed Action. The ALG has an adequate infrastructure and reserves to meet these increased demands. Diesel fuel consumption would be slightly greater than the Proposed Action. Supplies would continue to be filled by the Defense Fuels Supply Center through contracts with local and regional suppliers.

Summary of Impacts. Utility requirements associated with the Alternative Action would be slightly greater than those identified for the Proposed Action. Because the peak year requirements would not be substantially greater than the impacts associated with the operations requirements, all utility impacts would be of long duration. The long-duration impacts associated with increased demands for utility service in Jacksonville would remain low because the increases are less than four percent. These impacts would not be significant because each utility system has adequate capacity to meet the new demands without increasing personnel or expanding existing facilities.

4.8.3 TRANSPORTATION

4.8.3.1 Region of Influence

The ROI for transportation includes the principal city streets in Jacksonville and the primary highways leading to Little Rock AFB.

4.8.3.2 Existing and Future Baseline Conditions

The principal streets in Jacksonville consist of Main Street, First Street, Graham Road, and Military Road. Main Street, which passes through the central business district (CBD), had an average annual daily traffic (AADT) of 11,580 in 1987. Graham Road, west of First Street, had an AADT of 7,190. First Street, part of Arkansas State Highway 161, had segments with a 1987 AADT ranging between 9,040 and 12,200. Military Road, located on the south side of the city, is part of Arkansas State Highway 294 and had an AADT of 5,900. Vandenberg Boulevard, which leads to Little Rock AFB, had an AADT of 8,020 in 1987. U.S. 67, which passes through the city, handled between 22,800 and 37,330 vehicles per day in 1987.

Current level of service (LOS) ratings at these principal streets are essentially free-flowing with reasonably unimpeded operations. Main Street, within the CBD, provided service at LOS B during the peak hour each workday during 1987. (Refer to Section 3.4.4 and Table 3.4.4-1 for descriptions of LOS letter scores). The 1987 estimated service ratings at the other principal streets include LOS A along Graham Road, LOS A along Military Road, and LOS A and B along sections of First Street. Along U.S. 67, segments were rated at LOS B, C, and D during the peak hour in 1987. Vandenberg Boulevard, which leads to the base, provided service at LOS A during the peak hour. Based on population projections for the city, traffic volumes on these principal streets are only expected to increase slightly and the resulting LOS ratings would remain the same through 1994.

Primary access to the base is provided by U.S. 67/167 and Arkansas State Highway 161. The base has three gates: the main gate through Vandenberg Boulevard, which connects to U.S. 67/167; the west gate through Arnold Drive, which connects to Arkansas State Highway 107; and the south gate through Harris Road, which is open during the day for school traffic. The morning peak-hour traffic volume at the main gate is about 1,400. The west gate, on the western end of Arnold Drive, has an entering volume of about 400 vehicles in the morning peak hour. The LOS ratings at these gates are C, A, and A respectively. Other major onbase roads carrying substantial amounts of traffic are Thomas Avenue, Cannon Drive, Second Street, and Sixth Street. During the morning peak hour, a queue of 25 to 30 vehicles forms on the Marshall Road approach to the Vandenberg Boulevard intersection, east of the main gate. Delays of one to two minutes per vehicle occur on this approach as drivers cautiously cross the two southbound lanes of traffic on Vandenberg Boulevard. Traffic on the two northbound lanes of Vandenberg Boulevard flows smoothly during this period. High accident locations in 1985 included the Vandenberg Boulevard and Marshall Road intersection (5 accidents), and the Arnold Drive and Cannon Drive (west) intersection (5 accidents). Recent onbase road improvements include the construction of an acceleration lane and a raised island on northbound Vandenberg Boulevard; construction of a right-turn lane on southbound Vandenberg Boulevard between the main gate and Marshall Road; realignment of Second Street to intersect Arnold Drive opposite Arkansas Boulevard; and restricting traffic operations to right turns only, both in and out, on the driveway connecting Arnold Drive with the Shoppette.

4.8.3.3 Impacts of the Proposed Action

During the construction phase, an increase in incoming vehicular traffic would occur as a result of the movement of construction workers, materials, and equipment at the base. Construction activities would require an estimated 515 program-related personnel during the peak employment year (1992). Of these, 109 program-related employees would reside in the City of Jacksonville and commute daily to the base. They would generate an additional 99 passenger vehicle trips to the base during the peak hours in 1992. This increase in traffic would add to the delays and queues at the main gate to Little Rock AFB. Additional heavy vehicle trips to the base would also increase traffic volumes at the gate. However, these movements could occur during off-peak hours and would not cause additional delays at the main gate during the rush hours. During the construction phase, program-related commuters would not increase congestion along the principal city streets in Jacksonville during the peak hours. However, traffic would increase along Vandenberg Boulevard, which leads to the base, increasing delays and congestion, but would not reduce the LOS rating (A).

During the operations phase, an estimated 78 out of 426 program-related employees would reside in the City of Jacksonville. They are expected to add 71 passenger vehicle trips to the base and would cause a slight increase in congestion along Vandenberg Boulevard, but would not reduce the LOS rating (A). Increased queues and waiting times would also occur at the entrance gate. In addition, occasional program-related deliveries of supplies and equipment could also increase traffic volumes at the gates. However, deliveries are expected to occur during off-peak hours and could use other access routes to the base.

Interruptions to vehicular flow along the public roads where the spur lines cross would also occur. The trains would only move out of the garrison when either major maintenance or repair necessitates that they be transported to the Main Operating Base or depot facilities, or when directed to disperse during times of national need. In addition, a training train would travel periodically to the garrison installation to accomplish operations, security, and maintenance training. These train interruptions at railroad/road crossings would not cause substantial delays to vehicular traffic. Moreover, these train interruptions would only occur occasionally.

Both short- and long-duration impacts on transportation would be negligible because the LOS rating along Vandenberg Boulevard, which leads to the base, would not be reduced below A. Employees commuting from Jacksonville would not reduce the LOS rating along the principal city streets in Jacksonville.

4.8.3.4 Impacts of the Alternative Action

Compared to the Proposed Action (4 TASs), the Alternative Action (6 TASs) would require slightly more program-related personnel. An estimated 558 program-related personnel would be added in 1992. Of these employees, 117 are expected to reside in the City of Jacksonville. They are estimated to add 106 passenger vehicle trips to the base during the peak hours in 1992. They would also slightly increase delays and queues at the entrance gate as with the Proposed Action. The LOS rating along Vandenberg Boulevard would not be reduced below A. Program-related personnel commuting from the City of Jacksonville would not reduce the LOS rating along the principal city streets.

During the operations phase, an estimated 86 out of 468 program-related personnel may reside in the City of Jacksonville. They are expected to add 78 passenger vehicle trips (7 more than for the Proposed Action) to the base during the peak hours and would cause additional vehicular traffic along Vandenberg Boulevard and the main gate. However, the LOS ratings would not be reduced below level A. Peacekeeper and training train impacts on vehicular traffic at road crossings would be about the same as the Proposed Action.

Commuting associated with the Alternative Action would be slightly greater than with the Proposed Action. However, both short- and long-duration impacts on transportation would still be negligible because the LOS rating along Vandenberg Boulevard leading to the main gate would not change at level A. The LOS ratings along the principal city streets in Jacksonville would also not change.

4.8.4 LAND USE

4.8.4.1 Region of Influence

The land use ROI includes Little Rock AFB; adjacent private lands located east, southeast, and south of the affected areas of the base; and a connector rail spur corridor approximately 3.4 miles long (offbase). The connector rail spur corridor would be located on existing Air Force and/or Union Pacific Railroad-owned right-of-way (ROW) and extends south from the base to the main line of the Union Pacific Railroad.

4.8.4.2 Existing and Future Baseline Conditions

The City of Jacksonville has adopted both a comprehensive plan and zoning ordinance. The area east of the base is generally planned for single-family residential, and the area south of the base, near the base main gate, is designated mostly single- and multifamily residential. The area southeast of the base is planned for commercial development. West of the main gate, the land is planned for industrial land uses. This is the area through which the existing rail spur passes from the base south to Interstate 67. Southeast of its crossing of Interstate 67 (about 2.5 mi from the base), the area in the vicinity of the spur is generally planned for single- and multifamily residential and commercial uses.

Figure 4.8.4-1 presents the generalized land use on the base and surrounding areas. There is an approximately 2,000-acre commercial forest area in the eastern portion of the base; it forms a buffer between the base and the urbanized area of the City of Jacksonville. Land uses east and south of the base, located within the city limits of Jacksonville, are generally residential with low-density single-family residences occurring nearest to the base boundary. Residential density tends to increase as the distance from the base boundary increases, consisting of higher density single-family residential subdivisions and some multifamily residential and mobile home parks. The unincorporated area north of Jacksonville and east of the base consists of one farm complex with pasture devoted to cattle grazing and nonirrigated cropland utilized for hay production. Commercial and public land uses occur southeast of the base, adjacent to Interstate 67. Industrial land use occurs west of Marshall Road (access road to the main gate of the base), south of the base. Forested parcels of vacant land are mixed with the industrial land uses in that area.

The visual attributes of the ROI are typical of the north-central portion of the Coastal Plains Physiographic Province. The area has rolling terrain that generally precludes ground level views beyond 0.5 mile. The native vegetation was hardwood and pine forests, but most has been removed for urbanization or cultivation in the vicinity of the base. Landscape features are rounded and undulating, and lines are straight to curving. Colors are mostly medium to dark green with winter dark browns and gold. Textures are rough to medium and not well ordered. Although it is elevated, existing onbase structures are not visible from U.S. 67/167 (AADT 23,700), the key observation point, because of intervening trees.

4.8.4.3 Impacts of the Proposed Action

The garrison at Little Rock AFB is proposed to be located entirely onbase in a timbered area in the east-central part of the base. These commercial timber resources are managed by the Air Force under an interim Timber Management Plan. The proposed

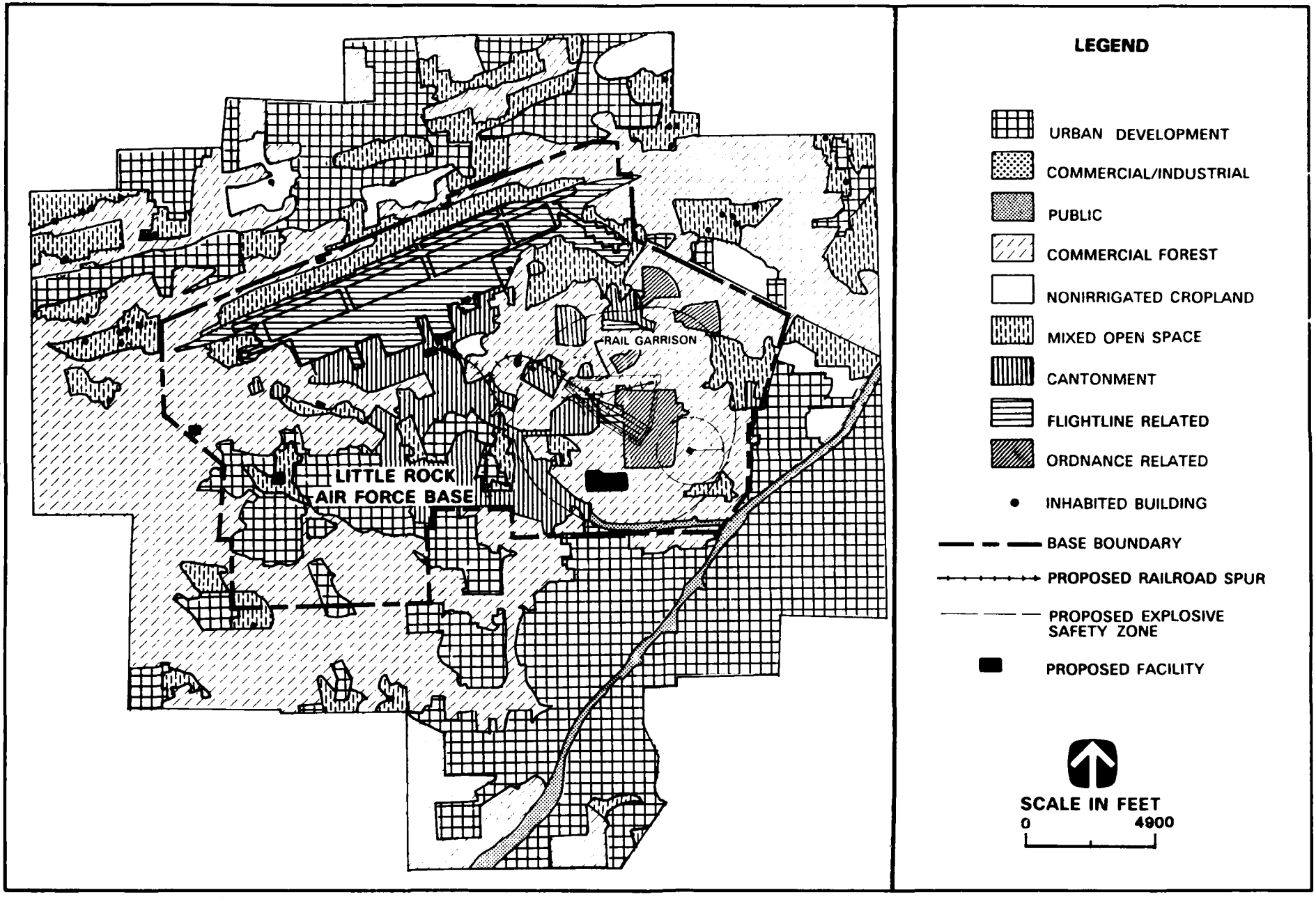


FIGURE 4.8.4-1 LAND USE AT LITTLE ROCK AFB, ARKANSAS AND VICINITY

program would require the permanent removal of approximately 85 acres of these onbase resources. No private land would be acquired and no offbase inhabited buildings would require relocation because the explosive safety zones would be confined to the base. The program would require relocation of seven existing onbase facilities including the conventional weapons storage area and the Defense Reutilization and Marketing Office facilities.

The United States government owns the existing connector spur that would be used by the program. However, the track would require rehabilitation to support the Peacekeeper trains. Because all construction activities would take place within existing ROWs, there would be no acquisition of private land for ROW purposes.

The TASs could not be seen from U.S. 67/167, the key observation point, because the TASs would be located about 4,500 feet from that highway, and intervening trees would block the view.

Summary of Impacts. The proposed program at Little Rock AFB would not require the acquisition of land for base expansion or ROW, nor would it require relocation of any offbase inhabited buildings. Because of the distance between the TASs and the key observation points, the TASs would not be visible from offbase. Therefore, short- and long-duration impacts on land use at Little Rock AFB would be negligible.

4.8.4.4 Impacts of the Alternative Action

Short- and long-duration impacts of the Alternative Action at Little Rock AFB would be about the same as for the Proposed Action except that about 105 acres of commercial timber land would need to be removed to accommodate the garrison facilities. In addition to those onbase facilities requiring relocation for the Proposed Action, the small arms range and the Air Base Ground Defense facilities would also require relocation for the Alternative Action. Impacts would remain negligible.

4.8.5 CULTURAL RESOURCES

4.8.5.1 Region of Influence

The ROI for Little Rock AFB consists of portions of the Ozark Plateau, Ouachita Plateau, and the Coastal Plain. The Ozark Escarpment runs northeast to southwest parallel to U.S. 67 to meet the Mississippi Valley, of which the Arkansas River Valley is a part. A portion of Bayou Meto, a major tributary of the Arkansas River, runs through the base. It is expected that prehistoric and historic resources would occur near drainages and on ridges and natural levees near water. The ROI contains the full range of resources which could occur on or near Little Rock AFB.

4.8.5.2 Existing and Future Baseline Conditions

Prehistoric Resources. A file search for recorded sites in the immediate vicinity of the base resulted in identification of 32 prehistoric sites, 4 historic sites, 1 prehistoric/historic site, and 1 isolated find. The prehistoric sites are primarily small, temporary camps consisting of lithic scatters, debitage, fire-cracked rock, and projectile points and fragments located along drainages and on natural level (topographic settings which occur onbase). One site has been identified as a group of three small mounds with associated sherds, lithic scatters, and fire-cracked rock.

A reconnaissance survey was conducted at Little Rock AFB in 1984. One isolated projectile point fragment was found, but no sites were identified. The State Historic Preservation Officer has determined that no additional survey is required on the base.

Historic Resources. Four historic sites have been recorded in the vicinity of the base. One is a Civil War battlefield, and the remaining three consist of ceramic sherds, glass,

metal objects, and midden materials customarily associated with farmhouses in rural areas. Structures remain at only two of the sites. One recorded site has a prehistoric component and historic evidence dating from the Civil War into the 1930s. An ordnance plant was constructed in 1942, and the remaining buildings are not yet 50 years old; therefore, they are not eligible for inclusion in the National Register of Historic Places.

Native American Resources. Few Native Americans reside in Arkansas at present, but the program area was ancestral territory for groups of Caddo, Chickasaw, and Quapaw. Descendants of these people presently reside in Oklahoma. Sacred or traditional use areas may exist, but the possibility is not considered strong because the base has been extensively disturbed.

Paleontological Resources. A search into geological and paleontological literature has been made, and it has been determined that no rare or unusual fossil materials have been identified on or in the vicinity of Little Rock AFB. Geological formations in the vicinity are from the Late Paleozoic era when invertebrate forms were abundant and varied, and fish, amphibians, and land plants first appeared. Fossil materials are deeply buried, and they are not considered significant because of their abundance.

4.8.5.3 Impacts of Proposed Action

The program impact areas consist of approximately 340 acres onbase in the garrison and support facility areas. A corridor 100 feet wide and 1.5 miles long would be required to connect the TAS with an existing onbase rail line. New road construction of approximately 1.5 miles in the garrison and 5 miles outside the garrison would be necessary; all new road construction would be onbase.

Prehistoric Resources. No known sites would be affected by the Proposed Action. The possibility of encountering intact prehistoric deposits is believed to be remote because of the amount of previous ground disturbance onbase.

Historic, Native American, and Paleontological Resources. No important or sensitive resources are likely to be affected by the Proposed Action.

Summary of Impacts. Long-duration impacts of the Proposed Action on cultural resources would be negligible because few intact sites are likely to remain onbase. The area was in agricultural production for many years before construction of the Arkansas ordnance plant in the 1940s. After the plant closed in 1952, a number of private manufacturers occupied the vacated buildings. Some of the ordnance plant buildings were demolished, and others were remodeled for subsequent use. Another round of construction occurred when the base was built on approximately the same acreage as the ordnance plant. Subsurface disturbance has occurred over much of the base area to a depth of at least three feet. It is unlikely that undisturbed resources remain in the program impact areas. There would be no short-duration impacts.

4.8.5.4 Impacts of the Alternative Action

Prehistoric, Historic, Native American, and Paleontological Resources. No short- or long-duration impacts on these resources are expected to occur as a result of the Alternative Action.

4.8.6 BIOLOGICAL RESOURCES

4.8.6.1 Region of Influence

The ROI for biological resources that would be affected by the Peacekeeper Rail Garrison program at Little Rock AFB is defined as the area where these resources would be directly affected by the construction of new facilities onbase or the upgrade of

3.4 miles of rail spur offbase (Section 4.8, Figure 4.8-1). Areas of indirect disturbance in the ROI where program-induced impacts may occur are defined as those recreational areas within an approximately 1-hour driving time of Little Rock, Arkansas. Primary recreational areas include the Arkansas River, Lake Conway, Lake Maumelle, Ouachita National Forest, Holla Bend National Wildlife Refuge, and numerous state wildlife management areas.

4.8.6.2 Existing and Future Baseline Conditions

Biological Habitats. Prior to development of Little Rock AFB, most of the land was farmed or used as pasture. The base has undergone extensive development. Forest/woodland is the major habitat type onbase. An additional 500 acres of loblolly pine have also been planted onbase for commercial purposes. Much of the area within 1 mile of the base has been converted to agricultural use (Figure 4.8.6-1). Forest and grassland comprise the remainder of this area near the base. The native vegetation onbase and in the surrounding region provides excellent habitat for numerous wildlife species such as the white-tailed deer, eastern cottontail rabbit, fox squirrel, gray squirrel, Virginia opossum, and red and gray fox. These habitats are also used by numerous bird, amphibian, and reptile species. Several small areas of forested and nonforested wetland and a 37-acre manmade lake which supports several fish species also occur onbase. Future baseline conditions are expected to be similar to existing conditions based on current base management plans.

The remaining ROI includes agricultural land, grasslands, and loblolly-shortleaf pine and hardwood forests. Major aquatic habitats in the region include the Arkansas River, Fourche Lafave River, Petit Jean River, Saline River, Lake Conway, Lake Maumelle, and Greer's Ferry Lake. These areas support important fishery resources and are the primary recreational destinations for fishermen in the region. The numerous state wildlife management areas in the ROI and the Ouachita National Forest provide recreation for hunters. Other special management areas that occur in the ROI include Holla Bend National Wildlife Refuge, Toltec Mounds State Park, and Hot Springs National Park. Future baseline conditions would be similar to existing conditions based on projections for population increases and increased recreational use in the ROI.

Threatened and Endangered Species. Three species (the federally listed bald eagle and the state-recognized red fox and bobcat) may occasionally occur onbase (Table 4.8.6-1). Six additional federally listed and three state-recognized species occur or may occur in the ROI (Table 4.8.6-1). Suitable habitat for these species does not occur in proposed construction areas.

4.8.6.3 Impacts of the Proposed Action

Biological Habitats. Construction of program-related facilities at Little Rock AFB would result in the disturbance of 243.8 acres of land (100.6 acres permanently, and 143.2 acres temporarily) (Section 4.8, Table 4.8-2). Most of the area likely to be (95.1 acres) is already developed land; in addition, 116.0 acres of forest/woodland and 32.7 acres of grassland would be disturbed (Table 4.8.6-2). Construction of garrison facilities would require the relocation of the existing ammunitions storage area. The habitats that would be disturbed by construction activities provide important habitat for numerous wildlife species and disturbance of these areas would cause an increase in small mammal mortality, disruption of daily/seasonal activities, and displacement of mobile species into adjacent habitats. These impacts, however, are not expected to affect biological resources onbase or in nearby habitats because a relatively small amount of habitat would be disturbed and removal of this habitat would not diminish biological diversity.

Program implementation would result in a small population increase in Pulaski County, which may cause an increase in recreational activities. Increases in recreational activities (e.g., hunting, fishing, and hiking) would not result in degradation of biological

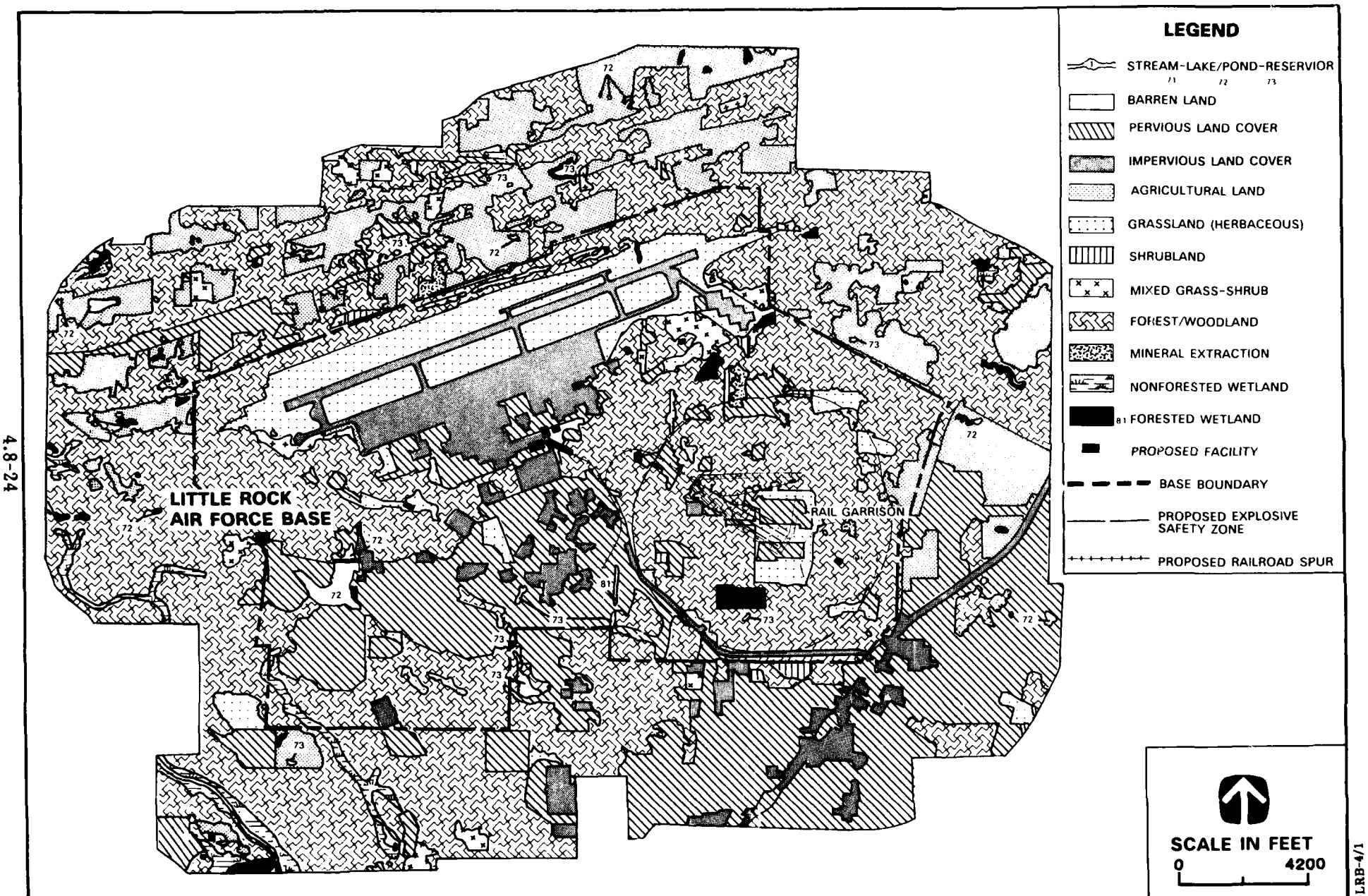


FIGURE 4.8.6-1 HABITAT AND LAND COVER TYPES AND POTENTIAL DISTURBANCE AREAS ON LITTLE ROCK AFB, ARKANSAS AND IN THE VICINITY

Table 4.8.6-1

Federally Listed, Federal-Candidate, and State-Sensitive Species Little Rock AFB, Arkansas and Vicinity

Common Name	Scientific Name	Federal Status	State Status	Distribution
American peregrine falcon	Falco peregrinus anatum	E	--	Occurs in the region as migrant
Bachman's warbler	Vermivora bachmanii	E	--	May occur in region, but probably extirpated from Arkansas
Bald eagle	Haliaeetus leucocephalus	E	--	May occur onbase occasionally as migrant
Bobcat	Lynx rufus	-	SA	May occur onbase
Gray bat	Myotis grisescens	E	--	May occur in region
Indiana bat	Myotis sodalis	E	--	May occur in region
Ozark big-eared bat	Plecotus townsendii ingens	E	--	May occur in region
Red-cockaded woodpecker	Picoides borealis	E	--	May occur in region
Red fox	Vulpes vulpes	-	SA	May occur onbase
Red-shouldered hawk	Buteo lineatus	-	SA	Occurs in region
Swainson's warbler	Limnothypis swainsoni	-	SA	Occurs in region
Yellow-crowned night-heron	Nycticorax violaceus	-	SA	Occurs in region

Notes: E = Endangered
SA = Special animal

Sources: U.S. Air Force 1984d; U.S. Fish and Wildlife Service 1984; Arkansas Natural Heritage Program 1988.

Table 4.8.6-2

Habitat and Land Cover Types Potentially Disturbed by the Peacekeeper Rail Garrison Program at Little Rock AFB, Arkansas

Habitat Type	Garrison, Support, and Relocated Facilities (acres)	Rail Line (acres)	Total (acres)
Proposed Action			
Forest/Woodland	109.2	6.8	116.0
Grassland	32.7	0.0	32.7
Developed land	72.1	23.0	95.1
TOTAL:	214.0	29.8	243.8
Alternative Action			
Forest/Woodland	145.3	6.8	152.1
Grassland	29.4	0.0	29.4
Developed land	87.3	22.0	109.3
TOTAL:	262.0	28.8	290.8

resources. The Arkansas River, Ouachita National Forest, Holla Bend National Wildlife Refuge, state wildlife management areas, and the numerous lakes in the region would receive the greatest increase in recreational activities. The numerous state parks in the region may also experience a minor increase in recreational activities.

Threatened and Endangered Species. No impacts on federally listed threatened and endangered species are expected to result from the program at Little Rock AFB. The two state-recognized species which may occur onbase (Table 4.8.6-1) would receive only minor impacts.

Summary of Impacts. Implementation of the program would affect 243.8 acres of land and would result in some disturbance of biological resources onbase. The woodland areas provide excellent habitat for numerous wildlife species, and disturbance of these areas would affect the condition of biological communities to some extent. However, 116.0 acres represents approximately four percent of the total acreage of woodland habitat onbase; therefore, removal of this habitat would not greatly reduce wildlife populations or affect biological diversity. Program implementation would also result in a slight increase in recreational activities. This increase is not expected to affect biological resources because the increase would be minor and recreational activities would be dispersed over a large area. Short-duration impacts would be low, and long-duration impacts would be moderate, primarily because of the loss of forest habitat. These impacts would not be significant.

4.8.6.4 Impacts of the Alternative Action

Much of the area (109.3 acres) that would be affected by the Alternative Action has been previously disturbed; however, 152.1 acres of forest habitat and 29.4 acres of grassland would be disturbed. The forested areas provide important habitat for wildlife species, but the additional amount of disturbance is minor compared to the Proposed Action. Therefore, disturbances to biological resources are expected to be similar to those described for the Proposed Action. Short-duration impacts would be low and long-duration impacts would be moderate. These impacts would not be significant.

4.8.7 WATER RESOURCES

4.8.7.1 Region of Influence

The ROI for Little Rock AFB is located in the Arkansas River Basin. It encompasses the upper watershed of Bayou Meto and the drainage of the Arkansas River north of Saline County to just downstream of the Little Rock metropolitan area (Figure 4.8.7-1). The ROI covers an area of about 500 square miles, including the support community of Jacksonville and the Town of Cabot.

4.8.7.2 Existing and Future Baseline Conditions

Major Water Users. Total water use in Pulaski County amounted to approximately 92,830 acre-feet (acre-ft) in 1985. Municipal water use accounted for about 59 percent of the total, most of which was supplied by the City of Little Rock. Agricultural use accounted for about 34 percent, and rural-domestic use accounted for 6 percent. Current and projected water use for Little Rock AFB and Jacksonville (including Cabot) is presented in Figure 4.8.7-1. Little Rock AFB and Cabot obtain their water from Jacksonville. The city ultimately obtains about 75 percent of its water requirements from Lakes Maumelle and Winona, which are respectively located 10 and 26 miles west of Little Rock (i.e., the lakes supply Little Rock, which supplies North Little Rock, which, in turn, supplies Jacksonville). Jacksonville supplements its water requirements with local groundwater pumpage. The water supply of the ROI is adequate to meet all anticipated needs during the projected period and no major water resources developments are being considered.

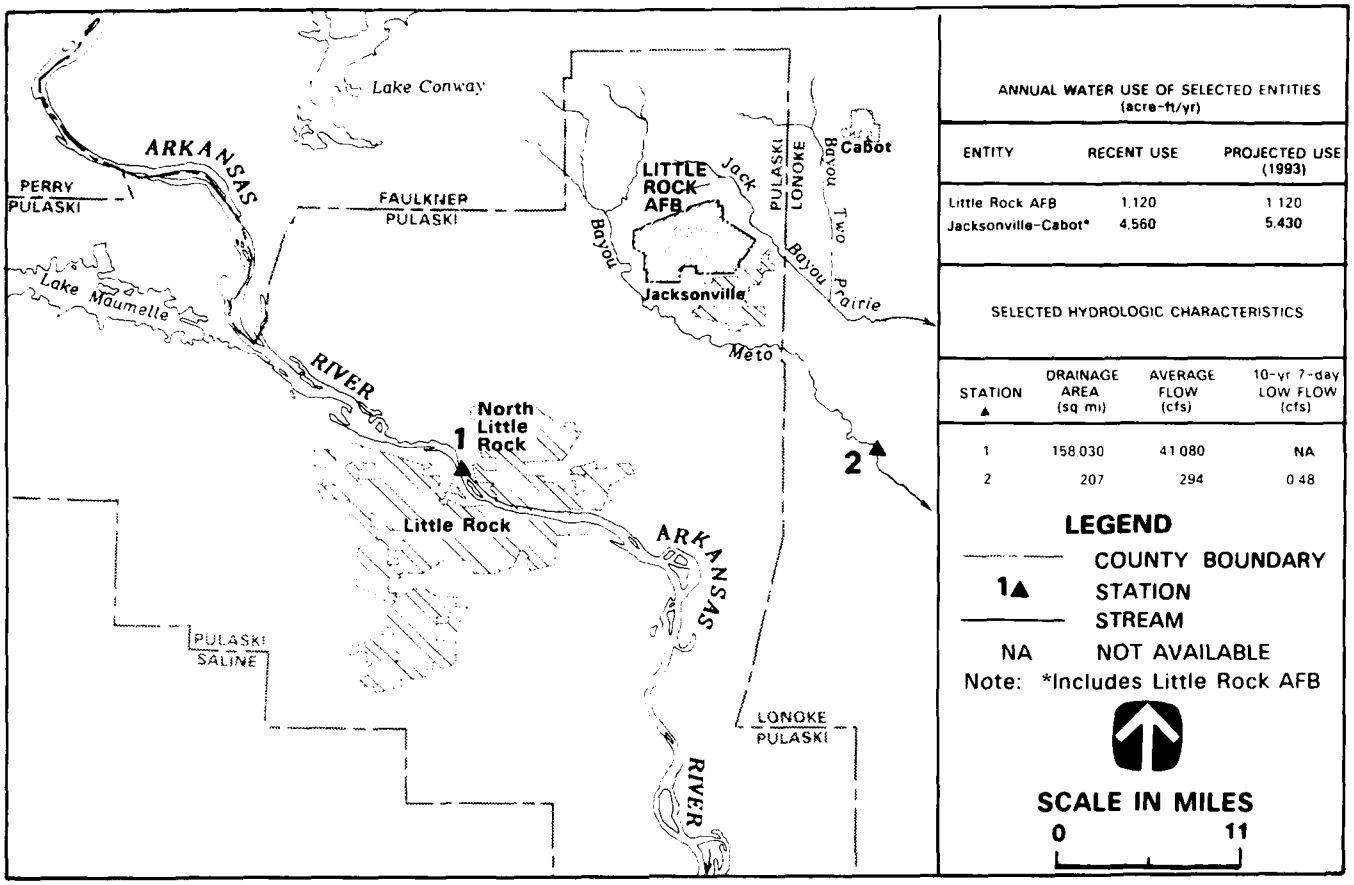


FIGURE 4.8.7-1 HYDROLOGIC FEATURES OF THE LITTLE ROCK AFB, ARKANSAS REGION OF INFLUENCE

Table 4.8.7-1

Program-Related Water Use
Within the Little Rock AFB Region of Influence
Peacekeeper Rail Garrison Program (Proposed Action)
(values in acre-ft)

	1990	1991	1992	1993 Onwards
Little Rock AFB				
Construction/Operations	49	44	34	24
Domestic	0	36	122	122
Jacksonville-Cabot Domestic	12	24	25	18
Other Towns Domestic	9	17	18	13
TOTAL:	70	121	199	177

Surface Water Hydrology and Quality. Bayou Meto is the closest perennial stream to Little Rock AFB. It flows southward to its confluence with the Arkansas River approximately 100 miles downstream of the base. The bayou receives about 5,000 acre-feet per year (acre-ft/yr) (4.5 million gallons per day [MGD]) of effluent from Jacksonville's new wastewater treatment plant (including sewage generated onbase). The water quality of the bayou is poor, and several of its designated uses are severely impaired. The swimmable use criteria is not being met because of fecal coliform bacteria contamination. Inadequately treated wastewater discharges from several municipalities in the upper drainage of the bayou are a major contributor to this problem. Commercial fishing in Bayou Meto (downstream of Jacksonville) has been restricted because of dioxin contamination from offbase industrial facilities. Stormwater runoff from the northeastern part of the base drains to Jack Bayou, which flows for 5 miles to Bayou Two Prairie and, in turn, discharges to Bayou Meto 70 miles downstream. Runoff from the southeastern part of the base also drains to Bayou Two Prairie via an unnamed, intermittent tributary (Section 4.8, Figure 4.8-1). The remainder of the base is drained by several intermittent streams that flow from one to three miles to Bayou Meto. Small, scattered areas of the base lie in designated 100-year floodplains. These areas are the extreme west, east, and northeast corners.

Groundwater Hydrology and Quality. Groundwater resources in the ROI are limited. Jacksonville's wells tap the Mississippi River alluvium, which is the principal aquifer of the ROI. This aquifer yields good-quality water to Jacksonville but is also heavily pumped by farmers. Moderate historical declines in groundwater levels of the aquifer have been reported. However, groundwater levels in Jacksonville's well field have stabilized over the last five years indicating that the aquifer is not being depleted as was originally believed. The aquifer can adequately supply the anticipated groundwater requirements of Jacksonville throughout the projection period without experiencing any substantial declines in the water table.

4.8.7.3 Impacts of the Proposed Action

Major Water Users. Total program-related water use would peak at about 200 acre-ft/yr in 1992 and stabilize at about 180 acre-ft/yr during the operations phase (Table 4.8.7-1). About 90 percent of this water would be supplied by the Jacksonville City Water Department. The program would increase baseline water use at Jacksonville by a maximum of three percent. Baseline-plus-program water requirements in Jacksonville (including Little Rock AFB and Cabot) would amount to 5,590 acre-ft (5 MGD) in 1993. The city's supply system has a capacity of at least 9,500 acre-ft/yr: 3,370 acre-ft/yr are guaranteed from North Little Rock and 6,130 acre-ft/yr can be obtained from wells, based on installed pumping capacity and current court restrictions. Therefore, the city's current water supply is adequate to meet program needs. Baseline-plus-program water use at Little Rock AFB would peak at 1,280 acre-ft (1.1 MGD) in 1992. The base has a contract with the city for an annual supply of 1,320 acre-ft/yr (1.2 MGD), which is adequate to meet program needs. The small increase in ROI water use resulting from the Proposed Action would not interfere with existing major water users.

Surface Water Hydrology and Quality. Program-induced increases in treated wastewater discharged to Bayou Meto would peak at about 130 acre-ft/yr in 1992, a 2-percent increase over the baseline discharge of 5,710 acre-ft/yr. Jacksonville has adequate wastewater treatment capacity to accommodate the proposed program (Section 4.8.2.3), and the small increase in discharge to the bayou should not materially affect baseline water quality.

Construction of the garrison site at Little Rock AFB would result in land disturbance and associated erosion on 143 acres in the Bayou Two Prairie drainage (Section 4.8, Figure 4.8-1). The northern part of the site lies within 700 feet of an intermittent drainage that flows for about 0.5 mile to Jack Bayou which, in turn, flows for about 5 miles to Bayou Two Prairie (the nearest perennial stream). Runoff from the southern

part of the garrison site would flow overland for about 800 feet to an intermittent drainage and then five miles to Bayou Two Prairie. The proposed garrison site is located in a moderately sloping area that generates substantial amounts of stormwater runoff, and the potential for sheet erosion is high (Section 4.8.8.3). However, Bayou Two Prairie is fairly distant, and the flow path of the runoff from the northern part of the garrison site contains several natural depressions that would act as sediment retention basins. In addition, runoff from the southern part of the garrison site passes through a retention pond before leaving the base. Therefore, program-induced sedimentation to Bayou Two Prairie is expected to be minor. The construction of approximately one mile of new connecting rail spur and the relocation of the munitions storage area on 30 acres in the Bayou Two Prairie drainage would temporarily contribute to a small increase in sediment yield to the bayou.

Groundwater Hydrology and Quality. Program-related water requirements at Jacksonville (including Little Rock AFB and Cabot) would be met by additional pumpage from the alluvial aquifer. Peak withdrawals from this aquifer would be relatively small (180 acre-ft/yr in 1992) and would represent a 9-percent increase over the baseline pumpage of the city's wells. The aquifer is not considered to be overdrafted and its groundwater levels have been stable for the last five years. Therefore, the effect of the additional pumpage on the available quantity and quality of the local groundwater resources is expected to be minor.

Summary of Impacts. The ROI water supply is adequate to meet program-related water requirements. Slight degradation of surface water quality and minor hydrologic changes would occur; therefore, the short- and long-duration impacts on water resources would be low. These impacts would not be significant.

4.8.7.4 Impacts of the Alternative Action

Major Water Users. Total program-related water use during the operations phase would be about 200 acre-ft/yr, a 10-percent increase over the Proposed Action. Baseline-plus-program water use at Little Rock AFB would increase by an additional one percent compared to the Proposed Action. The comparable increase in Jacksonville's water supply system would also be minor. The available water supply is adequate to meet the water needs of this alternative with no effects on existing major water users.

Surface Water Hydrology and Quality. With six Train Alert Shelters (TASs), the disturbed area at the garrison would increase by 23 percent to 176 acres. Short-term sediment yield could be expected to increase by a similar percentage. However, the water quality effects on Bayou Two Prairie and Bayou Meto are not expected to be measurably different from those of the Proposed Action.

Groundwater Hydrology and Quality. Program-induced groundwater pumpage would increase by 10 percent over the Proposed Action. This small increase would not result in any additional impacts on the Mississippi River alluvium aquifer.

Summary of Impacts. Impacts on water resources are expected to remain essentially the same as the Proposed Action: short- and long-duration impacts would be low and not significant.

4.8.8 GEOLOGY AND SOILS

4.8.8.1 Region of Influence

The ROI at Little Rock AFB for the geology and soils resource includes the installation and associated program-related areas in the immediate vicinity. The land within a 1-mile radius of the installation and a 1,000-foot-wide corridor along the connecting rail spur was characterized for purposes of establishing the local baseline context. In addition, a regional ROI was established for geologic hazards for the purpose of developing a regional framework for seismicity at the installation.

4.8.8.2 Existing and Future Baseline Conditions

Little Rock AFB is located in the extreme eastern terminus of the Ouachita Mountain region which is characterized by northeast-southwest trending parallel ridges and valleys. Surficial deposits of the Pennsylvanian Atoka Formation, Tertiary Wilcox Group, Tertiary Midway Group, and Quaternary alluvium occur onbase. These units are composed of shale, clay, silt, and sand. The installation lies in seismic zone 1 (Uniform Building Code 1985), in which a maximum credible earthquake with a magnitude of 6.1 is the largest predicted for the area. However, the New Madrid Seismic Province is located approximately 150 miles northeast of the installation, and it is likely that Little Rock AFB would be subjected to strong ground motion from a large earthquake associated with the New Madrid Seismic Province. Maximum horizontal acceleration in rock is expected to be 0.06 g, with a 90-percent probability of not being exceeded in 50 years, assuming the earthquake epicenter was not located in the New Madrid Seismic Province (Algermissen et al. 1982). An inactive set of thrust faults and one fault with horizontal movement trend approximately east-west through the center of the installation. One fault with horizontal movement trends northwest-southeast in the southwestern portion of the base. The geologic materials near Little Rock AFB are not susceptible to liquefaction even though depth to groundwater is generally five feet in the base vicinity. Areas susceptible to landslides or terrain failure were not discovered at program-affected areas. However, steeper bluffs north of the installation could be prone to terrain failure associated with strong seismic vibrations.

Energy and Mineral Resources. Oil and gas resources have been identified in the ROI. Oil and gas leases occur southwest of the garrison site and are crossed by the existing rail spur. No uranium or coal mines/leases, Known Geothermal Resource Areas, or metallic/nonmetallic mineral resource mining operations or leasing activities exist in the ROI.

Soil Resources. The U.S. Soil Conservation Service (SCS) has mapped 20 soil types in the ROI. Nine of these soil types occur in areas where program-related facilities may be located. They occur on nearly level to moderately sloping surfaces with some areas identified as moderately steep surfaces. They have a loamy texture and range from poorly drained to well drained. Soil erosion susceptibility was evaluated for wind and sheet erosion. Wind erosion of unvegetated/disturbed ground in the ROI is not a major concern of the SCS in Arkansas. However, the prevailing westerly and southerly wind directions would make east-west and north-south elongated tracts of land susceptible to wind erosion. Sheet erosion has been identified as a potential problem for soils in the ROI. The proposed garrison, rail spur, and other facilities would all be located on soils with a moderate susceptibility to wind erosion and a low to high susceptibility to sheet erosion.

4.8.8.3 Impacts of the Proposed Action

Energy and Mineral Resources. Impacts on energy and mineral resources are not expected because oil and gas leases/production would not be affected by the proposed program. No other energy or mineral resources have been identified in the ROI.

Soil Resources. Program-related wind erosion at the proposed garrison, other facilities, and rail spur is primarily projected to occur at rates less than 0.1 ton per acre per year (T/ac/yr). This is because regional wind velocities are low and do not substantially influence rates of soil erosion. During garrison construction, soil would also erode at a rate of 1.2 T/ac/yr for large exposed areas of a soil type. The application of one ton per acre (T/ac) of straw mulch would temporarily reduce this rate to less than 0.1 T/ac/yr. Program-induced sheet erosion at the proposed garrison site is projected to occur at rates of 32 T/ac/yr to 229.5 T/ac/yr. Soils along the rail spur are projected to erode at rates of 25.8 to 229.5 T/ac/yr and at rates of 14.2 T/ac/yr to 229.5 T/ac/yr at the other proposed facility sites. The application of one T/ac of straw mulch after construction

would temporarily reduce the rates of erosion for the garrison soils to 6.4 T/ac/yr to 45.9 T/ac/yr, rail spur soils to 5.2 T/ac/yr to 45.9 T/ac/yr, and other facility soils to 2.8 T/ac/yr to 45.9 T/ac/yr. The range of soil erosion rates identified for the proposed program (14.2 to 230.7 T/ac/yr) are comparable to those determined for general urban development (16 to 156 T/ac/yr) as supplied by the U.S. Department of Housing and Urban Development (1981).

Soil erosion impacts are based on the combined effects of wind and sheet erosion values and how they compare to the maximum tolerable soil loss for each soil type. Soil erosion rates would exceed the maximum tolerable soil loss (1-5 T/ac/yr) of the affected soil types during construction. Program-induced soil erosion is therefore expected to cause short-duration impacts. Long-duration impacts are not expected because accelerated rates of erosion would occur for only a short period of time prior to mulching and reestablishing a vegetative cover in the disturbed area.

Summary of Impacts. Overall short-duration impacts from the proposed program on the geology and soils resource are expected to be high because accelerated rates of erosion during program-related construction would exceed the maximum tolerable soil loss of the soils affected. Long-duration impacts are expected to be negligible because accelerated rates of erosion would not continue into the operations phase of the program. Short-duration impacts are not expected to be significant because increased rates of erosion would not result in appreciable net loss of topsoil over the short period of time under consideration.

4.8.8.4 Impacts of the Alternative Action

The Alternative Action would slightly increase the size of the garrison. Therefore, impacts on the geology and soils resource would be about the same as for the Proposed Action. Consequently, all levels of impact and significance would remain the same as for the Proposed Action. Short-duration impacts would be high and not significant, while long-duration impacts would be negligible.

4.8.9 AIR QUALITY

4.8.9.1 Region of Influence

The air quality ROI includes Little Rock AFB, the City of Jacksonville, the City of Little Rock, and the interstate highways and principal arterials in Pulaski County.

4.8.9.2 Existing and Future Baseline Conditions

Little Rock is located within the central Arkansas Air Quality Control Region (No. 016). There are no Prevention of Significant Deterioration Class I areas within 50 miles of the base. Ambient air quality at Little Rock AFB has not been monitored. However, ambient concentrations of specific pollutants have been monitored at a number of locations in the City of Little Rock, 15 miles from the base. The 1986 air quality measurements in Little Rock indicate that the maximum 24-hour particulate matter (PM_{10}) observation was 76 micrograms per cubic meter ($\mu g/m^3$). The highest annual PM_{10} arithmetic mean was 30 $\mu g/m^3$. The region is now in compliance with all existing primary air quality standards and in attainment for all criteria pollutants. Little Rock AFB is also classified attainment for all criteria pollutants.

The total suspended particulate (TSP), sulfur oxide (SO_x), nitrogen oxide (NO_x), volatile organic compounds (VOC, a measure of reactive hydrocarbons), and carbon monoxide (CO) emissions for Pulaski County, where Little Rock AFB is located, are summarized in Table 4.8.9-1.

Minor traffic increases will occur because of the construction of shopping malls and the expansion of the airport in Pulaski County. As a result of these traffic increases, CO

Table 4.8.9-1

Pulaski County, Arkansas Air Emissions Inventory, 1987
(tons per year)

Emission Source	TSP	SO_x	NO_x	VOC	CO
Fuel Combustion	350	1,821	5,682	521	1,951
Industrial Process	0	0	0	9,577	0
Solid Waste Disposal	708	28	166	1,064	3,325
Air/Water Transportation	9	27	223	824	2,953
Land Transportation	5,588	1,027	11,859	8,233	47,868
Miscellaneous	24,682	0	19	104	662
Little Rock AFB	23	22	854	1,087	3,657
TOTAL:	31,360	2,925	18,803	21,410	60,416

Source: U.S. Environmental Protection Agency 1988b.

emissions will also increase. However, these emissions should not contribute to the violation of National Ambient Air Quality Standards (NAAQS). Generally, the air quality will continue to be good in this region.

4.8.9.3 Impacts of the Proposed Action

Direct air emissions would result from construction of the rail spur line and support facilities and operation of the proposed program at Little Rock AFB. Emission sources associated with construction include light-duty vehicle traffic, diesel trucks, offsite heavy-duty vehicles, diesel construction equipment, and fugitive dust from ground disturbance.

The highest monthly fugitive dust emissions from proposed program construction activity would be about 21 tons. Fugitive dust calculations assume a 50-percent reduction due to watering of the construction sites. All of the fugitive dust emissions at Little Rock AFB were conservatively assumed to be within the 10-micrometer particle size and referenced against the PM_{10} standard for impact analysis. It is expected that actual PM_{10} emissions would be smaller than the emissions calculated under the U.S. Environmental Protection Agency (EPA) guidelines for TSP.

Construction-related impacts were calculated for 24-hour and annual averaging periods. A program-related increase of 0.6 $\mu g/m^3$, which includes particulates from combustion products, would occur increasing the 24-hour average background concentration to 76.6 $\mu g/m^3$. The predicted 24-hour fugitive dust background concentration would not equal or exceed the 24-hour NAAQS of 150 $\mu g/m^3$ (PM_{10}). The annual background concentration would increase to 30.2 $\mu g/m^3$, which would not equal or exceed the PM_{10} standard of 50 $\mu g/m^3$. Fugitive dust generated at Little Rock AFB for the peak construction year would have negligible impacts on Pulaski County air quality. The EPA-minimum threshold levels for fugitive dust would not be exceeded, and no violation of NAAQS would occur.

Overall short- and long-duration air quality impacts would be negligible.

4.8.9.4 Impacts of the Alternative Action

The Alternative Action, (6 TASs), would cause a 0.2-percent increase in fugitive dust emissions over the Proposed Action. This would result in total increase of 0.7 $\mu g/m^3$, increasing the 24-hour average ambient concentration to 76.7 $\mu g/m^3$. Both the short- and long-duration impacts would be negligible and would not cause any violation of the NAAQS.

4.8.10 NOISE

4.3.10.1 Region of Influence

The ROI for the noise resource is broadly defined as the area where program-related noise level increases occur. Specifically, the ROI includes Little Rock AFB, the City of Jacksonville, the City of Little Rock, and the interstate highways and principal arterials in Pulaski County.

4.8.10.2 Existing and Future Baseline Conditions

The major sources of noise in the vicinity of Little Rock AFB and the City of Jacksonville are base aircraft operations and vehicular and railroad traffic.

The highest noise levels (70 to 80 decibels weighted on the A-scale [dBA] to 80 dBA expressed as day-night equivalent sound level [L_{dn}]) resulting from base aircraft operations encompass an area including the base runway and flight line. The area offbase included between the 65 dBA to 70 dBA (L_{dn}) contours is predominantly agricultural with commercial and industrial establishments interspersed in the farmland and at roadway intersections.

The principal vehicular noise source in Jacksonville is traffic utilizing U.S. Highway 67/167. Sensitive receptors (residential areas within 200 ft of the highway) experience noise levels of 55 dBA to 60 dBA (L_{dn}).

The Union Pacific main line passing through Jacksonville and the U.S. Government rail spur entering the base from east Jacksonville are the principal railroad noise sources. The estimated noise levels at residential receptors within 100 feet of the main line are 60 dBA to 65 dBA (L_{dn}) and 55 dBA to 60 dBA (L_{dn}) along the U.S. government rail spur.

4.8.10.3 Impacts of the Proposed Action

Temporary impacts resulting from construction-related noise would occur within the immediate vicinity of construction sites. The various activities that would take place include construction of industrial structures, rail spur, and roadways (grading, compacting, and paving); landscaping; and cleanup at Little Rock AFB.

Construction-related noise at Little Rock AFB is not anticipated to affect onbase or offbase residential areas since such noise levels from point sources attenuate quickly with distance. Potential construction-related noise levels of 80 dBA to 85 dBA at 100 feet from the source within the TAS construction site would be reduced to about 51 dBA at the offbase residential areas which are located about 5,000 feet from the construction location. The noise levels at base residential areas which are located about 9,600 feet from the TAS construction site would be about 45 dBA. These noise levels would be masked by ambient noise levels of about 55 dBA to 65 dBA (L_{dn}). Once the construction activity ceases, noise levels would return to near ambient conditions. The short-duration noise impacts from all construction activities would be negligible.

During the operations phase, a minor increase in noise levels would result from program-generated vehicular traffic. This increase would be about 0.4 dBA (L_{dn}) at sensitive receptors (residential receptors) within 200 feet of U.S. Highway 67/167. This small

increase in vehicular noise levels would have negligible impacts on the sensitive receptors.

Noise impacts from training train activities would be negligible. The distance from the rail spur corridor of sensitive receptors is over 4,000 feet. Offbase training train activities would cause minor, temporary increases in average noise levels on sensitive receptors along the main railroad line.

Overall short- and long-duration impacts for noise would be negligible.

4.8.10.4 Impacts of the Alternative Action

The noise levels resulting from the construction of six TASs at the garrison site would be about the same as the Proposed Action. The short- and long-duration noise impacts at onbase and offbase residential receptors would be negligible.

4.8.11 Impacts of the No Action Alternative

With the No Action Alternative, the Peacekeeper Rail Garrison system would not be deployed. Activities at Little Rock AFB will continue to support other existing or proposed missions. For the host communities in the vicinity of the base, environmental changes would occur as a result of normal community growth. Future baseline conditions reflecting the No Action Alternative were described in earlier portions of this chapter.

4.8.12 Irreversible and Irretrievable Resource Commitments

Deployment of the Peacekeeper Rail Garrison program at Little Rock AFB would result in the irreversible and irretrievable commitments of some human and natural resources. The affected resources are the following:

- The proposed program requires the use of relatively small amounts of labor, materials, energy, and other economic resources during both the construction and operations phases. The local procurement of building materials (such as cement, sand, and gravel) may alter some resource characteristics in the deployment area. Although these economic factors, once used by the proposed program, generally cannot be recovered for other purposes, the extent of their use would be small in comparison to total resource availability.

- Both irreversible and irretrievable commitments would occur if prehistoric sites eligible for the National Register of Historic Places (NRHP) are destroyed or damaged during construction and 7operations. While data recovery is possible, avoidance is preferred because technological advances in the discipline will permit future researchers to make more effective use of the resources.

- Both irreversible and irretrievable commitments would occur if NRHP-eligible historic sites and architectural resources are destroyed during construction and operations.

- Disturbed biological communities, given sufficient time, can recover to a state approximating predisturbance conditions once the disturbance ends. However, some areas will be permanently disturbed and impacts from these disturbances irreversible and irretrievable. In addition, some of the expected impacts on vegetation and wildlife habitats would be of such long duration that they would represent irreversible and irretrievable commitments of biological resources for all practical purposes.

- Soils would be permanently disturbed at construction and related sites (e.g., borrow pits, roads, buildings, and rail spur) and may be irreparably damaged during the life of the program if disturbed areas are not mulched or revegetated, especially at the garrison location. Aggregate resources would be used for construction of buildings, roads, and rail spurs.

4.8.13 Relationship Between the Local Short-Term Use of Man's Environment and the Maintenance and Enhancement of Long-Term Productivity

Deployment of the Peacekeeper Rail Garrison program at Little Rock AFB would result in the short-term use of some human and natural resources that may affect the maintenance and enhancement of long-term productivity. The affected resources are the following:

- Short-term program-generated disruptions and delays of traffic would result in a decrease in the comfort, convenience, and safety afforded users of primary roads leading to the base. No effect on long-term productivity is expected.

- Additional information gained during program-related surveys of archaeological and historic resources may contribute to the data base and improve man's knowledge of the area's history. This would enhance the management of remaining cultural resources in the region.

- Areas temporarily disturbed by the construction activities would result in short-term losses of biological habitats. However, recovery rates are expected to be relatively fast and no effect on long-term productivity is expected.

- Soil erosion during construction would increase sedimentation to local streams resulting in a short-term deterioration of surface water quality. However, the additional loss of soil would not affect soil productivity or the long-term quality of streams.

- Reductions in air quality levels would result from fugitive dust during construction. However, no long-term reduction in air quality is expected.

4.8.14 Environmental Concerns Associated With a Possible Future Second Rail Connector

A second rail access to Little Rock AFB could be achieved by providing a westerly rail connector to the main line of the Union Pacific Railroad (Figure 4.8.14-1). This spur would require the acquisition of approximately 121 acres of land and the construction of 14 miles of new track. Additionally, one 50-foot bridge, one 75-foot bridge, and 13 culverts would be required for stream and river crossings.

Construction costs for this second rail connector would be approximately $20.7 million (1986 dollars) and would require approximately 170 direct construction workers and 200 secondary workers over a 1-year period. Although many of these workers would be from the local area (including Faulkner, Jefferson, Lonoke, Polaski, and White counties in Arkansas), some direct and secondary workers and their dependents could be expected to inmigrate to the area. The City of Jacksonville as well as other small communities along the rail corridor could experience temporary population increases that exceed their normal growth capacities. Increases in traffic resulting from construction activity and commuting workers may result in additional traffic congestion along some roads and highways.

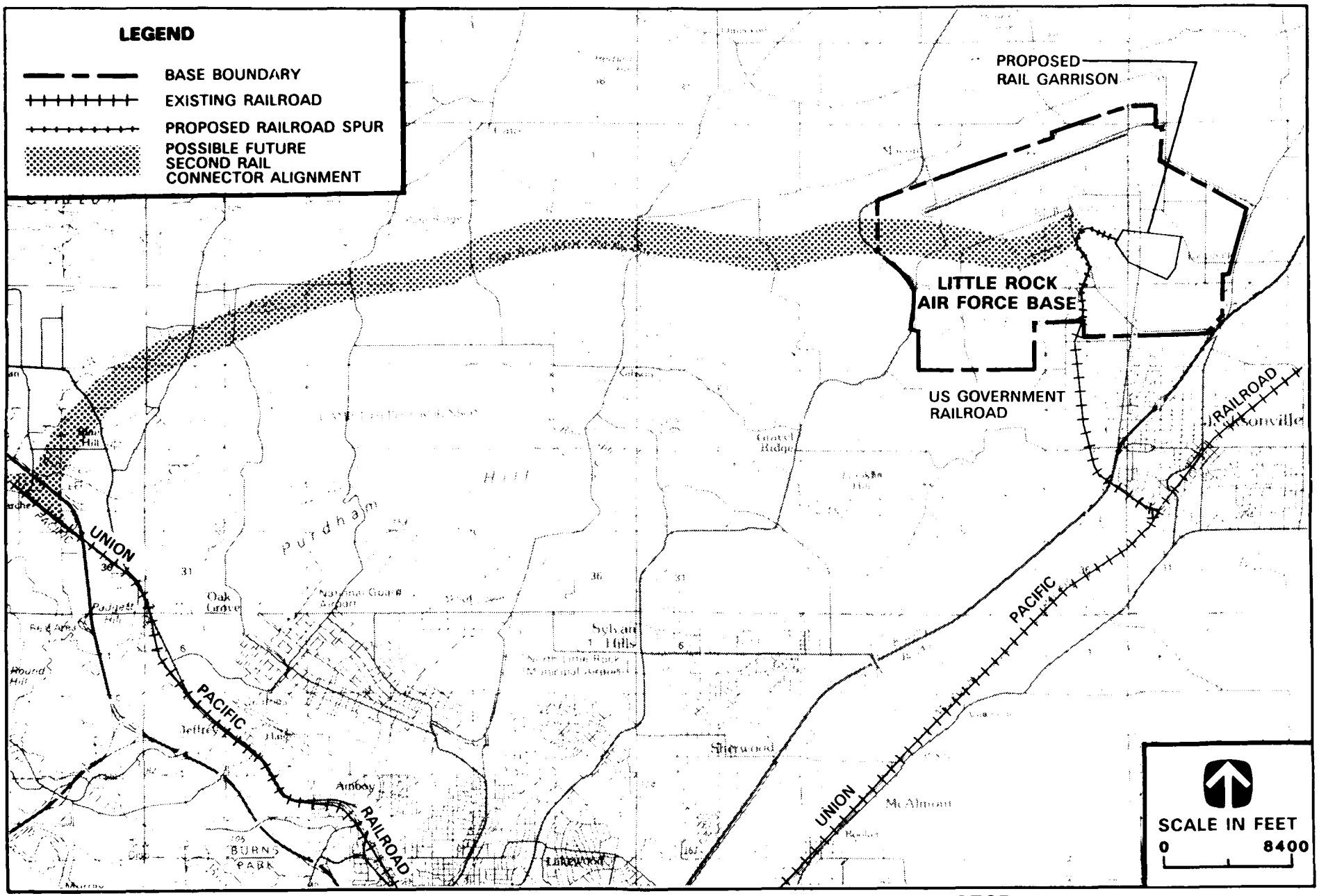


FIGURE 4.8.14-1 CONCEPTUAL ALIGNMENT OF A POSSIBLE FUTURE SECOND RAIL CONNECTOR FOR LITTLE ROCK AFB, ARKANSAS

I.R-4/3

The second rail connector right-of-way (ROW) would be located east of the base and be placed in mostly mixed open space with some commercial forest and nonirrigated cropland. Ten miles of the ROW would be on private land and four miles would be located in Camp Robinson, an inactive Army facility. The Camp Robinson portion of the ROW would be about 50 acres and the private land portion would be about 120 acres. The ROW corridor would pass through a medium-density residential subdivision and some scattered houses located approximately one mile west of the base. Houses are also located north of Blue Hill where the corridor crosses Arkansas State Highway 365. Conflict with inhabited buildings where the wye joins the Union Pacific main line at Marche, Arkansas appears to be avoidable.

The second rail connector would cross 13 streams and bayous and 2 rivers, and parallel White Oak Bayou and Cypress Branch for eight miles. Prehistoric sites in this area are located along drainages and on natural levees, therefore, there is a high probability of affecting large numbers of prehistoric sites near the drainages.

Construction activities would adversely affect important biological habitats onbase and offbase. Numerous wetlands would be drained and filled, resulting in the permanent loss of important habitat for wildlife species. Approximately 13 streams would also be affected and species found in the riparian habitats along these streams would be affected during construction. Bridge construction across Winifree Creek and Bayou Meto could result in impacts on biological resources. Numerous forest areas, which provide habitat for various species, would also be affected. Several federally listed threatened and endangered species and state-sensitive species occur in the region and some of these species may be adversely affected by construction activities.

Site-specific water quality degradation could result from the construction of new track, rail bridges, and culverts. However, the resulting sedimentation would be of short term and should not cause any serious water quality problems.

Soil erosion during program-related construction would increase sedimentation into the bayous and small drainages. Aggregate (rail ballast) production may be an issue because of to the substantial requirement. Terrain failure would need to be investigated because of the strike valleys and ridges that would be traversed. The route may also cross a set of inactive faults.

Little Rock AFB is located within the Central Arkansas Air Quality Control Region. The region is now in compliance with all criteria air quality standards and in attainment for all criteria pollutants. Construction of the second rail connector would cause temporary local increases in fugitive dust and gaseous pollutant emissions. These emissions should not cause any violations in the National Ambient Air Quality Standards.

The existing noise levels along the alternative rail spur routes vary from 65 dBA to 75 dBA (L_{dn}) near the base and from 45 dBA to 55 dBA (L_{dn}) in rural areas. Temporary increases in noise levels would result from rail construction activities in the vicinity of sensitive noise receptors in residential communities along the route.

4.9 MALMSTROM AIR FORCE BASE, MONTANA

Malmstrom Air Force Base (AFB), with an area of 4,391 acres (4,313 acres are fee-owned and 78 acres are leased), is located in Cascade County in north-central Montana. The host organization at this Strategic Air Command base is the 341st Strategic Missile Wing, supporting 150 Minuteman II and 50 Minuteman III missiles. The Minuteman missile launch facilities are dispersed over 23,000 square miles of north-central Montana. The 301st Air Refueling Wing (AREFW) and 91st Air Refueling Squadron (AREFS), with 16 KC-135R tanker aircraft, were activated in early 1988. A second squadron of 14 KC-135R aircraft has been proposed for deployment in the fourth quarter of fiscal year (FY) 1991.

Malmstrom AFB employed 3,601 military personnel (530 officers and 3,071 enlisted), 580 appropriated fund civilian personnel, and 298 other civilian personnel at the end of FY 1987. The activation of the 301st AREFW and 91st AREFS will increase the number of personnel at the base by 665 military and 36 civilians. Approximately 65 percent of the military personnel live on Malmstrom AFB and 35 percent live in communities near the base.

The City of Great Falls, located approximately two miles west of the base, is the host community for Malmstrom AFB (Figure 4.9-1). Most of the personnel living offbase reside in Great Falls, but some personnel live in smaller communities in the area. Great Falls, located along the Missouri River in a predominantly agricultural region, had an estimated 1985 population of 58,250. Cascade County had an estimated 1985 population of 83,689.

The following sections provide a description of activities associated with the deployment of the Peacekeeper Rail Garrison program at Malmstrom AFB for the Proposed Action (4 Train Alert Shelters [TASs]) and the Alternative Action (6 TASs). In addition, two other programs under consideration for deployment at Malmstrom AFB are discussed. These include the deployment of 200 Small Intercontinental Ballistic Missiles (ICBMs) in the vicinity of Malmstrom AFB and the second squadron of KC-135R aircraft.

Proposed Action. For the Proposed Action at Malmstrom AFB, the Air Force would construct garrison facilities and provide personnel necessary for the deployment and operation of up to four Peacekeeper missile trains. Approximately $92 million (in 1986 dollars) of construction would occur at the base for the Proposed Action. Construction activities for the purpose of analysis are assumed to begin in 1990 and be completed in 1992, with full operations beginning in 1993. Direct employment requirements would be 99 in 1990, peak at 439 in 1992, and stabilize at 338 during the full operations phase. Peak construction employment of 251 would occur in 1991. Annual direct employment requirements for the Proposed Action are presented in Table 4.9-1 for site activation, construction, assembly and checkout, and operations activities.

For the Proposed Action, two subalternatives would be considered. For the purpose of clarity, these are referred to as the south site option and east site option. The garrison for the south site option would be located in the southeast portion of the base (Figure 4.9-1). Acquisition of restrictive easements on 226 acres adjacent to the southern boundary of the base would be required to accommodate the explosive safety zone for the garrison (Table 4.9-2). Seven buildings (including the 4 TASs), roads, utilities, parking, and approximately 1.2 miles of track would be constructed within the garrison. Construction of the garrison would permanently disturb approximately 50 acres and temporarily disturb 92 acres (Table 4.9-3).

For the south site option, a 4.4-mile connector rail spur (1.2 mi onbase and 3.2 mi offbase) would be constructed from the garrison to the Burlington Northern main line southeast of the base (Figure 4.9-1). Approximately 40 acres would be acquired for the offbase portion of the rail spur and a wye connection where the spur would join the

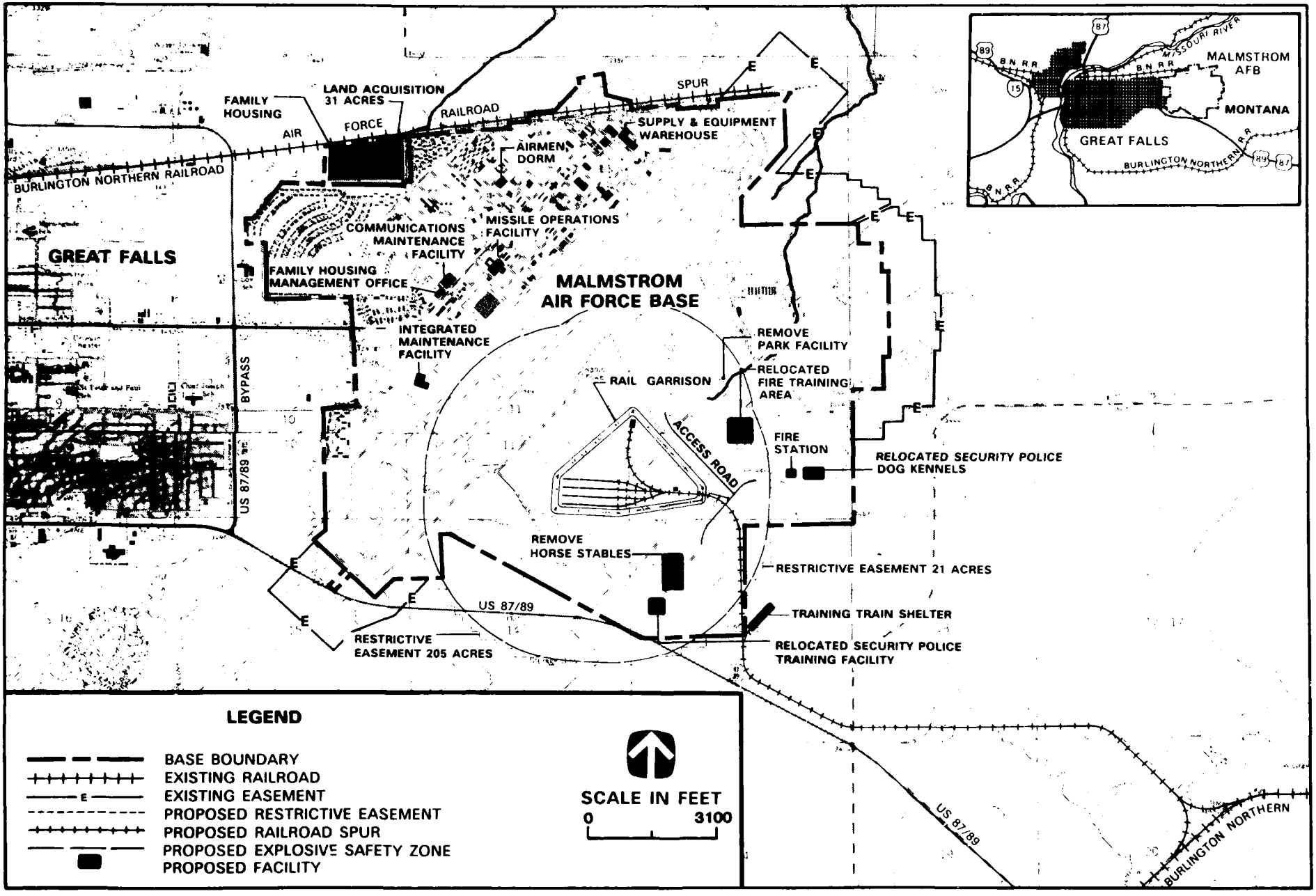


FIGURE 4.9-1 PROPOSED PEACEKEEPER RAIL GARRISON FACILITIES AT MALMSTROM AFB, MONTANA (SOUTH SITE OPTION)

Table 4.9-1

Annual Direct Employment (Military and Civilian) for the Peacekeeper Rail Garrison, KC-135R Refueling (Second Squadron), and Small ICBM Programs in the Malmstrom AFB Area by Calendar Year (Full-Time Equivalent Jobs)

	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998[1]
PEACEKEEPER RAIL GARRISON											
Proposed Action (4 TASs)											
Site Activation	0	1	15	24	11	0	0	0	0	0	0
Construction	0	0	83	251	89	0	0	0	0	0	0
Assembly & Checkout	0	0	1	18	1	0	0	0	0	0	0
Operations	0	0	0	99	338	338	338	338	338	338	338
TOTAL:	0	1	99	392	439	338	338	338	338	338	338
Alternative Action (6 TASs)											
Site Activation	0	1	16	24	11	0	0	0	0	0	0
Construction	0	0	101	265	89	0	0	0	0	0	0
Assembly & Checkout	0	0	2	27	2	0	0	0	0	0	0
Operations	0	0	0	108	372	372	372	372	372	372	372
TOTAL:	0	1	119	424	474	372	372	372	372	372	372
KC-135R (Second Squadron)											
Site Activation	0	0	0	0	0	0	0	0	0	0	0
Construction	50	157	86	32	0	0	0	0	0	0	0
Assembly & Checkout	0	0	0	0	0	0	0	0	0	0	0
Operations	0	0	0	119	284	284	284	284	284	284	284
TOTAL:	50	157	86	151	284	284	284	284	284	284	284
SMALL ICBM											
Malmstrom AFB											
Site Activation	10	20	20	60	80	100	100	100	100	60	10
Construction	0	0	840	470	490	460	90	0	0	0	0
Assembly & Checkout	0	0	0	0	310	190	280	310	230	100	0
Operations	0	0	0	250	1,100	1,630	1,940	2,440	3,100	3,100	3,100
Minuteman Deployment Area											
Construction	0	0	240	340	320	330	150	20	0	0	0
TOTAL:	10	20	1,100	1,120	2,300	2,710	2,560	2,870	3,430	3,260	3,110

Note: [1]Employment would continue at these levels for the duration of the respective programs.

Table 4.9-2

Offbase Land Acquisition and Easement Requirements
Peacekeeper Rail Garrison Program
Malmstrom AFB, Montana (South Site Option)
(acres)

	Proposed Action	Alternative Action
Land Acquisition		
Garrison Area	0	0
Rail Spur	40.0	40.0
Housing Area	31.0	31.0
Relocated Facilities	0.0	0.0
TOTAL:	71.0	71.0
Restrictive Easements	226	260

Table 4.9-3

Summary of Area Disturbed by the Peacekeeper Rail Garrison Program
Malmstrom AFB, Montana (South Site Option)
(Proposed and Alternative Actions)

Facility Group	Area Disturbed (acres)		
	Permanent	Temporary	Total
Proposed Action			
Garrison Facilities	50.0	92.0	142.0
Rail Spur	24.0	18.7	42.7
Support Facilities	55.0	70.0	125.0
Relocated Facilities	3.5	2.8	6.3
TOTAL:	132.5	183.5	316.0
Alternative Action			
Garrison Facilities	56.9	114.1	171.0
Rail Spur	24.0	18.7	42.7
Support Facilities	55.0	70.0	125.0
Relocated Facilities	4.0	2.8	6.8
TOTAL:	139.9	205.6	345.5

main line (Table 4.9-2). Approximately 24 acres would be disturbed permanently and 19 acres temporarily outside the garrison for the connector spur and wye (Table 4.9-3).

The south site option would require the construction of support facilities with a total floor space of approximately 93,600 square feet (sq ft). To provide access to the Training Train Shelter, a 0.1-mile rail spur would be constructed from the connector spur (Figure 4.9-1). If additional military family housing is provided onbase, 166 family housing units (1,100 sq ft each) would be constructed on land adjacent to the base; acquisition of 31 acres adjacent to the northwest boundary of the base would be required (Figure 4.9-1, Table 4.9-2). In addition, approximately 0.5 mile of new base boundary fencing would be required. Construction of the support facilities, fencing, roads, utilities, and parking would disturb approximately 55 acres permanently and 70 acres temporarily.

The south site option would also require the relocation of several existing base facilities, including some roads and utilities, to new locations (Figure 4.9-1). Relocation of these facilities would permanently disturb approximately four acres and temporarily disturb three acres. In addition, the existing horse stables and a park facility, located within the explosive safety zone for the garrison, would be eliminated.

For the east site option, the garrison would be located in the eastern portion of the base and collocated with the existing weapons storage area (Figure 4.9-2). Seven buildings (including the 4 TASs), roads, utilities, parking, and approximately 1.4 miles of track would be constructed within the garrison. To accommodate the garrison, acquisition of 69 acres adjacent to the eastern boundary of the base would be required (Table 4.9-4). Acquisition of restrictive easements on 344 acres adjacent to the base would be required to accommodate the explosive safety zone for the garrison (Table 4.9-4). Construction of the garrison would permanently disturb approximately 64 acres and temporarily disturb 133 acres (Table 4.9-5).

For the east site option, a 3.1-mile connector rail spur (0.1 mi onbase and 3.0 mi offbase) would be constructed from the garrison to the Burlington Northern (BN) main line southeast of the base (Figure 4.9-2). Approximately 45 acres would be acquired for the offbase portion of the rail spur and a wye connection where the spur would join the main line (Table 4.9-4). Approximately 17 acres would be disturbed permanently and 13 acres temporarily outside the garrison for the connecting spur and wye (Table 4.9-5).

The east site option would require the construction of support facilities with a total floor space of approximately 93,600 sq ft. To provide access to the Training Train Shelter, a 1.1-mile (0.7 mi onbase and 0.4 mi offbase) rail spur would be constructed from the connector spur (Figure 4.9-2). Acquisition of 4.8 acres would be required for the offbase portion of the spur. If additional military family housing is provided onbase, 166 family housing units (1,100 sq ft each) would be constructed on land adjacent to the base; acquisition of 31 acres adjacent to the northwest boundary of the base would be required (Figure 4.9-2; Table 4.9-4). In addition, approximately 1.5 miles of new base boundary fencing would be required. Construction of the support facilities, fencing, roads, utilities, and parking would permanently disturb approximately 61 acres and temporarily disturb 75 acres.

The east site option would also require the relocation of several existing base facilities, including some roads, to new locations (Figure 4.9-2). Relocation of these facilities would permanently disturb approximately 11 acres and temporarily disturb 2 acres. In addition, an existing park facility, located within the explosive safety zone for the garrison, would be eliminated.

Alternative Action. For the Alternative Action, the Air Force would construct garrison facilities and provide personnel for the deployment and operation of up to six Peacekeeper missile trains. Approximately $107.1 million (in 1986 dollars) of construction would occur at Malmstrom AFB for the Alternative Action. Construction

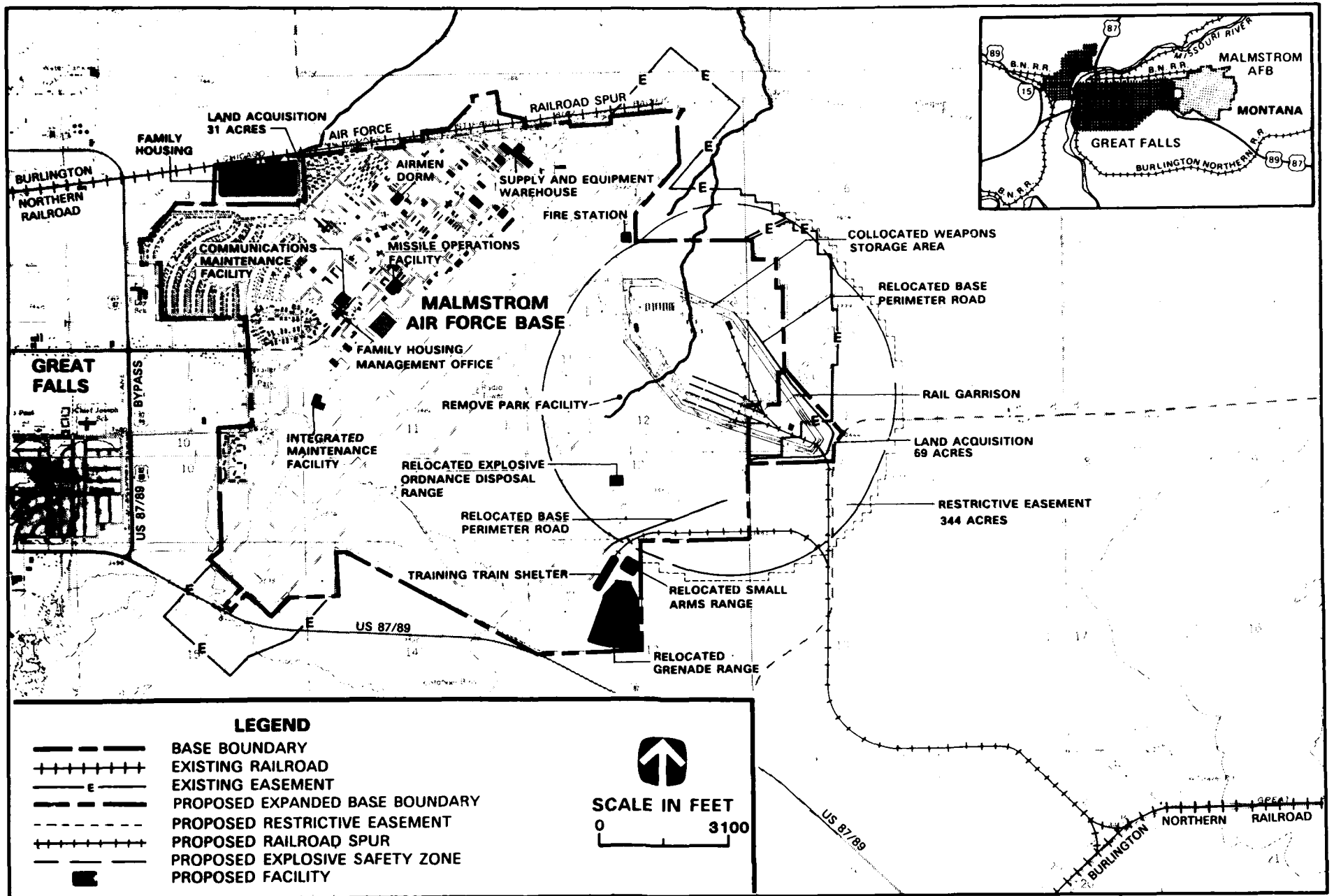


FIGURE 4.9-2 PROPOSED PEACEKEEPER RAIL GARRISON FACILITIES AT MALMSTROM AFB, MONTANA (EAST SITE OPTION)

Table 4.9-4

Offbase Land Acquisition and Easement Requirements
Peacekeeper Rail Garrison Program
Malmstrom AFB, Montana (East Site Option)
(acres)

	Proposed Action	Alternative Action
Land Acquisition		
Garrison Area	69.0	81.0
Rail Spur[1]	50.0	49.0
Housing Area	31.0	31.0
Relocated Facilities	0.0	0.0
TOTAL:	150.0	161.0
Restrictive Easements	344	365

Note: [1]Includes land acquisition for Training Train Shelter rail spur.

Table 4.9-5

Summary of Area Disturbed by the Peacekeeper Rail Garrison Program
Malmstrom AFB, Montana (East Site Option)
(Proposed and Alternative Actions)

Facility Group	Area Disturbed (acres)		
	Permanent	Temporary	Total
Proposed Action			
Garrison Facilities	63.6	132.8	196.4
Rail Spur	16.9	13.2	30.1
Support Facilities	60.6	75.4	136.0
Relocated Facilities	11.1	2.0	13.1
TOTAL:	152.2	223.4	375.6
Alternative Action			
Garrison Facilities	70.3	160.6	230.9
Rail Spur	16.9	13.2	30.1
Support Facilities	60.6	75.4	136.0
Relocated Facilities	11.1	2.0	13.1
TOTAL:	158.9	251.2	410.1

and operations activities are assumed to occur in the same time frame as the Proposed Action. Annual direct employment requirements for the Alternative Action are presented in Table 4.9-1.

The garrison for both the south and east site options would contain six TASs (instead of 4) and would be constructed in approximately the same location as the Proposed Action (Figures 4.9-3 and 4.9-4). Nine buildings (including the 6 TASs), roads, utilities, parking and approximately 1.8 miles of track would be constructed within the garrison for the south site option and 1.9 miles for the east site option. Technical and personnel support facility requirements for each option would be similar to the Proposed Action.

The south site option would require the acquisition of restrictive easements of an additional 34 acres (total of 260 acres) to accommodate the explosive safety zone for the garrison (Table 4.9-2). Construction of the six-TAS garrison would disturb approximately 7 additional acres permanently (56.9 acres total) and 22 acres temporarily (114.1 acres total) (Table 4.9-3). The rail spur connecting the garrison to the BN main line for the south site option would be similar to the Proposed Action. For the Alternative Action, one additional base facility (3 Minuteman transporter-erector parking pads) would require relocation (Figure 4.9-3).

For the east site option, to accommodate the garrison, acquisition of an additional 12 acres (total of 81 acres) would be required. Acquisition of restrictive easements on an additional 21 acres (total of 365 acres) would also be required to accommodate the explosive safety zone for the garrison (Table 4.9-4). Construction of the six-TAS garrison would disturb approximately 7 additional acres permanently (70.3 acres total) and 28 acres temporarily (160.6 acres total) (Table 4.9-5). The rail spur connecting the garrison to the BN main line for the east site option would be similar to the Proposed Action. One less acre (total of 44.2 acres) would be acquired for the offbase portion of the rail spur for the Alternative Action (Table 4.9-4). Relocation of existing base facilities for the east option would be the same as the Proposed Action.

Other Air Force Programs. Two additional programs are being considered for deployment at Malmstrom AFB: the Small ICBM program and a second squadron of KC-135R aircraft.

The Small ICBM program would provide for the deployment of 200 Hard Mobile Launchers (HMLs) at up to 200 of the Minuteman missile launch facilities. The Main Operating Base would be Malmstrom AFB. New support facilities containing approximately 3.2 million sq ft of floor space would be constructed over a 6-year period at the base to support Small ICBM operations; some existing facilities would require additions and/or modifications to provide an additional 67,000 sq ft of floor space. Various roads, utilities, and other support construction would also be required.

The majority of the Small ICBM technical facilities would be constructed between 1990 and 1992 on the southeast side of the Malmstrom AFB runway, within or adjacent to the existing weapons storage area (WSA). The WSA would be expanded to accommodate Small ICBM weapon assembly and storage facilities. A HML vehicle operations training area would be constructed requiring acquisition of 350 acres adjacent to the east base boundary.

Personnel support facilities would be sited on the northwest side of the runway and be integrated within the existing support complex, with the exception of military family housing and some technical and personnel support facilities, which would require acquisition of an additional 430 acres of land north of the base. A total of up to 800 acres of land adjacent to the base may have to be acquired to accommodate the Small ICBM program facilities. Construction of personnel support facilities planned for the base would start in 1991 and be completed by 1995.

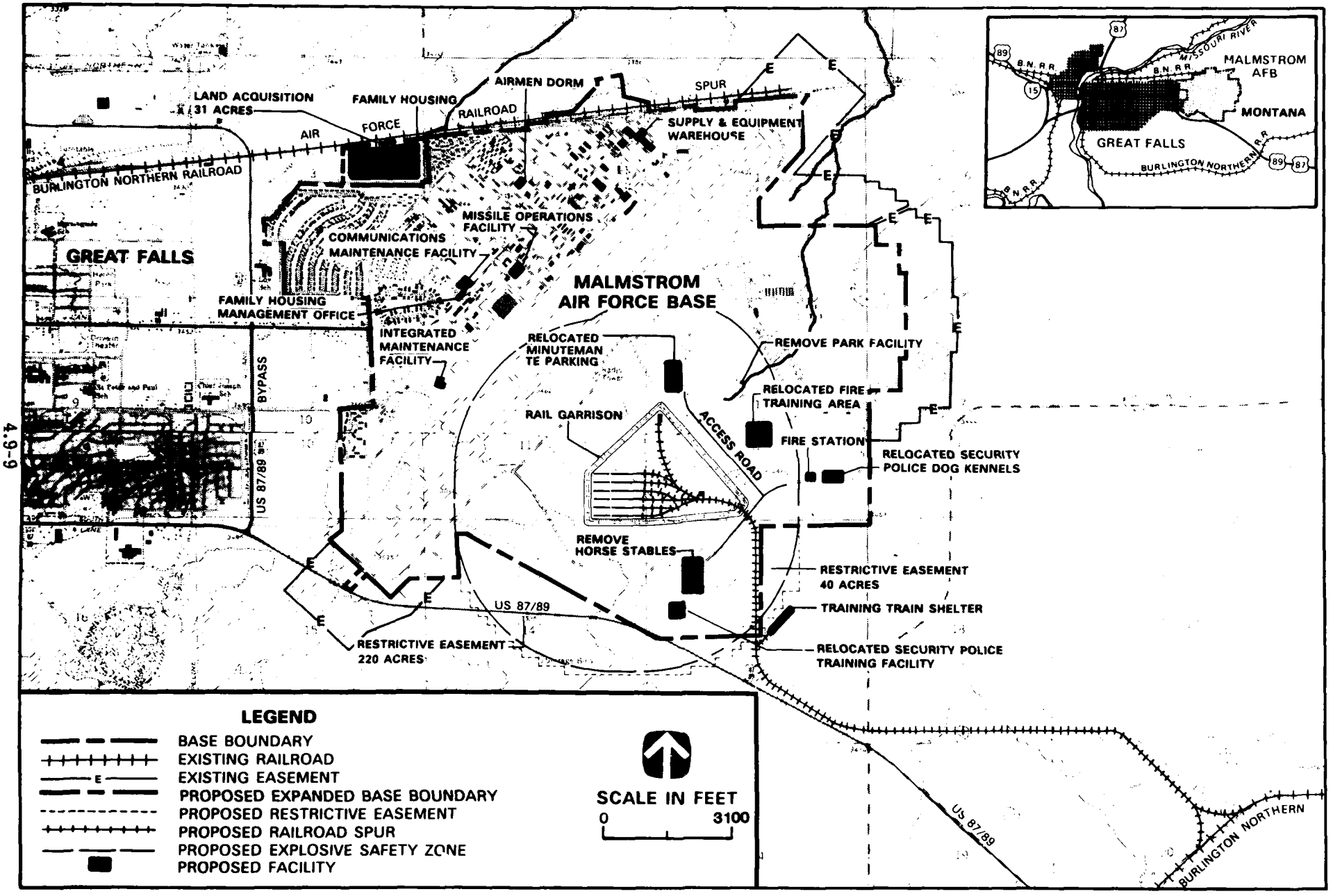


FIGURE 4.9-3 PROPOSED PEACEKEEPER RAIL GARRISON FACILITIES AT MALMSTROM AFB, MONTANA (SOUTH SITE OPTION) (ALTERNATIVE ACTION)

Base road improvements include widening Goddard Avenue from the main gate to the perimeter road near the central heating plant, modifying connections from the personnel support area to the perimeter road leading to the WSA, improving the roads on the east side of the base from the WSA to their connection with U.S. 87/89 east of Great Falls, and the establishment of a manned entrance near U.S. 87/89. Local streets connecting Great Falls with the main gate on Goddard Avenue may require improvements, and the county road leading to the north gate may require relocation to make room for the additional onbase military family housing.

The Small ICBM program would create a total of 1,100 direct jobs (including 240 in the Minuteman deployment area) and 1,250 secondary jobs in 1990, the peak construction year (Table 4.9-1). The greatest total employment effect (due to concurrent construction and operations activities) would occur in 1996 when 3,430 direct jobs and 1,350 secondary jobs would be required. Sustained operations employment is projected to be 4,350 jobs (3,100 direct and 1,250 secondary) starting in 1999. During the construction years (1990-1996), the Air Force would spend over $700 million in the region. After Final Operational Capability is achieved (post-1999), program-related Air Force spending in the region would approach $63 million per year throughout the life of the program.

In addition to the deployment of the Small ICBM, deployment of a second squadron of KC-135R aircraft at Malmstrom AFB is also under consideration. The addition of the second squadron to the 301st AREFW would add 14 aircraft to the base, increasing the total number to 30. Construction is scheduled to begin in 1989 with operations beginning during the fourth quarter of FY 1991. This action would increase the number of personnel at the base by 284.

Over the 3-year construction phase, a total of 325 workers would be required. Once in operation, approximately 395 hours would be flown annually in the local traffic pattern and about 790 of the Wing's 916 sorties would originate at Malmstrom AFB. Approximately 25 percent of these would be flown at night.

Summary of Program Impacts. At Malmstrom AFB, two possible siting options (south and east sites) are being considered. The Proposed Action (both south and east options) would result in significant impacts on socioeconomics and transportation. Socioeconomic impacts (both south and east options) would be low because program-induced inmigration would cause population increases of 1.3 percent over baseline levels during construction (1992) and 1.1 percent over baseline during operations (1993). This level of program-induced population growth would result in low impacts on housing, education, public services, and public finances in the Great Falls area for both the peak and succeeding years. These impacts would be significant because additional program-related population could aggravate existing overcrowded conditions in the Cascade County jail. Transportation impacts (both south and east options) would be moderate because the level of service (LOS) rating for segments of 10th Avenue South would further degrade existing D and E ratings. These impacts would be significant because program-induced traffic would aggravate existing congested conditions.

Impacts for all other resources would not be significant.

The Alternative Action at Malmstrom AFB would not alter the LOI or significance ratings for any resource.

The cumulative impacts of either the Proposed or Alternative Actions, a second KC-135R squadron, and the proposed Small ICBM program would result in significant impacts on three resources: socioeconomics, transportation, and geology and soils. Both short- and long-duration socioeconomic impacts would be high because inmigration would increase population in the Great Falls area over 13 percent above baseline projections during the construction phase and 12.3 percent over baseline during operations. These impacts would be significant because of the need for expanded school facilities near the

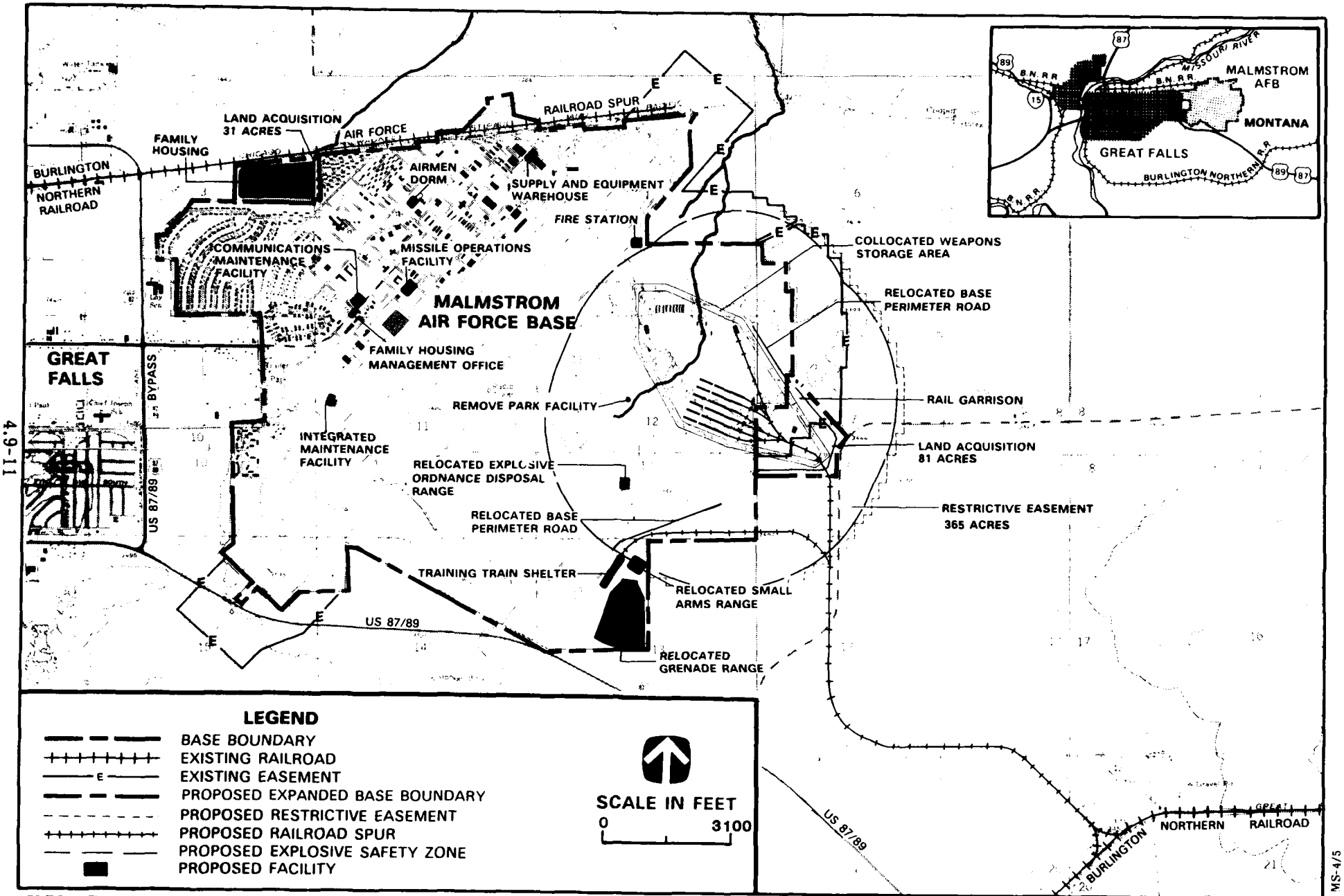


FIGURE 4.9-4 PROPOSED PEACEKEEPER RAIL GARRISON FACILITIES AT MALMSTROM AFB, MONTANA (EAST SITE OPTION) (ALTERNATIVE ACTION)

base, the aggravation of existing overcrowded conditions in the Cascade County jail, and revenue shortfalls in Cascade County. Both short- and long-duration transportation impacts would be high because the LOS rating for segments of 10th Avenue South would be reduced from D to E, and E to F. These impacts would be significant because the LOS would drop to E and F, which are substandard levels. Long-duration geology and soil impacts would be moderate for soil erosion because of increased rates of loss resulting from the deployment of the three programs. These impacts would be significant because of the permanent disturbance of 350 acres associated with the HML vehicle operations training area which would be barren for the life of the program, resulting in an appreciable loss of topsoil.

Both short- and long-duration beneficial socioeconomic effects would be generated by the Proposed and Alternative Actions, as well as with the concurrent deployment of the three programs, including increases in employment and income, and greater utilization of temporary and permanent housing.

4.9.1 SOCIOECONOMICS

4.9.1.1 Region of Influence

The Peacekeeper Rail Garrison program at Malmstrom AFB may cause socioeconomic impacts at both regional and local levels. Potential changes in employment and income are most likely to occur in Cascade and Lewis and Clark counties, the two most populous and industrially diverse counties serving the base. Although construction labor and materials, as well as operations procurement, may originate from throughout the State of Montana and beyond, the primary economic effects on this two-county region establish its designation as the Region of Influence (ROI) for employment and income changes.

Because all program-related workers and dependents required for program construction and operations are expected to influence the Great Falls area, the ROI for population and demographics and related socioeconomic elements (education, public services, public finance) emphasizes this local area including both the city and Cascade County. Housing focuses only on the Great Falls urban area because most program-related families are expected to reside there.

4.9.1.2 Existing and Future Baseline Conditions

Employment and Income. Major industries in the two-county ROI include agriculture, mining and natural resource production, and local, state, and federal government (including Malmstrom AFB). The commercial trade, finance, transportation, and service sectors of the area (originating primarily in Great Falls) serve north-central Montana and southern Alberta, Canada.

Total employment in the ROI increased slightly between 1980 and 1984 from 66,750 to 67,130. Overall employment for the region is projected to increase to about 75,650 in 1990 and reach 80,750 by 1995. The unemployment rate for Cascade and Lewis and Clark counties averaged about 7 percent in 1984, about equal to the national rate, but lower than the state average of 8.1 percent. The ROI unemployment rate is forecast to remain near this level through 1995.

Cascade County's total employment was reported at 40,836 in 1984, a 2-percent decline from the 1980 level. Retail trade, services, and government represented about 75 percent of 1984 employment. Employment in the county is projected to reach 45,235 in 1990 and 47,230 in 1995.

From 1980 to 1984, total earnings (in current dollars) in the ROI increased from $0.8 billion to $1.1 billion and in Cascade County from $522 million to $646 million. Discounting for inflation, these increases in total earnings represented a 1.1 percent

growth in the ROI and a 1.1-percent decline in Cascade County over the 1980 to 1984 period. Per capita personal income in the ROI increased from $9,022 in 1980 to $11,652 in 1984 and in Cascade County from $8,784 in 1980 to $11,310 in 1984.

Total earnings (in 1986 dollars) for the ROI are projected at $1.27 billion in 1990 and $1.34 billion in 1995. The corresponding per capita personal income is projected at $12,293 in 1990 and $12,338 in 1995. For Cascade County, per capita personal income is projected at $11,900 in 1990 and $11,950 in 1995.

Population and Demographics. The population of Cascade County was estimated at 83,689 in 1985, an increase of about 2,300 from the 1980 Census of 80,700. Cascade County population is projected to grow to 86,500 by 1990 and 88,000 by 1995. Population in the Great Falls urban area (including the city, unincorporated suburbs, and Malmstrom AFB) totaled about 65,000 in 1985, and is projected to grow to 72,650 by 1990, reaching 74,000 by 1995.

Military personnel and their dependents included about 8,570 persons in the Great Falls urban area in 1986. This was approximately 13 percent of the area's 1986 population of 66,837. The highest share of military population to total community population previously experienced was about 20 percent, recorded in 1972. Military population in the Great Falls area associated with current missions and the first squadron of KC-135R aircraft (301st Air Refueling Wing and 91st Air Refueling Squadron) is expected to total 10,700 (14.6% of the Great Falls area population) by 1990, and remain at that level in the absence of other future programs.

Housing. There were 27,253 permanent year-round housing units in the Great Falls urban area in 1980. Of these units, 1,722 (6.3%) were vacant and available for rent or sale. By 1985, permanent housing increased to an estimated 29,252 units, with about 970 units (3.3%) vacant and available. In 1986, temporary housing in the Great Falls area included 32 hotels/motels (1,600 rooms) and 4 private campgrounds (260 sites), with an average vacancy rate of 50 and 75 percent, respectively. During the summer months, (the period of peak occupancy), it is estimated that approximately 450 room/sites are available.

In 1987, Malmstrom AFB had 1,406 family housing units onbase with an average occupancy rate of 99.7 percent. A mobile home area with spaces for 100 privately owned units is located onbase for use by military personnel. About one-half of these spaces were in use in 1987. Onbase unaccompanied enlisted personnel housing facilities have the capacity to house 40 officers and 1,663 enlisted personnel and were fully utilized in 1987. The renovation of five unaccompanied enlisted personnel housing facilities by 1988 reduced the capacity of these units by about 200 beds. The housing referral office had 168 listings as of February 1988. The breakdown by bedrooms was: 56 one-bedroom, 73 two-bedroom, 25 three-bedroom, 9 four-bedroom, and 5 five-bedroom rental units. It is expected that many of these units will be occupied by personnel associated with the first squadron of KC-135R aircraft, and associated base support personnel.

The permanent housing stock is projected to grow to approximately 30,300 by 1990 and 30,700 by 1995, with an approximate 2.9-percent available vacancy rate. Fewer available vacancies were projected in 1990 and 1995 as housing requirements of baseline population growth and personnel associated with the first squadron of KC-135R aircraft are met. No changes in the supply of temporary facilities is projected.

Education. The Great Falls Public School system (GFPS) includes Elementary School District No. 1 and High School District No. A. In school year 1987-88, the system operated 15 elementary schools, 2 junior highs, 2 high schools, and several special schools with total enrollment of about 12,000 students. District No. 1 (elementary) has an overall pupil-to-teacher ratio of 21.5-to-1; this is below the weighted average state standard of 27.8-to-1. Approximately 17 percent of the school system's enrollment are dependents of federal employees.

Classroom enrollment for the GFPS system is projected to reach 12,315 in 1990-91, 12,599 in 1995-96, and 12,652 in the year 2000-01. These projections include students associated with the first KC-135R squadron at Malmstrom AFB. Additional staffing will be needed to maintain existing classroom sizes. Existing facilities, including currently vacant buildings, should be adequate to accommodate the projected increase in baseline enrollment.

Public Services. Major public services in the Great Falls area are provided by the city and county governments. In 1986, the City of Great Falls had approximately 405 employees providing comprehensive city services including public safety, public works, community development, recreation, and libraries. In the same year, Cascade County had 587 employees in 45 different departments including the Sheriff, County Nursing Home, Roads and Bridges, Treasury, and many other functions providing for the public health, safety, and welfare of county residents. The city and county jurisdictions provided a public service level equal to 5.8 and 7 9 personnel, respectively, per 1,000 population in 1986.

Budgetary restraints in 1987 and 1988 reduced employment for both jurisdictions, especially for Cascade County, and it is uncertain whether the projected growth of employment and population in the area will be able to maintain 1986 service levels through the 1990s. Unless city government employment can increase from 405 to 421 by 1990 and 429 by 1995, the number of personnel per 1,000 population in the area would decrease to 5.6 and 5.5, respectively. Similarly, unless county government employment can increase from 587 to 605 by 1990 and to 616 by 1995, the number of personnel per 1,000 population in the area would decrease to 6.8 and 6.7, respectively.

Public Finance. Services provided by the City of Great Falls are principally funded through the general and special revenue funds. In FY 1986, expenditures from these funds were $14.3 million. Public safety (law enforcement and fire protection services) and public works expenditures accounted for the majority of these outlays. Revenues in FY 1986 were $15.3 million. Property taxes and intergovernmental revenues are the principal revenue sources of the city. The city does not levy or receive sales taxes. Year-end balances of these funds were $12.8 million, approximately 90 percent of expenditures in FY 1986. Outstanding general obligation bond indebtedness at the end of FY 1986 was $2.4 million, about 15 percent of the bonding capacity of the city. Over the 1990 through 1995 period, revenues and expenditures are projected to reach the $22-million level.

Budgeted general fund revenues and expenditures of the elementary school district were $21.4 million in FY 1986. Year-end fund balances were $4.4 million, approximately 20 percent of expenditures in that year. Over the 1990 through 1995 period, revenues and expenditures are projected to be $23.1 million to $24.2 million. Budgeted general fund revenues and expenditures of the high school district were $12.9 million. Year-end fund balances were $3.2 million, approximately 25 percent of expenditures in that year. Over the 1990 through 1995 period, revenues and expenditures are projected to be $11.9 million to $12.3 million.

Revenues and expenditures in Cascade County were $12.8 million and $12.6 million, respectively, in FY 1986. Reserve funding levels were approximately $2.7 million, representing about 21 percent of expenditures in that year. Over the 1990 through 1995 period, revenues and expenditures are estimated to slightly decline to the $11.6 million level.

4.9.1.3 Impacts of the Proposed Action

For the Proposed Action, a brief summary of the program-related effects on key socioeconomic indicators is presented in Table 4.9.1-1.

Table 4.9.1-1

Selected Socioeconomic Indicators, Peacekeeper Rail Garrison Program
Malmstrom AFB, Montana, 1990-1993
Proposed Action

	1990	1991	1992	1993[1]
Region of Influence				
Employment (Jobs)				
Total Program-Related Jobs	218	752	729	530
Direct Jobs	99	392	439	338
Civilian	93	303	157	58
Military	6	89	282	280
Secondary Jobs	119	360	290	192
Local Hires	179	550	372	209
Program-Related Spending (000s 86$)	$4,827	$14,857	$12,512	$8,496
Personal Income (000s 86$)				
Direct	$2,739	$9,973	$9,058	$6,264
Secondary	2,589	7,644	6,120	4,033
Total Personal Income	$5,328	$17,617	$15,178	$10,297
Great Falls[2]				
Population				
Baseline Population	72,648	72,904	73,161	73,419
Program-Related Change	96	507	929	839
Change as % of Baseline	0.1	0.7	1.3	1.1
Housing Demand				
Temporary Units	9	26	11	2
Permanent Units	29	97	97	71
Total Units	38	123	108	73
School District Enrollment				
Elementary	9	52	102	94
Secondary	4	22	44	40
Total Enrollment	13	74	146	134

Notes: [1]Program-related effects would continue at these levels throughout the life of the program.
[2]Includes Malmstrom AFB for population and school enrollment.

Employment and Income. Initial program-related employment would occur in 1990 with an estimated total of 218 jobs, both direct and indirect in the ROI. Under the south siting option the number of jobs would increase to 752 in 1991, and then stabilize at 530 during the operations phase beginning in 1993. In the peak construction year (1991), total program-related jobs would account for 1.0 percent of the total baseline employment in the ROI; thereafter, the share would decline to 0.7 percent.

Of the 752 jobs created in the peak construction year (1991), direct jobs would account for 392 and the remaining 360 jobs would be secondary or induced. All direct and most indirect jobs would occur in Cascade County. Out of 392 direct jobs, 303 would be civilian (primarily in the construction trades) and 89 would be military. Locally hired civilians (both direct and secondary) would number 550, about 73 percent of the peak year total.

Throughout the operations phase (1993 and thereafter), the total number of program-related jobs would be 530 (338 direct and 192 secondary). Of the 338 direct jobs, 280 would be military and 58 would be civilian. The number of local hires would be 209. Under the east siting option, because the weapons storage area (WSA) would be collocated with existing facilities, slightly lower direct employment requirements would result. Direct employment requirements would be about 79 persons fewer than under the south siting option.

From 1990 to 1992, the unemployment rate in the ROI would be slightly lower than the baseline unemployment rate. During the peak construction year (1991), the unemployment rate in the ROI would be 6.4 percent compared to 6.8 percent without the program. Because the number of program-related jobs created would be a relatively small percentage of baseline levels, unemployment rates during the operations phase would remain virtually unchanged whether the east site option or the south site option is chosen.

The Proposed Action with the south site option would generate personal income (in 1986 dollars) ranging from $5.3 million in 1990 to $17.6 million in 1991 and stabilizing at $10.3 million during the operations phase. Cascade County's share of that income would range from $4.7 million in 1990 to $16.0 million in 1991, and then stabilize at $9.5 million during the operations phase beginning in 1993. Income effects under the east siting option would be slightly less because of the lower employment levels. The program-related spending in the ROI would vary from $4.8 million in 1990 to $14.8 million in 1991, and then stabilize at $8.5 million during operations.

Population and Demographics. Cascade County's population would increase by 96 in 1990, by 507 in 1991, and by 930 in 1992 under the south site option. In 1993 and thereafter, the total increase in population would stabilize at 840. The majority of the program-related inmigrants in 1993 and thereafter would be military personnel and their dependents. If housing is developed onbase, approximately three-quarters (630 persons) would reside onbase, with the remaining persons locating in the Great Falls area. Population inmigration would represent an increase of 1.3 percent in 1992 and 1.1 percent in 1993 in the area's population (city population plus base residents). The number of weekly commuters would remain less than 20 during the construction phase. During the operations phase (1993 and thereafter), there would be no weekly commuters to the area.

During the operations phase, the population increase of 840 would be primarily military personnel and their dependents (720 military-related and 120 civilian personnel and dependents). The additional military-related population would increase the proportion of military population in the Great Falls area to about 16 percent in 1993, from the 14.7 percent estimated under baseline conditions. Population increases under the east siting option would be slightly lower because of the lower direct employment requirements under this option.

Housing. For the Proposed Action, the Air Force has programmed for up to 166 family housing units to be constructed either on Malmstrom AFB or in the proximity of the base. However, current projections of housing vacancies and potential new construction in Great Falls suggest that no new units would actually have to be provided by the Air Force through one of its housing programs. Since these conditions may change, the Air Force will continue to monitor the housing market in the Great Falls area and will increase or decrease the extent of its participation as necessary to prevent housing impacts in the community. All program-related civilian and some military households would be housed in privately owned permanent housing units and temporary facilities in the Great Falls area. Of the remaining military households, 166 accompanied personnel would live in newly constructed onbase or offbase family units and 85 unaccompanied personnel would live in existing unaccompanied enlisted personnel housing facilities.

The offbase program-related demand for housing (assuming the south site option is chosen) is expected to begin in 1990. In that year, 30 permanent units (2.8% of available vacancies) and 10 temporary facilities (4% of available vacancies) would be required in the Great Falls area. The peak demand for temporary facilities would occur in 1991. The short-duration demand would be for 25 facilities (5.5% of available vacancies) in that year and would be virtually nonexistent by 1993. The peak demand for permanent units would be experienced in 1991 and 1992. The short-duration demand for permanent facilities would be for 95 units (out of 870 available or 10.9% in 1992) and would decline to the long-duration demand of 70 units (out of 867 available or 8.1%) by the following year. These demands would be slightly lower under the east site option. The long-duration available vacancy rate would decline from 2.8 to 2.6 percent.

Because the short-duration demand for temporary facilities in Great Falls (under either site option) would not cause a shortage even during periods of peak baseline occupancy, beneficial effects would occur as a result of the program. Similarly, the short- and long-duration demands for permanent units would remove excess vacancies. Therefore, the program-related demand for permanent units would also be beneficial.

Education. During the operations phase under the south site option, the two school districts in Great Falls are expected to receive an additional 135 students as a result of the program. If family housing is constructed onbase, it is expected that approximately 100 students would live onbase. The concentration of the younger of these students onbase would cause enrollment at Loy Elementary school, located adjacent to the base, to increase by approximately 55 students. Pupil-to-teacher ratios at Loy are expected to increase from 22.5-to-1 to 25-to-1, a ratio still below the weighted average state standard of 27.8-to-1, but higher than levels recently experienced. For the district as a whole, the pupil-to-teacher ratio at the elementary level would increase from 21.5-to-1 to 21.7-to-1. This overall level is also below the weighted average calculated from state standards. Secondary level students living onbase and the program-related students living offbase would be enrolled in various schools throughout the district. If housing for military families were concentrated in a selected offbase location, measurable increases in pupil-to-teacher ratios at the local elementary school serving such locations could result. If offbase family housing is not concentrated in a selected location, students would be dispersed throughout the system, minimizing concentrations of pupils at selected elementary and secondary schools. Additional staffing may be needed in order to maintain existing pupil-to-teacher ratio. Because of lower population inmigration levels under the east site option, enrollment increases would be approximately ten fewer than under the south siting option.

Public Services. Program-related increases in population under the south site option would lead to increases in demands for public services provided by the City of Great Falls of about 1.1 percent over baseline levels in 1993. The increased service demands would be experienced by a majority of the departments now providing service to area residents. To maintain current service levels, as measured by the city's rate of 5.8 personnel per 1,000 population, city staffing levels would have to increase from a baseline of 426 to 431 by 1993. Most of the additional staffing would be needed in the Police, Fire, and Public Works departments. Without additional personnel, the number of city personnel per 1,000 population would fall from 5.8 to 5.7. This would not result in an appreciable deterioration from the community's current level of public service provision.

Program-related increases in population would lead to increases in demands for public services provided by Cascade County of about one percent over baseline levels in 1993. To maintain existing service levels, county staffing would have to increase from a baseline level of 612 to 618 by 1993. The Sheriff's Department and Public Works Department would be expected to need a large share of these personnel. Without additional staffing, the number of county personnel per 1,000 population would fall from 7.0 to 6.9. The Cascade County jail, currently operating above capacity, has been identified as an inadequate public facility. Currently, no funds are available for the

construction of a new jail. While the Cascade County jail facility is considered a problem under baseline conditions (causing certain public safety functions to deteriorate to minimally acceptable levels), program-induced population inmigration would further aggravate this problem. Because of lower population inmigration levels under the east site option, demands for public services would be slightly lower than for the south site option.

Public Finance. Program-related increases in the expenditures of the City of Great Falls and Cascade County would be limited to outlays for additional personnel (up to $120,000 for the city and $170,000 for the county under the south site option). These increases would represent about a 1.5-percent increase in projected baseline expenditures in the county and less than 1 percent in the city. Expenditure increases for the east site option would be slightly lower. With reserve funding levels of $12.8 million in the city and $2.7 million in the county, existing financial resources of the jurisdictions would be able to meet the additional outlays.

Based on an average cost of $3,500 per high school pupil, increased high school district expenditures under the south site option would amount to $140,000 by 1993. This would represent an increase of about 1.2 percent over projected baseline levels. Based on an average cost of $2,500 per elementary school pupil, increased elementary district expenditures would amount to $230,000 in 1993. This would represent an increase of about one percent over projected baseline levels. These increases would be reduced slightly under the east site option. Whether housing is developed onbase or offbase, temporary revenue shortfalls (approximately $100,000 in FY 1992) would be experienced by the local school districts. Reserve funding levels of approximately $7.6 million in the districts (as of FY 1986) would be sufficient to cover these potential shortfalls. If housing is developed offbase, slightly higher revenues from property taxes would result. However, for the school districts, revenues from this source would not be sufficient to cover foregone revenue from P.L. 81-874 programs in the long term. Potential shortfalls would represent less than one-half of one percent of operating expenditures of the districts and would require some adjustment in funding from either state foundation programs or other local sources.

Summary of Impacts. Both short- and long-duration socioeconomic impacts of program deployment at Malmstrom AFB would be low whether the south site option or the east site option is chosen. Program-induced population inmigration in the Great Falls urban area would represent increases of about 1.3 percent over baseline levels in 1992 and 1.1 percent in 1993 under the south site option. Under the east site option these increases would be slightly less. Housing demand, school enrollment increases, and local government expenditure requirements would also be low. If military family housing is constructed onbase, student enrollment at Loy Elementary School could cause the pupil-to-teacher ratios to rise above levels recently experienced within the district. District-wide, however, these enrollment increases could be accommodated. Impacts would be significant because the already inadequate capacity of the Cascade County jail would be further strained by demand associated with program-related population increases and because no funding is available for the expansion or construction of a new facility. A recent court decision, however, has held that the current funding mechanism for local school districts in the state is unconstitutional. Although the decision is being appealed by the affected state agencies, the resolution of the issue may result in major changes in the way local schools are funded. Depending on the relocation of this issue, program-related effects on local school district finances may become significant. Both short- and long-duration beneficial socioeconomic effects would be generated by the Proposed Action, including increases in employment and income, and greater utilization of temporary and permanent housing.

4.9.1.4 Impacts of the Alternative Action

For the Alternative Action, a brief summary of the program-related effects on key socioeconomic indicators is presented in Table 4.9.1-2.

Table 4.9.1-2

Selected Socioeconomic Indicators, Peacekeeper Rail Garrison Program
Malmstrom AFB, Montana, 1990-1993
Alternative Action

	1990	1991	1992	1993[1]
Region of Influence				
Employment (Jobs)				
Total Program-Related Jobs	250	802	784	584
Direct Jobs	118	424	474	372
Civilian	112	328	164	64
Military	6	96	310	308
Secondary Jobs	132	378	310	212
Local Hires	206	583	393	230
Program-Related Spending (000s 86$)	$5,446	$15,717	$13,383	$9,350
Personal Income (000s 86$)				
Direct	$3,268	$10,792	$9,718	$6,895
Secondary	2,880	8,035	6,533	4,438
Total	$6,148	$18,827	$16,251	$11,333
Great Falls[2]				
Population				
Baseline Population	72,648	72,904	73,161	73,419
Program-Related Change	111	553	1,016	924
Change as % of Baseline	0.2	0.8	1.4	1.3
Housing Demand				
Temporary Units	10	28	12	3
Permanent Units	32	107	104	78
Total	42	135	116	81
School District Enrollments				
Elementary	10	56	112	103
Secondary	4	24	48	44
Total	14	80	160	147

Notes: [1]Program-related effects would continue at these levels throughout the life of the program.
[2]Includes Malmstrom AFB for population and school enrollment.

Employment and Income. Impacts of the Alternative Action on employment and income in the ROI would be higher than the Proposed Action. During the construction phase under the south site option, the Alternative Action would create new jobs ranging from 250 in 1990 to 802 in 1991, which is 32 to 50 more jobs than the Proposed Action. Of the 802 new jobs during the peak construction year (1991), 424 would be direct jobs (328 civilian and 96 military) and 378 secondary jobs. The number of local hires would be 583, which is 33 more than the Proposed Action. During the operations phase, total new jobs created by the Alternative Action would number 584, which is 54 more than the Proposed Action. Of these 584 new jobs, 372 would be direct jobs (64 civilian and 308 military) and 212 secondary jobs. Local hires would number 230 or 21 more than the Proposed Action. Under the east site option, slightly lower direct employment requirements would result. Direct employment would be about 89 persons fewer than under the south site option.

During the construction phase, the Alternative Action with the south site option would generate personal income (in 1986 dollars) ranging from $6.1 million in 1990 to $18.8 million in 1991 in the ROI, which is $0.8 million to $1.2 million more than the Proposed Action. Cascade County's share of that personal income would range from $5.5 million in 1990 to $17.1 million in 1991. During operations, the Alternative Action would generate $11.3 million personal income for the ROI and $10.5 million of that personal income would go to Cascade County. Income effects under the east site option would be slightly less. In the ROI, the program-related spending would range from $5.4 million in 1990 to $15.7 million in 1991, and then stabilize at $9.3 million during the operations phase.

Population and Demographics. The inmigration associated with the Alternative Action under the south site option would range from 111 in 1990 to 1,016 in 1992 in the ROI; 15 to 87 more persons than the Proposed Action. During the operations phase, total inmigrants to the ROI would number 924, which is 85 more than the Proposed Action. During both the construction and operations phases, all program-induced inmigrants would reside in Cascade County. Therefore, compared with the population levels associated with the Proposed Action, Cascade County's population would be 85 more during the operations phase of the Alternative Action. As a result, the area's population would increase by 1.4 percent in 1992 and 1.3 percent in 1993 and thereafter. This increase in population would come primarily from additional military personnel needed for the expanded program and their families. Population increases under the east site option would be slightly lower.

Housing. For the Alternative Action, the Air Force has programmed for up to 183 family housing units to be constructed either on Malmstrom AFB or in the proximity of the base. However, current projections of housing vacancies and potential new construction in Great Falls suggest that no new units would actually have to be provided by the Air Force through one of its housing programs. Since these conditions may change, the Air Force would continue to monitor the housing market in the area and would increase or decrease the extent of its participation as necessary to prevent housing impacts in the community. The Alternative Action would not change the expected program-related occupancy patterns within the Great Falls Urban area. An additional 17 accompanied personnel would live in newly constructed family housing units, either onbase or offbase and 8 unaccompanied military personnel would live in existing onbase unaccompanied enlisted personnel housing facilities.

The demand for housing in the Great Falls area in 1990 under the south site option would be virtually the same as for the Proposed Action. The total demand would require 6.7 percent of the available units in 1991 and 1.1 percent of the available units during operations. An additional ten permanent units would be required in 1991 (out of a total of 872), reducing available vacancies by 12 percent. The operational demand for permanent units would increase by ten units and would reduce available vacancies by 9.2 percent. These demands would be slightly lower under the east site option. The long-duration available vacancy rate would fall from 2.8 to 2.6 percent.

Because these additional housing demands would not be large enough to cause shortages in the local housing market, they would have a beneficial effect.

Education. The Alternative Action (under the south site option) would increase enrollment by 15 students above those levels identified for the Proposed Action. Increases would be slightly less under the east site option. If family housing is constructed onbase, 110 students would be expected to live onbase, causing pupil-to-teacher ratios at Loy Elementary School to rise from 22.5-to-1 to 25.5-to-1. This level is still below the weighted average state standard for the elementary level. Districtwide pupil-to-teacher ratios at the elementary level would remain essentially the same as those identified for the Proposed Action. The construction of family housing offbase would minimize the chance of overcrowding at selected schools in the area.

Public Services. The population inmigration associated with the Alternative Action under either siting option is expected to result in slightly higher demands on the provision of public services in the Great Falls area. Staffing needs would be essentially the same as those identified for the Proposed Action. The number of personnel per 1,000 population for both the city and the county would remain essentially the same as those identified for the Proposed Action. Except for the Cascade County jail, existing municipal facilities appear to be adequate.

Public Finance. Because staffing needs would remain essentially unchanged with this alternative, expenditure impacts would remain at levels estimated for the Proposed Action. Existing financial resources are expected to meet the additional costs. Temporary revenue shortfalls may be experienced by the local school districts.

Summary of Impacts. Both short- and long-duration socioeconomic impacts for the Alternative Action would be low under either site option because program-related population inmigration into the Great Falls area, and the attendant increases in housing demand, public services, school enrollment, and public expenditures, would represent about a 1.4-percent increase over baseline levels in 1992 and 1.3 percent in 1993. Impacts would be significant because the Cascade County jail, currently overcrowded, would be inadequate to safely meet the public safety needs of the community. Both short- and long-duration beneficial socioeconomic effects would be generated by the Alternative Action, including increases in employment and income, and greater utilization of temporary and permanent housing.

4.9.1.5 Cumulative Impacts

A brief summary of program employment and population for the concurrent deployment of the Peacekeeper Rail Garrison program and other Air Force programs at Malmstrom AFB is presented in Table 4.9.1-3.

Concurrent deployment of the Peacekeeper Rail Garrison program and other Air Force programs at Malmstrom AFB would have cumulative effects greater than with Proposed Action alone. Two additional Air Force programs are under consideration for deployment at Malmstrom AFB. These involve a second squadron of KC-135R aircraft and the Small ICBM program. The cumulative effects of these programs are examined as three scenarios. The first is the Proposed Action and second squadron of KC-135R aircraft. The second is the Proposed Action and the Small ICBM program, and the third is all three programs combined. Also, the difference between the Proposed Action cumulative scenarios and the corresponding Alternative Action cumulative scenarios are described. The analyses assume the south site option will be chosen.

Peacekeeper Rail Garrison and KC-135R Programs

Employment and Income. Total employment created by the Peacekeeper Rail Garrison program and the second squadron of KC-135R aircraft would range from 86 in 1988 to 977 in 1991, and then stabilize at 957 during operations. During the peak construction year (1990), of the 385 total jobs, 185 would be direct (179 civilian and 6 military) and 200 would be secondary. The number of local hires would be 319. During operations, out of 957 total jobs, 622 would be direct (68 civilian and 554 military) and 335 would be secondary. Local hires would number 355.

Combined, both programs would generate personal income (in 1986 dollars) ranging from $2.2 million in 1988 to $21.5 million in 1991, and then stabilizing at $19.0 million during operations. Cascade County's share of that personal income would range from $2.0 million in 1988 to $19.6 million in 1991, and then stabilize at $17.8 million during operations. Total program-related spending would be $1.5 million in 1988, $18.2 million in 1991, and $15.0 million during operations.

Table 4.9.1-3

Total Employment and Population Inmigration
Peacekeeper Rail Garrison, Small ICBM, and Second KC-135R Squadron Programs
Malmstrom AFB, Montana
1988-1998

	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998
Total Employment	86	561	2,683	2,937	4,853	4,983	4,476	4,940	5,751	5,529	5,331
Peacekeeper Rail Garrison	0	1	218	752	729	530	530	530	530	530	530
KC-135R	86	287	167	225	427	427	427	427	427	427	427
Small ICBM	0	273	2,298	1,960	3,697	4,026	3,519	3,983	4,794	4,572	4,374
Population Inmigration	36	247	928	2,138	5,395	6,462	6,993	8,172	9,679	9,415	9,163
Peacekeeper Rail Garrison	0	2	96	507	929	839	839	839	839	839	839
KC-135R	36	115	63	328	725	725	725	725	725	725	725
Small ICBM	0	130	769	1,303	3,741	4,898	5,429	6,608	8,115	7,851	7,599

Population and Demographics. Cumulative impacts of population inmigration are discussed with respect to Cascade County because no other area is affected by the various program-related population inmigration.

The effect on population from the Peacekeeper Rail Garrison program and the second squadron of KC-135R aircraft would begin in 1988 with 36 inmigrants. This number would peak at 1,654 in 1992 and then stabilize at 1,564 during the operations phase. The inmigration would increase Cascade County's population from 87,109 to 88,763 or 1.8 percent in 1992, and from 87,413 to 88,977 or 1.8 percent in 1993. In the Great Falls area, the population would increase from 73,161 to 74,815 or 2.3 percent in 1992 and from 73,419 to 74,983 or 2.1 percent in 1993. The number of weekly commuters would be less than 25 during the construction phase.

Housing. The cumulative demand for both permanent and temporary housing associated with the Peacekeeper Rail Garrison program and the second squadron of KC-135R aircraft would also be confined to the Great Falls urban area. It is expected that new onbase unaccompanied enlisted personnel housing facilities would be constructed at Malmstrom AFB to house about 80 of the 185 unaccompanied personnel associated with these two missions. Another 85 would be housed in existing onbase unaccompanied enlisted personnel housing facilities. The remaining 20 unaccompanied personnel would seek housing offbase. The Air Force has programmed for up to 166 family housing units to be constructed either on Malmstrom AFB or in the proximity of the base. However, current projections of housing vacancies and potential new construction in Great Falls suggest that no new units would have to be provided by the Air Force through one of its housing programs. Since these conditions may change, the Air Force would continue to monitor the housing market in the Great Falls area and would increase or decrease the extent of its participation as necessary to prevent housing impacts in the community. The peak demand for permanent housing units under this cumulative scenario would be in 1992. In this year, 287 privately owned offbase permanent units would be required. This short-duration demand would be met through the use of projected available vacancies (870 units), reducing the available vacancy rate from 2.9 to 1.9 in that year. The long-duration demand would be for 261 privately owned offbase units (26 fewer than the peak) beginning the following year. This would cause the long-duration vacancy rate to decline 2.8 to 2.0 percent in 1993. The demand for temporary facilities would peak in 1991 at 34 units or 7.0 percent of the available vacant facilities during periods of minimum vacancy, and decline to the long-duration demand for 12 units or 3.0 percent of the available vacant facilities during periods of minimum vacancy.

Education. The concurrent deployment of the Peacekeeper Rail Garrison program and the second squadron of KC-135R aircraft would lead to increased enrollment in the GFPS system. In 1993, the operations year for the two programs, an additional 250 students would be added to schools in the area. Of these 250 students, 134 would be attributable to the Peacekeeper Rail Garrison program and 116 would be attributable to the second squadron of KC-135R aircraft.

The addition of these students would cause the districtwide pupil-to-teacher ratios at the elementary level to increase from 21.5-to-1 to 22.0-to-1. This ratio would be below the weighted average state standard. Students associated with the second squadron of KC-135R aircraft would be dispersed throughout the district and would not measurably add to the influx at Loy Elementary School. Increased enrollment at Loy Elementary School, mainly associated with the Peacekeeper Rail Garrison program, may increase pupil-to-teacher ratios at that school above levels recently experienced. If the housing requirements associated with the Peacekeeper Rail Garrison program are located offbase, enrollment increases attributable to both programs would be dispersed throughout the district. Additional staffing may be needed to maintain existing pupil-to-teacher ratios.

Public Services. In 1993, the concurrent deployment of the Peacekeeper Rail Garrison program and the second squadron of KC-135R aircraft would lead to population increases of 2.1 percent and 1.8 percent for the City of Great Falls and Cascade County, respectively. These population increases would translate into increased demands for these jurisdictions' public services. The City of Great Falls would need nine additional personnel to maintain existing service level standards. The Police, Fire, and Public Works departments would need a majority of these personnel. Without additional staffing, the number of city personnel per 1,000 population would drop from 5.8 to 5.7. Cascade County would need 11 additional personnel by 1993 or the number of county personnel per 1,000 population would drop from 7.0 to 6.9. This level of population inmigration would affect the county's ability to provide public services to their constituents, mainly as a result of the problems associated with the inadequacy of the Cascade County jail facility.

Public Finance. Deployment of the Peacekeeper Rail Garrison program and the second squadron of KC-135R aircraft would result in increased expenditures in the City of Great Falls of approximately $320,000 by FY 1993. This would represent an increase of about one percent over projected baseline levels in this year. Program-induced revenues would be slightly lower at $310,000. This assumes that housing for military families would be developed onbase. If housing were constructed offbase, collection of additional property taxes would result in slightly higher revenues.

In Cascade County, deployment of the two programs would result in increased expenditures of approximately $210,000 by FY 1993. This would represent an increase of about two percent over projected baseline levels in this year. Program-induced revenues would be slightly lower at $140,000 in the same year. This assumes that housing for military families is developed onbase. If housing were constructed offbase, the additional property taxes would result in slightly higher revenues.

For the Great Falls Elementary School District No. 1, deployment of the two programs would result in increased expenditures of approximately $440,000 by FY 1993. This would represent an increase of about two percent over projected baseline levels in this year. Program-induced revenues would be slightly lower at $410,000 in the same year. Payments from P.L. 81-874 programs would amount to approximately $50,000 during the operations phase. If housing were developed offbase, payments from P.L. 81-874 programs would be reduced while revenues from property taxes would increase.

For the Great Falls High School District No. A, deployment of the two programs would result in increased expenditures of approximately $270,000 by FY 1993. This would represent an increase of about two percent over projected baseline levels in this year. Program-induced revenues would be slightly lower at approximately $250,000 in the same year. Payments from P.L. 81-874 programs would amount to approximately $30,000 during the operations phase. If housing were developed offbase, payments from P.L. 81-874 programs would be reduced while revenues from property taxes would increase.

Summary of Impacts. Both short- and long-duration socioeconomic impacts associated with deployment of the Peacekeeper Rail Garrison and the second squadron of KC-135R aircraft would be low. Population inmigration in the peak year (1992) would number 1,654 persons, representing 2.3 percent of baseline population levels in the Great Falls area. Long-duration population inmigration would be 1,564 persons beginning in 1993, representing 2.1 percent of baseline population levels. The program-induced demand for housing would be met by available vacancies, and because existing educational facilities would absorb program-related enrollment increases, and existing revenue sources of the jurisdictions would be able to meet program-related expenditures. The construction of onbase family housing may cause pupil-to-teacher ratios at Loy Elementary to rise above recently experienced levels, but these districtwide enrollment increases could be accommodated. These impacts would be significant because program-induced population

inmigration would place additional burdens on the already overcrowded county jail. Beneficial effects would be experienced by hotel/motel operators (short duration) and by landlords (long duration). With the Alternative Action, population inmigration would be about 85 persons greater than the Proposed Action. Deployment of the Alternative Action and the second squadron of KC-135R aircraft would cause 1,650 persons to inmigrate into the Great Falls urban area by 1993 and remain there during operations. This increase of 5.4 percent in inmigrants over the Proposed Action would be reflected in all of the socioeconomic elements, but would not be sufficient to change the overall level of impact or significance ratings presented in the Proposed Action or second squadron of KC-135R aircraft cumulative section. A recent court decision, however, has held that the current funding mechanism for local school districts in the state is unconstitutional. Although the decision is being appealed by the affected state agencies, the resolution of the issue may result in major changes in the way local schools are funded. Depending on the resolution of this issue, program-related effects on local school district finances may become significant.

Peacekeeper Rail Garrison and Small Intercontinental Ballistic Missile Programs

Employment and Income. The Peacekeeper Rail Garrison and Small ICBM programs combined would create total jobs ranging from 274 in 1989 to 4,426 in 1992, and then peaking at 5,324 in 1996. During the peak construction year (1992), of the 4,426 total jobs, 2,548 would be direct (1,146 civilian and 1,402 military) and 1,878 would be secondary. The number of local hires would be 2,537. At their peak in 1996, of the total 5,324 new jobs, 3,767 would be direct (381 civilian and 3,386 military) and 1,557 would be secondary. Local hires would number 1,698.

Combined, the Peacekeeper Rail Garrison and Small ICBM programs would generate personal income (in 1986 dollars) ranging from $6.8 million in 1989 to $96.5 million in 1992, and to $100.7 million in 1996. Cascade County's share of that personal income would be $6.1 million, $88.4 million, and $96.3, respectively. Total spending generated by the two programs in the ROI would range from $5.9 million in 1989 to $79.8 million in 1992, and $72.3 million in 1996.

Population and Demographics. The Peacekeeper Rail Garrison and Small ICBM programs would generate population inmigration to the Great Falls area of Cascade County ranging from 132 in 1989 to 4,670 in 1992, and then 8,954 in 1996. At its peak in 1996, the inmigration to the Great Falls area would account for 12 percent of the baseline population. As a result, the increase over the county's baseline population would range from 0.2 percent in 1989 to 5.4 percent in 1992, and then 10.1 percent in 1996. The number of weekly commuters would vary from 7 to 74 during the 1989 to 1997 period. During the operations phase of the two programs, beginning in 1998, population inmigration would decrease to 8,438, which is 9.5 percent above the projected baseline.

Housing. The cumulative demand for both permanent and temporary housing associated with the Peacekeeper Rail Garrison and the Small ICBM programs would be confined to the Great Falls urban area. It is expected that new onbase unaccompanied enlisted personnel housing facilities would be constructed at Malmstrom AFB to house about 1,065 of the 1,275 unaccompanied personnel associated with the two missions. An additional 85 personnel would be housed in existing unaccompanied enlisted personnel housing facilities onbase. The remaining 125 unaccompanied personnel would seek housing offbase. The Air Force has programmed for up to 1,912 family housing units to be constructed either on Malmstrom AFB or in the proximity of the base. However, current projections of housing vacancies and potential new construction in Great Falls suggest that no new units would have to be provided by the Air Force through one of its housing programs. Since these conditions may change, the Air Force would continue to monitor the housing market in the Great Falls area and would increase or decrease the extent of its participation as necessary to prevent housing impacts in the community. If all Air Force personnel were required to seek suitable and affordable housing in the

community in the absence of any Air Force housing program, some serious consequences would result. With a majority of military personnel in the lower enlisted grades having an average monthly housing allowance of about $350, the available supply of low- and moderate-priced housing would quickly be occupied, resulting in a shortage of almost 1,200 units. Since monthly housing expenditures at this modest level are not sufficient for the development, financing, and construction of new two-, three-, and four-bedroom housing units, the housing shortfall would be offset through the use of unsuitable and potentially substandard housing. The competition for low- and moderate-income housing between military and civilian residents in the Cheyenne area would cause hardships for both groups because of increased housing costs and substandard housing conditions. In some cases, Air Force families may displace existing residents, placing an even greater burden on low-income households. The combined effects of insufficient affordable housing, higher housing costs, and potential displacement of low-income families would result in a high and significant housing impact. To avoid these significant impacts, the Air Force would provide adequate housing for its personnel to offset potential shortages.

The peak year of demand for permanent housing units under this cumulative scenario would be 1992. In this year, 586 privately owned offbase permanent housing units would be required. This short-duration demand would be met through the use of projected available vacancies (870 units) and expected private construction (280 additional units). This would reduce the available vacancy rate from 2.9 to 1.8 percent in that year. The long-duration demand would be for 426 privately owned offbase units (160 fewer units than the peak) beginning in 1998. The long-duration vacancy rate would fall from 2.8 to 2.3 percent in that year. The demand for temporary facilities would peak in 1990 at 107 units or 24.0 percent of the temporary facilities available during the periods of minimum vacancy. The long-duration demand would be for 20 units or 4.0 percent of the available temporary facilities during periods of minimum vacancy.

Education. The concurrent deployment of the Peacekeeper Rail Garrison and Small ICBM programs at Malmstrom AFB would lead to enrollment increases of 1,345 student by 1998. Of these students, 1,211 would be attributable to the Small ICBM program and 134 to the Peacekeeper Rail Garrison program.

The addition of these students to the Great Falls area would cause the districtwide pupil-to-teacher ratio at the elementary level to increase from 21.5-to-1 to 24.4-to-1. This ratio would still be below the weighted average state standard. Because of the proposed construction of onbase family housing for both programs, severe overcrowding at Loy Elementary School would occur. In 1998, 633 onbase students would be slated to attend Loy Elementary School if the district's current policy of maintaining neighborhood schools was adhered to. If these students enrolled at Loy, pupil-to-teacher ratios would increase from 22.5-to-1 to 53-to-1. This level far exceeds state standards. Additional staffing would not rectify the imbalance because this enrollment exceeds the design capacity of the school. Locating military family housing offbase would alleviate the serious overcrowding problem at Loy Elementary by dispersing students more evenly throughout district schools. Districtwide pupil-to-teacher ratios would increase to the aforementioned level. Even with offbase housing, however, this level of enrollment increase could cause capacity problems at selected schools.

Public Services. The concurrent deployment of the Peacekeeper Rail Garrison and Small ICBM programs would lead to population increases of 11.3 percent and 9.5 percent respectively, in 1998 for the City of Great Falls and Cascade County. These large increases in population would lead to measurable increases in demands for these jurisdictions' services. The City of Great Falls would need 49 additional personnel by 1998. Most departments would need additional staffing. Without additional personnel, the number of personnel per 1,000 population would drop from 5.8 to 5.2. Cascade County would need 59 additional personnel to maintain existing service levels. Additional staffing would be needed by a majority of the county's departments. Without additional staffing, the number of county personnel per 1,000 population would drop from

7.0 to 6.4 in 1998. If these jurisdictions cannot respond to this population influx with increased staffing, there would be a noticeable effect on service delivery in the area. The Cascade County jail facility would be inadequate from the standpoints of safety, capacity, and legal constraints.

Public Finance. Deployment of the Peacekeeper Rail Garrison and Small ICBM programs would result in increased expenditures in the City of Great Falls of approximately $1.9 million in the peak year (1996) and $1.8 million during the operations phase. These increases would be about eight percent over projected baseline levels in these years. Program-induced revenues would be slightly lower at $1.7 million during both the peak year and the operations phase. This assumes housing for the military families would be provided onbase. If housing were developed offbase, additional property tax collections would increase estimated revenues.

In Cascade County, deployment of the two programs would result in increased expenditures of approximately $1.1 million in the peak year and $1.0 million during operations. These increases would be 9-percent over projected baseline expenditures in the peak year and 8 percent during operations. Program-induced revenues would be lower at $750,000 in the peak year and $730,000 during operations. This assumes that housing for the military families would be developed onbase. If housing were developed offbase, additional property tax collections would increase estimated revenues.

For the Great Falls Elementary School District No. 1, deployment of both programs would result in increased expenditures of $2.5 million in the peak year and $2.4 million during operations. These increases would be about ten percent over projected baseline levels in these years. Program-induced revenues would be approximately $2.2 million in FY 1996 and $2.4 million during operations. Payments under P.L. 81-874 programs would amount to approximately $540,000 during operations. This assumes military family housing is developed onbase. If housing is developed offbase, payments from P.L. 81-874 programs would be reduced to approximately $20,000 while revenues from property taxes would be increased. Because of lagging revenues from state foundation programs, temporary revenue shortfalls of up to $280,000 in the peak year are projected. Revenues and expenditures would be in balance over the operations phase.

For the Great Falls High School District, deployment of both programs would result in increased expenditures of approximately $1.5 million in the peak year (1996) and $1.4 million during operations. These increases would be about 11 percent over projected baseline levels in these years. Program-induced revenues would be approximately $1.4 million in FY 1996 and $1.5 million during operations. Payments from P.L. 81-874 programs would be approximately $320,000 during operations. This assumes that the military family housing would be developed onbase. If housing is developed offbase, payments from P.L. 81-874 programs would be reduced to approximately $12,000 while revenues from property taxes would be increased. Because of lagging revenues from state foundation programs, temporary revenue shortfalls of up to $140,000 in the peak year are projected. Program-related revenues and expenditures would be in balance over the operations phase.

Summary of Impacts. Short-duration socioeconomic impacts associated with the deployment of the Peacekeeper Rail Garrison and the Small ICBM programs simultaneously at Malmstrom AFB would be high. Population inmigration in the peak year (1996) would number 8,954 persons, representing 12.0 percent of the Great Falls area baseline population level. Long-duration impacts would be moderate because the population inmigration of 8,438 persons beginning in 1998, would represent 9.5 percent of baseline population levels. These impacts would be significant because of the need for expanded school facilities in the area of the base, overcrowding at the Cascade County jail, and revenue shortfalls in Cascade County which would further reduce already low reserve funding levels. Beneficial effects would be experienced by hotel/motel operators (short duration) and landlords (long duration). Deployment of the Alternative Action and

the Small ICBM at Malmstrom AFB would cause approximately 9,040 persons to inmigrate into the Great Falls urban area during the peak year (1996). During operations, this total inmigration would be approximately 8,525 persons. These increases in population inmigration would be 0.9 percent in 1996 and 1 percent during operations, and would be reflected in each socioeconomic element. However, they would not be sufficient to change the overall level of impact or significance rating presented in the Proposed Action/Small ICBM cumulative section.

Peacekeeper Rail Garrison, Small ICBM, and 2nd Squadron of KC-135R Aircraft Programs

Employment and Income. Total employment created by all three programs, Peacekeeper Rail Garrison, Small ICBM, and the second squadron of KC-135R aircraft would range from 86 in 1988 to 2,683 in 1990, and then 5,751 in 1996. During the peak construction year (1990), of the 2,683 jobs created by the three programs, 1,183 would be direct (1,168 civilian and 15 military) and 1,500 would be secondary. The number of local hires would be 2,253. At their peak in 1996, of the total 5,751 new jobs, 4,051 would be direct (391 civilian and 3,660 military) and 1,700 would be secondary. Local hires would number 1,844. Total jobs related to all three programs would range from 0.1 to 7.1 percent of the total baseline jobs in the ROI during the 1988 to 1996 period.

Combined, all three programs would generate personal income (in 1986 dollars) ranging from $2.2 million in 1988 to $68.9 million in 1990, and then $109.4 million in 1996 in the ROI. Cascade County's share of that personal income would vary from $2 million to $61.1 million, and then $104.5 million during those same years. Total spending in the ROI for all three programs combined would increase from $1.5 million in 1988 to $64.2 million in 1990 to $104.6 million in 1996.

Population and Demographics. The effect on population from all three programs would range from 36 in 1988 to 928 in 1990, and then 9,679 in 1996. Cascade County's population would increase from 84,274 in 1988 to 87,426 in 1990, and to 98,020 in 1996 with the three programs. The inmigration would represent an increase ranging from 0.1 to 11.0 percent over the baseline population of Cascade County. At its peak in 1996, the inmigration into the Great Falls area would be 13.0 percent of the baseline population. The number of weekly commuters would vary from 3 to 80 during the 1988 to 1996 period. During the operations phase of the programs, beginning in 1998, population inmigration would decrease to 9,164, 12.3 percent of the baseline projected for the Great Falls area.

Housing. The cumulative demand for both permanent and temporary housing associated with the three programs would be confined to the Great Falls urban area. It is expected that new onbase unaccompanied enlisted personnel housing facilities would be constructed at Malmstrom AFB to house about 1,150 of the 1,365 unaccompanied personnel associated with the three missions. An additional 85 personnel would reside in existing onbase unaccompanied enlisted personnel housing facilities. The remaining 130 unaccompanied personnel would seek housing offbase. For the Proposed Action, the Air Force has programmed for up to 1,912 family housing units to be constructed either on Malmstrom AFB or in the proximity of the base. However, current projections of housing vacancies and potential new construction in Great Falls suggest that no new units would have to be provided by the Air Force through one of its housing programs. Since these conditions may change, the Air Force will continue to monitor the housing market in the Great Falls area and will increase or decrease the extent of its participation as necessary to prevent adverse housing impacts in the community. If all Air Force personnel were required to seek suitable and affordable housing in the community in the absence of any Air Force housing program, some serious consequences would result. With a majority of military personnel in the lower enlisted grades having an average monthly housing allowance of about $350, the available supply of low- and moderate-priced housing would quickly be occupied, resulting in a shortage of almost 1,400 units. Since monthly housing

expenditures at this modest level are not sufficient for the development, financing, and construction of new two-, three-, and four-bedroom housing units, the housing shortfall would be offset through the use of unsuitable and potentially substandard housing. The competition for low- to moderate-income housing between military and civilian residents in the Cheyenne area would cause hardships for both groups because of increased housing costs and substandard housing conditions. In some cases, Air Force families may displace existing residents, placing an even greater burden on low-income households. The combined effects of insufficient affordable housing, higher housing costs, and potential displacement of low-income families would result in a high and significant housing impact. To avoid these significant impacts, the Air force will provide adequate housing for its personnel to offset potential shortages.

The peak demand for permanent housing units under this cumulative scenario would be in 1992. In this year, 776 privately owned offbase permanent housing units would be required. This short-duration demand would be met through the use of projected available vacancies (870 units) and expected private construction (280 additional units). This would reduce the available vacancy rate from 2.9 percent to about 1.2 percent in that year. The long-duration demand would be for 616 privately owned offbase units (160 fewer units than the peak) beginning in 1998. The long-duration vacancy rate would fall from 2.8 to 1.7 percent in that year. The demand for temporary facilities would peak in 1990 at 115 or 25.0 percent of the available facilities during periods of minimum vacancy. The long-duration demand would be for 30 temporary facilities or 7.0 percent of those available during periods of minimum vacancy.

Education. The concurrent deployment of the three programs would cause enrollment increases of 1,466 students above baseline levels by 1998. This would cause districtwide pupil-to-teacher ratios at the elementary level to increase from 21.5-to-1 to 24.5-to-1 in that year. Loy Elementary School, located adjacent to the base, would have pupil-to-teacher ratios exceeding 50-to-1 with the programs. These enrollment increases far exceed state standards and are beyond Loy's design capacity. Even with offbase housing, capacity problems may exist at selected schools.

Public Services. In 1998, the concurrent deployment of the three programs would lead to population increases of 12.3 percent and 10.3 percent for the City of Great Falls and Cascade County, respectively. To maintain existing service levels, Great Falls would need 53 additional personnel by 1998. Additional staffing would be needed for a majority of the city's departments. Without additional staffing, the number of city personnel per 1,000 population would drop from 5.8 to 5.2. Cascade County would need 64 additional staff above baseline levels. Staffing would be needed in most county departments. Without additional staffing, the number of county personnel per 1,000 population would drop from 7.0 to 6.3. With additional staffing, these jurisdictions would be able to accommodate program-related increases in service demand. The Cascade County Jail, however, would continue to be inadequate.

Public Finance. Deployment of all three programs (Peacekeeper Rail Garrison, Small ICBM, and the second squadron of KC-135R aircraft) would result in increased expenditures in the City of Great Falls of approximately $2.0 million in the peak year (1996) and $1.9 million during the operations phase. These increases would be approximately nine percent over projected baseline levels in these years. Program-induced revenues would be slightly lower at $1.9 million in the peak year and $1.8 million during the operations phase. This assumes that housing for the military families would be constructed onbase. If housing were constructed offbase, the additional property tax collections would increase revenues to approximately $2.0 million in the peak year and $1.9 million during operations.

In Cascade County, deployment of all three programs would result in increased expenditures of $1.2 million in FY 1996 and $1.1 million during operations. These increases would be approximately nine percent over projected baseline levels in these

years. Program-induced revenues would be slightly lower at $830,000 in the peak year and $770,000 during operations. This assumes that housing for military families would be constructed onbase. If housing were constructed offbase, the additional property tax collections would increase revenues to approximately $990,000 in FY 1996 and $960,000 during operations. This increase in revenues, however, would still not be sufficient to meet program-induced expenditure demands.

For the Great Falls Elementary School District No. 1, deployment of all three programs would result in increased expenditures of $2.7 million in the peak year FY 1996 and $2.6 million during the operations phase. These increases would be approximately 11 percent over projected baseline levels in these years. Program-induced revenues would be approximately $2.4 million in the peak year and $2.6 million during operations. Payments from P.L. 81-874 programs would amount to approximately $540,000 during operations. This assumes that the military family housing would be developed onbase. If housing is developed offbase, payments from P.L. 81-874 would be reduced substantially (to approximately $25,000) while property taxes from the additional housing built in the community would increase. Because of lagging revenues for state foundation programs, temporary revenue shortfalls of up to $310,000 in the peak year are projected. Revenues and expenditures would be in balance over the operations phase.

For the Great Falls High School District No. A, deployment of all three programs would result in increased expenditures of approximately $1.6 million in both the peak year and during operations. This increase would be approximately 12 percent over projected baseline levels. Program-induced revenues would be approximately $1.5 million in the peak year and $1.6 million during operations. Payments from P.L. 81-874 programs would amount to approximately $320,000 during operations. If housing is developed offbase, payments from P.L. 81-874 programs would be reduced substantially (to approximately $15,000) while property taxes from the additional housing built in the community would increase. Because of lagging revenues from state foundation programs, temporary revenue shortfalls of up to $150,000 in the peak year are projected. Revenues and expenditures would be in balance over the operations phase.

Summary of Impacts. Both short- and long-duration socioeconomic impacts associated with deployment of all three programs would be high. Population inmigration in the peak year (1996) would number 9,679 persons, representing 13.0 percent of the Great Falls area baseline population levels. Long-duration population inmigration would be 9,164 persons beginning in 1998, representing 12.3 percent of baseline population levels. These impacts would be significant because of the need for expanded school facilities in the area of the base, overcrowding at the Cascade County jail (inadequate under baseline conditions), and revenue shortfalls in Cascade County which would further reduce already low reserve funding levels.

Deployment of the Alternative Action, the second squadron of KC-135R aircraft, and the Small ICBM program at Malmstrom AFB would cause approximately 9,767 persons to inmigrate into the Great Falls urban area during the peak year (1996). During operations, this total inmigration would be approximately 9,250 persons. The population increases would be about 0.9 percent above the Proposed Action in 1996 and during operations, and would be reflected in each socioeconomic element. However, short- and long-duration impacts would remain high and significant as previously discussed in the Proposed Action/second squadron of KC-135R aircraft/Small ICBM cumulative section.

Both short- and long-duration beneficial socioeconomic effects would be generated by the Proposed and Alternative Actions, including increases in employment and income, and greater utilization of temporary and permanent housing.

Mitigation Measures. Mitigation measures that could be undertaken to eliminate potential significant impacts of the Proposed or Alternative Actions and the concurrent deployment of the Peacekeeper Rail Garrison program, the Small ICBM program, and the

second squadron of KC-135R aircraft at Malmstrom AFB are listed in the following. All or some of these measures may be implemented. For each measure, the agencies that may be involved in implementation are identified.

- As appropriate, award multiple small contracts to enable local firms with limited bonding capacities the opportunity to bid. Contract awards to local firms would reduce population inmigration during the construction phase and subsequently lower demand for temporary housing units (U.S. Army Corps of Engineers).
- Provide information to local job service agencies about the availability of jobs (by type) and the skills needed for them. This information could help reduce the number of job seekers inmigrating into the area and reduce demand for local housing (U.S. Air Force contractors).
- Maximize participation in P.L. 81-874 entitlement programs by encouraging parents who live or work on federal facilities to respond to school district requests for information. This federal program provides aid to local school districts which have had substantial increases in school enrollments as a result of new or expanded federal activities (U.S. Air Force).

4.9.2 UTILITIES

4.9.2.1 Region of Influence

The utilities ROI for Malmstrom AFB includes the host community of Great Falls and the base.

4.9.2.2 Existing and Future Baseline Conditions

Potable Water Treatment and Distribution. The City of Great Falls provides potable water to its residents and to Malmstrom AFB with diversions from the Missouri River. In 1987, average daily demands equaled 11.4 million gallons per day (MGD) or approximately 24 percent of the 48-MGD treatment plant capacity. System storage capacity of 15.7 million gallons (MG) is adequate to meet peak summer demands, though water use restrictions have been enforced in the past when necessary. The city is replacing outdated equipment at their treatment plant and will be increasing its capacity to 60 MGD by 1989. Average daily demands will increase to 12.7 MGD by 1990 and 12.94 MGD by 1998, using 22 percent of the proposed treatment capacity.

Potable water use at Malmstrom AFB equaled 1.02 MGD in FY 1987. Capacity of the interconnection with the city is estimated to be 3.37 MGD and the present contract allows for the annual use of 460 MG of water. Onbase storage of 2.8 MG is adequate for meeting peak summer demands. Onbase potable water use will increase to 1.16 MGD by 1990 as a result of the first KC-135R air refueling mission.

Wastewater. Wastewater treatment for Great Falls and Malmstrom AFB occurs at an activated-sludge facility owned by the City of Great Falls and operated under servile contract with a private sewage treatment management firm. The facility is currently processing 9.4 MGD and operating at 61 percent of its 15.5-MGD treatment capacity. Discharges to the Missouri River consistently meet Montana Pollutant Discharge Elimination System permit requirements. Wastewater flows are estimated to increase to 9.87 MGD by 1990 and 10.05 MGD by 1998. In 1998, the facility will be operating at 65 percent of its treatment plant capacity. Malmstrom AFB discharged 0.54 MGD to this plant in FY 1987. Wastewater flows will increase to 0.75 MGD by 1990. Adequate capacity will be available in the existing force main to handle these wastewater flows and the present contract with the city allows for the treatment of 0.82 MGD (300 MG annually) of effluent.

Solid and Hazardous Waste. Solid waste collection and disposal is provided by the City of Great Falls and two private firms. Total daily disposal requirements will increase from

the current volume of 345 tons per day (T/day) to 357 T/day in 1990 and to 364 T/day by 1998. Currently, the city's landfill is estimated to have a lifespan of 15 years, while the private site is projected to be available for 75 years. Solid waste generated onbase is disposed of by a private contractor. A total of 4,188 tons per year or 11 T/day was removed in FY 1987.

Onbase hazardous waste are managed by Malmstrom AFB; the Defense Reutilization and Marketing Office (DRMO) is responsible for providing for the proper handling of the wastes and arranging for transport to treatment and disposal facilities. The base stores the wastes in a storage facility located adjacent to the DRMO and a new conforming storage facility is programmed for construction in 1989. The wastes include sodium chromate, batteries and battery acid, oils, paints, thinners, solvents, and other regulated materials. Onbase hazardous waste generation will increase by approximately 43,800 pounds in 1990 as a result of the first KC-135R air refueling mission.

Energy Utilities. The Montana Power Company (MPC) provides electrical service to the City of Great Falls and Malmstrom AFB cantonment area. In 1986, MPC had a system capability of 1,674 megawatts (MW) with a peak demand of 1,233 MW. Total sales of electricity in 1986 were 9.6 billion kilowatt-hours. The MPC projects a 1.6-percent average annual increase in peak demand between 1986 and the year 2000. To meet the projected peak demands of 1,439 MW in 1990 and 1,598 MW in 1998, the company will rely on purchased power and hydroelectric generating plant upgrades.

For FY 1987, Malmstrom AFB purchased 44,380 megawatt-hours of electricity from MPC. Service to the base is supplied by the MPC Great Falls northeast substation, which has a transformer capacity of 20 megavolt-amperes (MVA). Peak demand on the substation was 10.3 MVA in 1985. Backup feed to the base is supplied by the Great Falls eastside substation, which has a transformer capacity of 20 MVA. Peak demand on the substation in 1985 was 23 MVA. With the addition of the KC-135R air refueling mission, onbase demand is projected to increase by 3.35 MW to a total of 11 MW. Additional power requirements can be supplied by MPC or from the Western Area Power Administration. A complete upgrade of the onbase distribution system is planned for FY 1992. In addition, a new 115-kilovolt transmission line and 30-MW substation may be installed onbase prior to 1990, and will replace the use of the Great Falls northeast substation. The MPC plans to increase the capacity of the eastside substation by 25 percent with the addition of fan cooling to the transformer banks.

The Great Falls Gas Company (GFGC) supplies natural gas to the City of Great Falls and Malmstrom AFB. The GFGC had sales in FY 1985 that reached 4,920 million cubic feet (MMcf), a 2.8-percent increase from 1984. In 1985, the company provided service to approximately 22,518 customers, and average annual residential consumption was 115 thousand cubic feet (Mcf). The company purchases its supply from MPC and currently has a 30-percent excess capacity margin due to reduced use as a result of energy conservation measures.

The GFGC anticipates growth in the residential, commercial, and industrial sectors, except for Malmstrom AFB, which has installed a coal-fired central heating plant and hot water distribution system. Sales are projected to increase at a 2-percent annual rate between 1987 and 1997 to a total of approximately 5,200 MMcf in 1990 and 6,000 MMcf in 1997. The GFGC provides natural gas to the base via a 12-inch-diameter line with a rated capacity of 470 Mcf per hour. In FY 1987, consumption equaled 436 MMcf. While the installation of the heating plant reduces natural gas use, the first KC-135R air refueling mission will bring natural gas consumption to 287 MMcf.

Liquid fuels are supplied to Malmstrom AFB through contracts with local and regional distributors that are filled through the Defense Fuels Supply Center. The fuel is currently delivered to the base by tanker truck and and stored in 56 onbase tanks with a total capacity of 52,715 barrels or 2.2 MG. In 1986, the base used 655,255 gallons of regular and unleaded gasoline and 409,963 gallons of diesel.

4.9.2.3 Impacts of the Proposed Action

For the utilities resource, the impact analysis is the same whether the south or east site option is selected, unless otherwise noted.

Potable Water Treatment and Distribution. Average daily requirements for the City of Great Falls system would increase from a baseline level of 12.78 MGD to a peak of 12.93 MGD in 1992. Program-related demands from the city and the base would equal 0.15 MGD or a 1.3-percent increase. The city's 60-MGD capacity treatment facilities would be operating at 22 percent and storage would be adequate to meet summer demands. Daily requirements at Malmstrom AFB with military housing provided onbase would increase from a baseline level of 1.16 MGD to 1.27 MGD or 9.6 percent in the same year. If housing for military personnel is built offbase, this requirement would decrease while the overall demand on the Great Falls system would increase slightly. Average daily demands of 1.27 MGD would be met through the 3.37-MGD interconnection with the city. These demands would be slightly less if the east site option was selected. The existing contract with the city allows 460 MG annually or 1.26 MGD. Revisions to this contract would have to be considered.

Wastewater. Average daily flows for the City of Great Falls would increase from a baseline level of 9.92 MGD to a peak of 10.04 MGD in 1992 because of a 0.12-MGD or 1.2-percent program-related increase. The existing treatment plant, with 15.5-MGD capacity, would be operating at 65 percent and would be able to adequately treat the increased flows. Wastewater flows at Malmstrom AFB with military housing onbase would increase from a baseline level of 0.75 MGD to a peak of 0.83 MGD because of an 0.08-MGD or 10.4-percent program-related increase in 1992. These flows would be slightly less if the east site option was selected. The existing force main from the base has an estimated 2.74-MGD capacity and has adequate capacity to handle the increased flow. The existing contract with the city may require revisions if flows are any greater than those currently estimated. If military housing is constructed offbase, flows at Malmstrom AFB would be less while the overall flows to the city's treatment plant would increase slightly.

Solid and Hazardous Waste. With the military family housing located onbase, solid waste generation resulting from the program-related population would increase by 0.9 T/day or less than one percent of the 358 T/day generation in the City of Great Falls in 1992. Solid waste generation onbase would increase by 1.2 T/day or 9.1 percent in 1993 (the peak year). This amount would be slightly less if the east site option was selected. If military housing is constructed offbase, the solid waste at Malmstrom AFB would be less while overall solid waste generation offbase would increase slightly. With the city and private haulers already adequately disposing of 358 T/day, the minor program-related increase would require no additional equipment or personnel. Existing landfills have projected lifespans of 15 and 75 years and would be able to handle the increased flow without a discernible effect on their lifespan. Program-related hazardous waste at Malmstrom AFB would be handled in accordance with the existing management system, stored onbase in conforming storage, and then transported to treatment and disposal facilities.

Energy Utilities. Program-related electricity demands would peak in 1993 with an increase of 3.5 MW. This demand would increase the projected peak demand of 1,498 MW for the MPC system by 0.2 percent. The MPC system has adequate power supplies to meet this increase without affecting their reliability. Electrical requirements at Malmstrom AFB, with onbase military housing, would equal 3.38 MW or a 31-percent increase on the MPC northeast substation. This demand would be less if the east site option was selected. Adequate capacity is available from this substation to meet the demands. Additional capacity will be available if the new 30-MW substation is constructed onbase. If military housing is constructed offbase, the demands for electricity at Malmstrom AFB would be less while overall consumption would increase

slightly. Natural gas consumption would increase by 36 MMcf or 0.7 percent. The GFGC has an adequate infrastructure and reserves to meet the new demand. Natural gas use at Malmstrom AFB, with onbase military housing, would increase from a projected demand of 288 MMcf to 312 MMcf, or 8.3 percent. If military housing is constructed offbase, the demands for natural gas at Malmstrom AFB would be less, while overall consumption would be similar. The GFGC has adequate capacity to supply Malmstrom AFB without affecting their operations. Diesel fuel consumption at Malmstrom AFB would increase. Supplies would continue to be filled by the Defense Fuels Supply Center through contracts with local and regional suppliers.

Summary of Impacts. Utility requirements associated with the Peacekeeper Rail Garrison program would increase demands on the City of Great Falls systems by less than two percent in 1992 (the peak year). During the operations phase, the increases are less but remain above one percent. Both peak year and operations requirements on energy utilities are less than one percent. Because the peak year requirements would not be substantially greater than the impacts associated with the operations requirements, all utility impacts are considered to be of long duration. These impacts would be low because the increases are less than five percent of the existing demands. These impacts would not be significant because each utility system has adequate capacity to meet the new demands without increasing personnel or expanding existing facilities.

4.9.2.4 Impacts of the Alternative Action

For this resource the impact analysis is the same whether the south or east site option is selected, unless otherwise noted.

Potable Water Treatment and Distribution. With the additional construction associated with six Train Alert Shelters (TASs), and the operations personnel to support the program under the south site option, potable water requirements would equal 0.18 MGD, which is 0.02 MGD greater than the Proposed Action. These demands would be slightly less if the east site option is selected. Adequate capacity is available in the City of Great Falls treatment and distribution system to process the additional demand. Revisions to the existing contract with the city would have to be considered.

Wastewater. Average daily flows to the City of Great Falls treatment plant, under the south site option, would peak in 1992 at 0.13 MGD, which is 0.01 MGD greater than the flows identified for the Proposed Action. If the east site option is selected, the flows would be slightly smaller. The city's treatment plant has adequate capacity to treat the additional flows, and the force main from the base can transmit the new onbase flows. Revisions to the existing wastewater treatment contract with the city would have to be considered.

Solid and Hazardous Waste. Solid waste generation from the increased construction and operations activities associated with the Alternative Action would be slightly greater than the Proposed Action. Solid waste generation for both the city and the base under the south site option would be 0.1 T/day greater during the construction and operations phases. If the east site option is selected, the amount of wastes would be slightly less. These increases would not adversely affect the city or private haulers. Adequate landfill space would continue to be available. Hazardous waste generation would be greater than the Proposed Action as a result of the maintenance activities associated with the two additional trains. These wastes would be incorporated into the existing management system and transported to treatment and disposal facilities.

Energy Utilities. Demands for electricity are 0.6 MW greater for the Alternative Action, with the south site option, than the Proposed Action. Demands would be slightly smaller if the east site option is selected. The current generation and transmission system of the MPC and the Great Falls eastside substation have adequate capacity to meet the increased demands. Demands for natural gas are 3.5 MMcf greater for the Alternative

Action, with the south site option, than the Proposed Action. Demands would be slightly smaller if the east site option is selected. The GFGC has an adequate infrastructure and reserves to meet these increased demands. Diesel fuel consumption would be greater than the Proposed Action. Supplies would continue to be filled by the DFSC through contracts with local and regional suppliers.

Summary of Impacts. Utility requirements associated with the Alternative Action would be slightly greater than those identified for the Proposed Action. Because the peak year requirements would not be substantially greater than the impacts associated with the operations requirements, all utility impacts would be of long duration. These impacts would be low because the increases are less than five percent. Impacts would not be significant because each utility system has adequate capacity to meet the new demands without increasing personnel or expanding existing facilities.

4.9.2.5 Cumulative Impacts

Concurrent deployment of the Peacekeeper Rail Garrison and Small ICBM programs and a second KC-135R squadron mission at Malmstrom AFB would have cumulative effects which would be greater than those associated with the Proposed Action. The analyses assume that the south site option is selected. The deployment of the Proposed Action and the second KC-135R squadron would have the following effects on utility systems:

Potable Water Treatment and Distribution. Program-related requirements of 0.3 MGD would increase average daily demands in the City of Great Falls by 2.3 percent. Both requirements onbase and in the city would increase the baseline demand of 12.77 MGD to 12.8 MGD in 1992. The city's treatment facilities, with a 60-MGD capacity, would be operating at 21 percent and storage would be adequate to meet peak summer demands. Daily requirements at Malmstrom AFB would increase from a baseline level of 1.16 MGD to 1.3 MGD in 1992. Program-related increases of 11.8 percent would be met through the existing interconnection with the city.

Wastewater. Average daily flows for the City of Great Falls would increase from a baseline level of 9.92 MGD to a peak of 10.14 MGD in 1992. Program-related demands for both the base and the city would equal 0.22 MGD or a 2.2-percent increase. The existing treatment plant would be able to adequately treat the increased flows. Wastewater flows at the base would increase from a baseline level of 0.75 MGD to a peak of 0.85 MGD as a result of a 0.1-MGD or 13-percent increase. The existing force main from the base has adequate capacity to handle the increased flow.

Solid and Hazardous Waste. Solid waste generation would increase by four T/day or 1.1 percent in the City of Great Falls in 1992. Solid waste generation at Malmstrom AFB would increase by 1.3 T/day or ten percent in 1992 (peak year). With the city and private haulers already adequately disposing of 358 T/day the program-related increase would require no additional equipment or personnel. Existing landfills have projected lifespans of 15 and 75 years and would be able to handle the increased flow without a discernible effect on their lifespan. Program-related hazardous waste generation onbase would increase by approximately 43,800 pounds and be incorporated into the existing management system, stored onbase in conforming storage, and then transported to treatment and disposal facilities.

Energy Utilities. Program-related electricity demands would peak in 1993 with an increase of 5.7 MW. This demand would increase the projected peak demand of 1,478 MW for the MPC system by less than one percent. The MPC system has adequate power supplies to meet this increase. Electrical requirements at Malmstrom AFB would equal 5.17 MW or a 48-percent increase on the existing substation. Adequate capacity is available from this substation to meet the demands. Additional capacity would be available if the new substation is constructed onbase. Natural gas consumption would increase by 64 MMcf or 1.2 percent. The GFGC Company has an adequate infrastructure

and reserves to meet the new demand. Natural gas use onbase would increase from a projected demand of 288 MMcf to 317 MMcf or by 9.9 percent. The GFGC has adequate capacity to supply the base. Diesel fuel consumption at the base would increase as a result of the Proposed Action. Jet fuel consumption at the base will increase as a result of the second KC-135R squadron. These supplies would continue to be filled by the DFSC through contracts with local and regional suppliers.

Summary of Impacts. Utility requirements associated with the Proposed Action and the second KC-135R squadron would increase demands on the City of Great Falls systems by less than three percent in 1992 (peak year). During the operations phase the increases would reduce slightly but remain above one percent. Both peak year and operations requirements on energy utilities would be less than two percent. Because the peak year requirements would not be substantially greater than the impacts associated with the operations requirements, all utility impacts would be of long duration. These impacts would be low because the increases are less than five percent. Impacts would not be significant because each utility system has adequate capacity to meet the new demands without increasing personnel or expanding existing facilities.

The deployment of the Proposed Action and the Small ICBM programs would have the following effects on utility systems.

Potable Water Treatment and Distribution. Program-related requirements of 1.48 MGD would increase average daily demands in the City of Great Falls by 11.5 percent. Both requirements onbase and in the city would increase the baseline demand of 12.88 MGD to 14.36 MGD in 1996. The city's treatment facilities, with a 60-MGD capacity, would be operating at 24 percent and storage would be adequate to meet summer demands. Daily requirements at Malmstrom AFB would increase from a baseline level of 1.16 MGD to 2.4 MGD in 1996. Program-related increases of 106 percent would be met through the existing interconnection with the city.

Wastewater. Average daily flows for the City of Great Falls would increase from a baseline level of 10.01 MGD to a peak of 11.1 MGD in 1996. Program-related demands for both the base and the city would equal 1.09 MGD or a 10.9-percent increase. The existing treatment plant would be able to adequately treat the increased flows. Wastewater flows onbase would increase from a baseline level of 0.75 MGD to a peak of 1.66 MGD as a result of a 0.91 MGD or a 120-percent increase. The existing force main from the base has adequate capacity to handle the increased flow; however, the existing pumping station would have to be expanded.

Solid and Hazardous Waste. Solid waste generation would increase by 17.6 T/day or 4.8 percent in the City of Great Falls in 1996. Solid waste generation at Malmstrom AFB would increase by 13.6 T/day or 104 percent in 1996 (peak year). With the city and private haulers already adequately disposing of 358 T/day the program-related increase would require no additional equipment or personnel. Existing landfills have projected lifespans of 15 years and 75 years and would be able to handle the increased flow without a discernible effect on their lifespan. Program-related hazardous waste generation associated with the Small ICBM program would equal about 161,000 pounds and additional wastes would be generated from the maintenance of the Rail Garrison system. These wastes would be incorporated into the existing management system, stored onbase in conforming storage, and then transported to treatment and disposal facilities.

Energy Utilities. Program-related electricity demands would peak in 1996 with an increase of 18.8 MW. This demand would increase the projected peak demand of 1,567 MW for the MPC system by 1.2 percent. The MPC system has adequate power supplies to meet this increase. Electrical requirements at Malmstrom AFB would equal 18 MW or a 165-percent increase on the existing substation. Additional capacity would be available if the new substation is constructed onbase. Natural gas consumption would increase by 349 MMcf or 5.9 percent. The GFGC Company has an adequate infrastructure and

reserves to meet the new demand. Natural gas use onbase would increase from a projected demand of 288 MMcf to 573 MMcf or by 99 percent. The GFGC has adequate capacity to supply the base without affecting their operations. Diesel fuel consumption onbase would increase as a result of the Proposed Action. Supplies would continue to be filled by the DFSC through contracts with local and regional suppliers.

Summary of Impacts. Utility requirements associated with the Proposed Action and the Small ICBM programs would increase demands on the City of Great Falls systems by 4.8 percent to 11.5 percent in 1996 (peak year). During the operations phase, the increases would reduce slightly but remain between 4.4 percent and 10.6 percent. Both peak year and operations requirements on energy utilities would range between 1.2 percent and 5.9 percent. Because the peak year requirements would not be substantially greater than the impacts associated with the operations requirements, all utility impacts would be of long duration. These impacts would be high because the increases would be greater than ten percent. Impacts would not be significant because each utility system has adequate capacity to meet the new demands without increasing personnel or expanding existing facilities.

The deployment of the Proposed Action, the Small ICBM, and the second KC-135R squadron programs would have the following effects on utility systems.

Potable Water Treatment and Distribution. The cumulative impacts of the Proposed Action, the Small ICBM program, and a second KC-135R squadron program would be greater from 1989 to the year 2000. Potable water treatment requirements for the City of Great Falls would gradually rise to a peak in 1996 with an increase of 1.62 MGD or 12.6 percent. During the operations phase, the demands would equal 1.51 MGD, which is 1.38 MGD greater than the Proposed Action. Treatment facilities have a capacity of 60 MGD to meet the increased demand. Onbase requirements in 1996 would increase average daily demands by 0.46 to 1.62 MGD. The existing contract with the city allows 460 MG annually, or 1.26 MGD. Revisions to this contract would be required.

Wastewater. Wastewater flows to the City of Great Falls system from all three missions would reach a peak of 1.19 MGD or an 11.9-percent increase in 1996. This increase would be 1.09 MGD greater than the Proposed Action and be processed at a facility with a 15.5-MGD capacity. Onbase wastewater flows would increase by 0.93 MGD to 1.68 MGD. Current capacity of the force main is 2.74 MGD. The existing contract with the city allows for the treatment of 300 MG annually. Revisions to this contract would be required.

Solid and Hazardous Waste. Solid waste generation would increase by 5.4 percent in the City of Great Falls and at Malmstrom AFB. No additional equipment or personnel would be required to collect or dispose of this waste. Existing landfills have adequate capacity to handle the increased flow. Program-related solid waste would shorten the 15-year lifespan of the existing landfills by 6 months. Hazardous waste generation would increase by 305,000 pounds over the Proposed Action. Additional conforming storage space would be required and shipments to treatment and disposal facilities would increase.

Energy Utilities. Requirements for electricity for all three programs would increase peak demands by 21.02 MW or the MPC system by 1.6 percent. Adequate capacity is available from the existing generating and transmission system to meet the new demand. Demands at Malmstrom AFB would increase by 182 percent. Programmed improvements to the base's electrical system would provide the capacity necessary to meet the projected increases. Natural gas consumption would increase by 6.4 percent. The GFGC would have adequate reserves to meet the increased demands. Diesel fuel and jet fuel consumption would increase because of the requirements of the three missions. These supplies will continue to be filled by the DFSC through contracts with local and regional suppliers.

Summary of Impacts. Utility requirements associated with the cumulative impacts of the Peacekeeper Rail Garrison program, the Small ICBM program, and a second KC-135R squadron program would increase demands on the City of Great Falls utility systems by 5 percent to 12.6 percent in 1996 (the peak year). During the operations phase, the increases are reduced slightly but remain between 5 percent and 12 percent. There are no short-duration impacts because of the gradual buildup of the direct and indirect program requirements. Long-duration impacts would be high because the increases are over ten percent. These impacts would not be significant because each utility system has adequate capacity to meet the new demands without increasing personnel or expanding existing facilities.

Utility requirements associated with the cumulative impacts of the Alternative Action, the second KC-135R squadron, and the Small ICBM programs would be slightly greater than the cumulative impacts of the Proposed Action.

For the Alternative Action and the second KC-135R squadron program, the potable water treatment requirements would be 0.02 MGD greater in the peak year (1992). Wastewater treatment requirements would be 0.01 MGD greater in 1992. Solid waste generation would be 0.02 T/day greater. The city's utility systems have adequate capacity to meet the increased demands. Demands for electrical power would be 0.14 MW greater in 1992. Natural gas consumption would increase by 3.5 MMcf. Both the MPC and the GFGC have adequate capacity to meet the increased demand. Impacts are about the same as those identified for the Proposed Action.

For the Alternative Action and both other programs, the cumulative impacts would be about the same as those identified for cumulative impacts with the Proposed Action. Long-duration impacts would be high and not significant. Demands for all utilities would be slightly greater in 1992; however, these increases are overshadowed by the increases associated with the Small ICBM program and the peak requirements in 1996. There would be no short-duration impacts.

4.9.3 TRANSPORTATION

4.9.3.1 Region of Influence

The ROI for transportation includes the principal city streets within Great Falls, Montana and the primary highways leading to Malmstrom AFB.

4.9.3.2 Existing and Future Baseline Conditions

The principal city streets in Great Falls follow a grid-type network of north-south and east-west roads. The most heavily used road in the city is four-lane divided 10th Avenue South (also designated as part of U.S. 87/89), which had sections with a 1985 average annual daily traffic (AADT) ranging from 19,100 to 32,800. The other principal arterials include east-west running River Drive/57th Street (also designated as U.S. 87 Bypass), with a 1985 AADT of between 3,300 to 9,200, 1st Avenue North with an AADT of 5,000 to 11,000, and 2nd Avenue North with an AADT of 4,000 to 7,300; and north-south one-way street couplets 5th and 6th Streets, 14th and 15th Streets, and 25th and 26th Streets, with an AADT of 3,000 to 7,200; and two-way 38th Street with a 3,800 to 5,300 AADT. Interstate 15, which passes through the western section of the city, had an AADT of 4,000 to 9,200.

Peak-hour traffic flow conditions at most of the principal streets are at level of service (LOS) A or B except along sections of 1st Avenue North and 2nd Avenue North within the central business district where service is at LOS C or D. (Refer to Section 3.4.4, Table 3.4.4-1 for descriptions of LOS letter scores). Traffic flow is also reduced along 10th Avenue South between River Drive and 38th Street where service levels are at LOS D or E during the peak hours. Estimated LOS resulting from normal traffic changes without the program are not expected to change, or at most would drop one level through 1994.

The primary access to Malmstrom AFB is provided by U.S. 87/89 and the U.S. 87 Bypass, which run immediately south and west of the base, respectively. The main entrance to the base is located at 2nd Avenue North, with an average of 10,540 vehicles daily passing through in 1985. The base has two other gates, the commercial gate along 10th Avenue North and the south gate along U.S. 87/89, which is used by military traffic commuting to the weapons storage area and the eastern part of the base. The section of 10th Avenue North leading to the commercial gate had an AADT of 3,585 vehicles in the same year. There are no significant congestion or problem areas onbase except during the peak hours (7:30-9:00 A.M. and 3:30-5:00 P.M.) when occasional, short delays occur at the gate. The delays are a result of vehicle registration and identification card checks by base security personnel.

4.9.3.3 Impacts of the Proposed Action

During the construction phase, an increase in incoming vehicular traffic would occur as a result of the movement of construction workers, materials, and equipment. An estimated 439 construction workers and program-related personnel would be required for the Peacekeeper Rail Garrison program during the peak employment year (1992). Of these, 116 program-related employees are estimated to reside in Great Falls and commute daily to/from the base. They would generate an additional 105 passenger vehicle trips to the base in 1992. This increase in traffic would add to the delays and queues at the entrance gates to Malmstrom AFB. Additional heavy vehicle trips to the base would also increase traffic volumes at the gates. However, these movements could occur during off-peak hours and would not cause additional delays at the main gate during rush hours. The south gate along U.S. 87/89 could also be used by construction vehicles and equipment. Program-related commuters would cause the LOS rating along 2nd Avenue North to drop from B to C, and increase delays and queues at the main entrance to the base. Vehicular traffic along 10th Avenue South would also increase but its LOS rating would remain at D and E.

During the operations phase, an estimated 77 out of 338 program-related employees may reside in Great Falls if most of the military family housing is provided onbase. They are expected to generate 70 passenger vehicle trips to the base and would cause a slight increase in delays and queues at the entrance gates. If all military family housing is provided offbase in the community of Great Falls, passenger vehicle trips to the base may increase to as many as 220. This would cause substantial delays at the entrance gates. In addition, occasional program-related deliveries of supplies and equipment could increase traffic volumes at the gates. However, they are expected to occur during off-peak hours and would use the south gate along U.S. 87/89.

Interruptions to vehicular flow at the connector spur/county road crossing would also occur. The trains would only move out of the garrison when either major maintenance or repair necessitates that they be transported to the Main Operating Base or depot facilities, or when directed to disperse during times of national need. In addition, a training train would travel periodically to the garrison installation to accomplish operations, security, and maintenance training. These train interruptions at railroad/road crossings would not substantially delay vehicular traffic. Moreover, these train interruptions would only occur occasionally.

Locating the garrison at either the south or the east site option would not change impacts on transportation during the construction phase. Therefore, short-duration impacts on transportation for both options would be moderate because of the LOS reduction from B to C along 2nd Avenue North, and the increase in vehicular traffic along 10th Avenue South (without reducing its LOS ratings of D and E). A slight increase in queues and waiting times could also occur at the main gate but this would not continue indefinitely. Impacts would be significant because traffic flow would further degrade at level D and E .

Long-duration impacts would be negligible because only 70 passenger vehicle trips are expected to be generated by the program; therefore, there would be no change in the LOS ratings. If military housing is provided offbase in the community of Great Falls, long-duration impacts would be rated as moderate because of the reduction in LOS from B to C along 2nd Avenue North and the further degradation of service along 10th Avenue South which is at LOS D and E. Impacts would be significant because traffic flow would further degrade at substandard levels D and E.

If the garrison installation is located at the east site, slightly fewer operations personnel would be required. Program-related commuting to the base would, therefore, be slightly lower than if the garrison installation is located at the south site. However, long-duration impacts on roads would still be rated negligible if housing is provided onbase, and moderate if housing is provided offbase. In the latter case, impacts would also be significant because traffic flow would further degrade at substandard level D and lower.

Mitigation Measures. The following mitigation measures could be undertaken to reduce or eliminate program impacts on transportation. All or some of these measures may be implemented. For each measure, the agencies that may be involved in implementation are identified.

- Schedule work hours for program-related employees to avoid commuting during normal traffic peak hours, and encourage ride sharing. This mitigation would reduce peak-hour traffic flow increases and therefore reduce congestion and delay without additional cost to the Air Force and its contractors (U.S. Air Force and its contractors).

- Provide additional manpower for registration and card checks at the entrance gate during the peak hour. This mitigation would be effective in reducing the queuing and waiting times at the base entrance and prevents the queue to backup into a major thoroughfare (U.S. Air Force).

- Encourage the use of the south gate along US 87/89 to divert some trips to the base from the main gate along 2nd Avenue North. This would be effective in reducing the congestion at the main gate and 2nd Avenue North. (U.S. Air Force).

- Improve 10th Avenue South, use other existing routes, or construct a bypass to reduce traffic congestion and delays along 10th Avenue South. The construction of a bypass may be a costly alternative but would provide for an alternate access route through the city and would avoid further delays to motorists traveling along 10th Avenue South (U.S. Air Force, Military Traffic Management Command, Federal Highway Administration, Montana Department of Highways, and City of Great Falls).

If any or all of these measures are undertaken, impacts on roads would become low and not significant because program-related commuting would be dispersed and would not change the level of service ratings.

4.9.3.4 Impacts of the Alternative Action

Compared to the Proposed Action (4 TASs), the Alternative Action (6 TASs) would require more program-related personnel. During the construction phase, an estimated 474 program-related personnel would be needed by 1992 (the peak employment year). Of these employees, 123 are expected to reside in Great Falls. They are estimated to add 112 passenger vehicle trips to the base in 1992. They would also increase delays and queues at the Malmstrom AFB entrance gate as with the Proposed Action.

During the operations phase, an estimated 84 employees (7 more than for the Proposed Action) would reside in Great Falls if most of the military family housing is provided onbase. They would cause a slight increase in congestion along 2nd Avenue North and the entrance gate. The delay at the entrance gates could be greater if all military family housing was located offbase in the Great Falls urban area. An estimated 250 operations personnel would commute daily generating 227 passenger vehicle trips to and from the base resulting in the reduction from B to C in LOS along 2nd Avenue North. Increase in vehicular traffic along 10th Avenue South would further degrade service which is at LOS D and E. Peacekeeper and training train impacts on vehicular traffic at road crossings would be the same as the Proposed Action.

Commuting associated with the Alternative Action would be slightly greater than that associated with the Proposed Action. However, both short- and long-duration impacts on transportation would remain about the same as the Proposed Action. Locating the garrison at either the south or the east site would not change impacts on transportation during the construction phase. Therefore, short-duration impacts for both options would be moderate because of the reduction in LOS from B to C along 2nd Avenue North and the further degradation of service along 10th Avenue South which is at LOS D and E. As with the Proposed Action, fewer program-related commuting by operations personnel would be generated. However, long-duration impacts would still be the same as those with the Proposed Action. Long-duration impacts would be negligible if military housing is provided onbase. If military housing is provided offbase in the community of Great Falls, long-duration impacts for both siting options would be moderate also because of the reduction in LOS from B to C along 2nd Avenue North and the further degradation of service along 10th Avenue South which is at LOS D and E. Both short- and long-duration impacts would be significant because the traffic flow would further degrade at substandard LOS D and E.

4.9.3.5 Cumulative Impacts

The cumulative transportation impacts of the Peacekeeper Rail Garrison and Small ICBM programs, and a second KC-135R squadron mission would be only slightly greater than deployment of the Small ICBM program and a second KC-135R squadron at Malmstrom AFB. The Small ICBM program and the second KC-135R squadron combined require more construction workers and operations personnel than the Peacekeeper Rail Garrison program alone and, therefore, would generate more vehicular traffic to the base.

The second KC-135R squadron would require 284 program-related employees in 1992 and thereafter. Of these employees, 200 are expected to reside in Great Falls and commute daily to the base in 1992 and thereafter. They would add an estimated 182 passenger vehicle trips to the base during the peak hours. With the Peacekeeper Rail Garrison program alone, short- and long-duration impacts would be moderate and significant. Concurrent deployment of the Peacekeeper Rail Garrison program and second KC-135R squadron would cause both short- and long-duration, high impacts because of increased congestion and delay along 2nd Avenue North, where the LOS could drop from B to C, and along 10th Avenue South, where the LOS could drop from D to E and E to F. Impacts would be significant because the LOS along these roads would be reduced to substandard level D and lower.

The Small ICBM would require 2,710 program-related employees in 1993, and would increase to 3,430 by 1996. Of these employees, 543 and 510 are expected to reside in Great Falls in 1993 and 1996, respectively. They would add an estimated 494 and 464 passenger vehicle trips to the base during the peak hours in the respective years. With concurrent deployment of the Peacekeeper Rail Garrison and the Small ICBM programs at Malmstrom AFB, short- and long-duration impacts would be high because of increased congestion and delays along 10th Avenue South, where the LOS could drop from D to E and E to F, and 2nd Avenue North, where the LOS could drop from B to D. Impacts would be significant because the LOS along these roads would be reduced to LOS D and lower.

With all three missions at Malmstrom AFB, short- and long-duration impacts would be high because of increased congestion and delays along 10th Avenue South, 2nd Avenue North, and other arterial streets, and because of increased waiting time at the gates. Impacts would be significant because the LOS would be reduced below standard level D.

Only a small increase in traffic demand would be generated by the Alternative Action as compared to the Proposed Action. The Alternative Action would create 112 passenger vehicle trips (7 more than the Proposed Action) to the base during the peak construction year (1992). During the operations phase, 76 passenger vehicles (6 more than the Proposed Action) would commute daily to the base. These six or seven additional vehicle trips would not change the LOS ratings along the principal streets leading to Malmstrom AFB lower than with the Proposed Action. Impacts would be about the same as for the Proposed Action with the other missions onbase.

With the Peacekeeper Rail Garrison program and second KC-135R squadron at Malmstrom AFB, both short- and long-duration impacts would be low and not significant. With the Peacekeeper Rail Garrison and Small ICBM programs at Malmstrom AFB, both short- and long-duration impacts would be high and significant. With all three programs at Malmstrom AFB, both short- and long-duration impacts would be high and significant.

Mitigation Measures. The same mitigation measures identified for the Proposed Action could be undertaken to reduce or eliminate program impacts. If these measures are undertaken, impacts on roads with all three missions at Malmstrom AFB would be low because of the reduction in LOS along 2nd Avenue North from B to C. Impacts would not be significant because the LOS rating would not drop to D or lower.

4.9.4 LAND USE

4.9.4.1 *Region of Influence*

The land use ROI includes Malmstrom AFB, adjacent private lands located both south and north of the affected areas of the base, and lands within connector spur rail corridors. The connector spur corridors would be located on private land and would extend south and east from the base to the main line of the Burlington Northern (BN) Railroad.

4.9.4.2 Existing and Future Baseline Conditio ıs

The Great Falls comprehensive plan, which includes all the area around the base, designates agricultural uses in the area to the south and east of the base where new connector spurs are proposed. Cascade County has a development plan and zoning, but no comprehensive plan. The county does have special use permit control over any development other than rural residential and agricultural.

Figure 4.9.4-1 presents a generalized overview of land use on the base and surrounding areas. The primary land uses are military (associated with Malmstrom AFB) and rural (on private land). Cultivation of winter wheat on nonirrigated cropland constitutes the primary rural land use. No prime or unique farmland is designated in the ROI. The livestock operation consists of a cluster of accessory farm-related structures, including three inhabited buildings which are located adjacent to a county road, a small earth-filled dam and reservoir of about four acres, and rangeland which serves as pasture. There is another cluster consisting of a barn and grain storage bins located adjacent to the BN Railroad. There are no urban land uses within the offbase portion of the ROI.

Offbase, the ROI also contains one 69-kilovolt electrical transmission line, three telephone cables, one railroad communication line, U.S. 87/89, three county roads, and an existing Air Force-owned railroad spur (Figure 4.9.4-1).

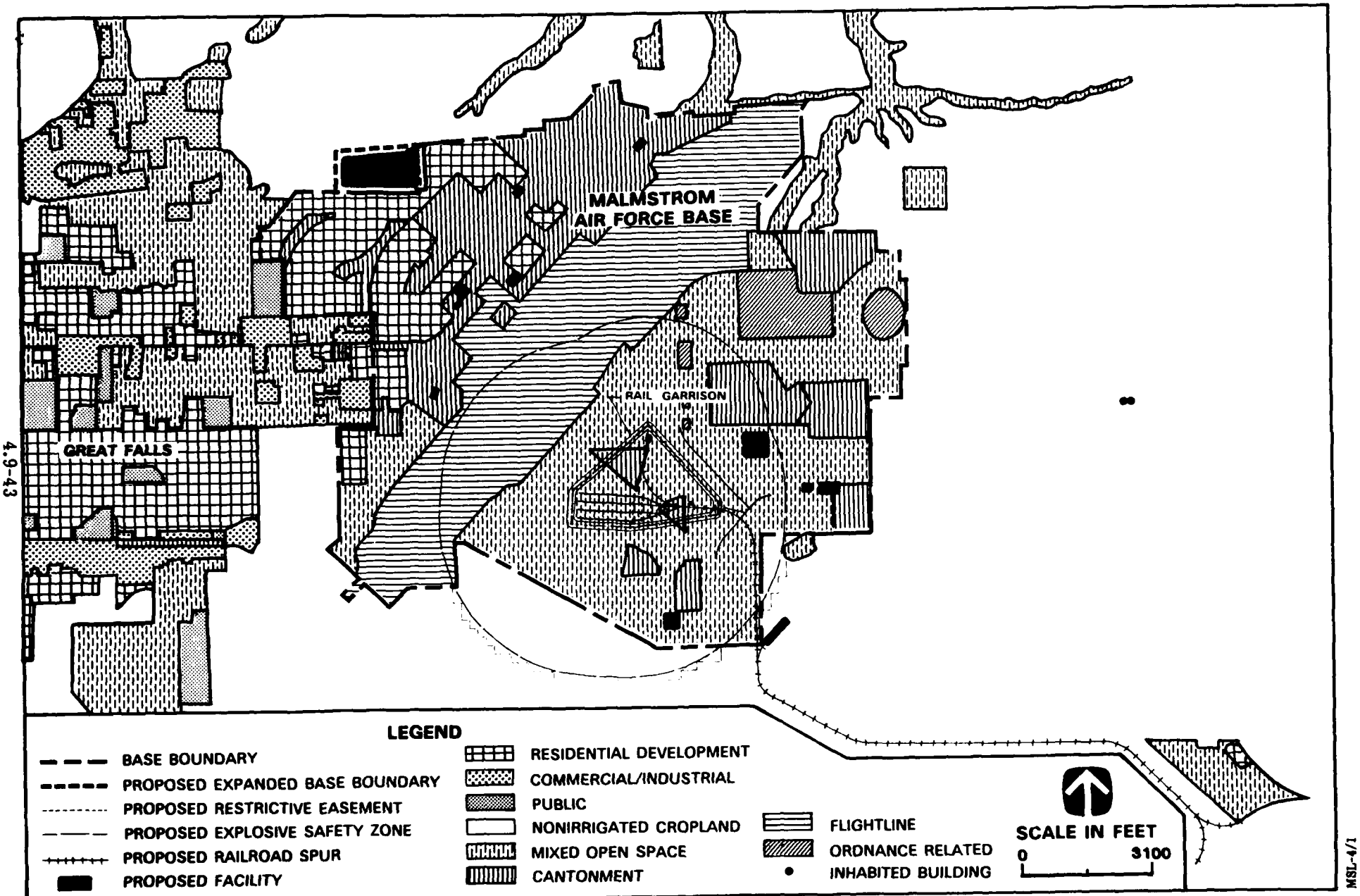


FIGURE 4.9.4-1 LAND USE AT MALMSTROM AFB, MONTANA (SOUTH SITE OPTION) AND VICINITY

The visual attributes of the ROI are typical of the northwestern portion of the Great Plains Physiographic Province. The area has flat to gently rolling terrain which is vegetated with short grassland. Landscape forms are undulating to flat, and lines are horizontal, straight, and angular. Colors are mostly pale green, brown, and gold, but winter colors are dark brown and white. Textures are smooth to medium and ordered. Existing onbase structures appear very low on the horizon north of the U.S. 87/89 (AADT 4,200), with the most obvious visual intrusions being power and light poles and radar domes. There are a few agricultural buildings in the offbase ROI but no residences along U.S. 87/89 which have views onto the Proposed Action area of the base.

4.9.4.3 Impacts of the Proposed Action

For the south site option, the garrison would be located entirely onbase. However, this option could include the expansion of the base northward to include approximately 31 acres of land, if military housing is provided onbase (Figure 4.9.4-1). This land is currently vacant and used for nonirrigated agriculture. According to the adopted City-County Comprehensive Plan, the 34 acres are designated for agricultural use. The western third is zoned for light industrial uses, and the remainder for agriculture. The proposed military housing would be compatible with the agricultural zoning portion. Such housing would also be compatible with the industrial portion because the introduction or military residential uses onto the fringe of an area designated for industrial uses would not be construed to be an annoyance or nuisance to adjoining industrial uses. About 225 acres of restrictive easement would be acquired offbase. This nonirrigated cropland contains no inhabited buildings. The existing agricultural land use would not be affected by the easement, but no inhabitable buildings could be built in the easement area in the future. The connector spur would require acquisition of about 40 acres including the railroad wye. This area consists of nonirrigated agricultural land and mixed open space. Peacekeeper Rail Garrison deployment at Malmstrom AFB would require the relocation of several existing onbase facilities, including the fire training area, SP kennel, and the Warrior Obstacle Course.

Although the TASs would be located only about 2,500 feet from U.S. 87/89 (the key observation point), the generally higher intervening terrain would block views of the TASs. Therefore, no impacts on visual attributes are anticipated. The visual impact of the spur line along U.S. 87/89 would be negligible because of its low profile.

For the east site option, the garrison would be located on the eastern base boundary and would require fee acquisition of about 70 acres of nonirrigated cropland which is zoned for agriculture and designated on the comprehensive plan for agriculture. This siting option would be compatible with those designations. About 345 acres of restrictive easement would be required offbase. An additional 155 acres of explosive safety zone is already within an Air Force easement. All of the land in the proposed easement is presently in nonirrigated cropland and contains no inhabited buildings. Existing onbase facilities that would require relocation with this option include the existing explosive ordnance disposal range, small arms range, grenade range, and a portion of the perimeter road. The connector spur would require about 50 acres of nonirrigated cropland including the wye.

The TASs would be located about 7,000 feet, and the Training Train Shelter (TTS) about 1,900 feet from U.S. 87/89 without intervening terrain or vegetation to block the view (Section 4.9, Figure 4.9-1). At this distance, the 800-foot-long, 30-foot-high TTS would appear to be the size of an object about 125 feet long and 5 feet high if the viewer were 300 feet from the same object. The angular appearance of the TTS would contrast with the rolling terrain and could be objectionable to some viewers at a distance of only 1,900 feet.

Summary of Impacts. For the south site option, the proposed connecting spur would remove about 40 acres of nonirrigated cropland from current use, and if onbase housing is

constructed north of the base, an additional 31 acres of nonirrigated cropland would be lost. In either case, the maximum loss would be only about 0.02 percent of that type of land use in Cascade County. No inhabited buildings would be located in the restrictive easement, and because of intervening topography, the TASs and TTS would not be visible to viewers on U.S. 87/89. With these conditions, the short- and long-duration LOI of the south option would be negligible.

For the east site option, a total of 150 acres of nonirrigated cropland would be acquired for the garrison (69 acres), housing (31 acres), and rail spur (50 acres). The maximum loss would be only 0.03 percent of nonirrigated cropland in Cascade County. No inhabited buildings would lie within the restrictive easement. Because of its proximity to U.S. 87/89, some viewers could object to the visual contrast created by the TTS. For these reasons, the short- and long-duration level of impact (LOI) of the east option would be moderate. Impacts would not be significant because no inhabited buildings would be affected, visual contrasts would not be high, and the proposed land acquisition would be compatible with existing zoning and land use plans.

4.9.4.4 Impacts of the Alternative Action

Impacts of the Alternative Action at the south site would be about the same as for the Proposed Action except that the base expansion, connector spur, and military housing would require about 160 acres of land and the restrictive easement would be 260 acres. In addition to the onbase facilities requiring relocation for the Proposed Action, three Minuteman transporter-erector parking pads would require relocation. No offbase inhabited buildings would be affected and the TASs would not be visible from the key observation point. For these reasons, the short- and long-duration LOI of the Alternative Action on land use would be negligible.

Impacts of the Alternative Action at the east site would be about the same as for the Proposed Action except that the base expansion, connector spur, and military housing would require about 160 acres of land and the restrictive easement would be about 305 acres. An additional 155 acres of the explosive safety zone is already within an Air Force easement. No offbase inhabited buildings would be affected but the TTS would be visible from the key observation point and objectionable to some highway users. Therefore, the short- and long-duration LOI of the Alternative Action on land use would be moderate. Impacts would not be significant for the same reasons cited for the Proposed Action.

4.9.4.5 Cumulative Impacts

If the second KC-135R squadron is deployed at Malmstrom AFB together with the Peacekeeper Rail Garrison program, the cumulative impacts on land use would still be negligible because the KC-135R squadron would have little impact on land use or visual attributes.

If the Small ICBM mission is deployed concurrently with the Peacekeeper Rail Garrison program, nonirrigated cropland fee acquisition would be about 780 acres for the Small ICBM and 70 acres for the Peacekeeper Rail Garrison program. This total of about 850 acres would be approximately 0.2 percent of the nonirrigated cropland in Cascade County. Current zoning on the 850 acres is about 813 acres in agriculture, 45 acres in light industrial, and 20 acres in heavy industrial. All of the 65 acres of land zoned for industrial uses are proposed for military housing for both the Peacekeeper Rail Garrison and Small ICBM programs. Housing would be compatible with industrial zoning in the area for the same reasons cited for the Proposed Action. Military facilities and rail spur connector development proposed by the two programs would be compatible with current agricultural zoning. Neither program would require the relocation of inhabited buildings from the easements. However, if the Peacekeeper Rail Garrison and Small ICBM programs are concurrently deployed, it would be necessary to locate the TTS to an area near the southeastern corner of the base, approximately 1,500 feet from U.S. 87/89

without intervening terrain or vegetation to block the view. At this distance, the 800-foot-long, 30-foot-high TTS would appear to be the size of an object 160 feet long and 6 feet high if the viewer were 300 feet from the same object. The angular appearance of the TTS would contrast with the rolling terrain of the area and could be objectionable to some viewers. For these reasons, the cumulative impacts of the Peacekeeper Rail Garrison and the Small ICBM programs would have a moderate LOI on land use. Impacts would not be significant because no inhabited buildings would require relocation and impacts on visual attributes would not be highly controversial.

If the Peacekeeper Rail Garrison, the Small ICBM, and the second KC-135R programs were concurrently deployed, the short- and long-duration impacts on land use would be the same as the Peacekeeper/Small ICBM combination: moderate and not significant because of the probable objection of some viewers to the TTS located only 1,500 feet from U.S. 87/89. The KC-135R squadron would not add to the land use impacts.

For the Alternative Action, short- and long-duration cumulative impacts for the three scenarios previously described would be about the same as for the Proposed Action: Peacekeeper Rail Garrison/KC-135R, negligible; Peacekeeper Rail Garrison/Small ICBM, moderate and not significant; Peacekeeper Rail Garrison/KC-135R/Small ICBM, moderate and not significant.

4.9.5 CULTURAL RESOURCES

4.9.5.1 Region of Influence

The ROI for Malmstrom AFB consists of a portion of the Missouri Plateau in central Montana. It includes the Highwood Mountains; part of the Missouri River drainage from the Teton River to the Big and Little Belt mountains; and portions of the Teton, Dearborn, Sun, and Smith river drainages. The area contains a variety of environmental settings characteristic of the Plains-Mountains transitional areas including isolated mountain groups (such as the Highwoods), buttes and mesas (e.g., Square Butte), river and creek drainages, terraces and bluffs, and upland plains. Prehistoric and historic resources in this area are representative of what could be expected to occur in the vicinity of Great Falls.

4.9.5.2 Existing and Future Baseline Conditions

Prehistoric Resources. Within the ROI, a variety of prehistoric site types have been recorded, including short-term plant-processing camps and hunting stands; habitation sites, including stone circle sites and rockshelters; antelope or buffalo kill and butchering sites; rock art sites; quarries and lithic sources; and rock cairns and alignments. Archaeological surveys have been conducted on approximately 270 acres onbase and 1,350 acres adjacent to the northern and eastern base boundaries. Most of the proposed Rail Garrison impact areas have been investigated. Three prehistoric sites (fire-cracked rock and lithic scatters) and six isolated finds were recorded. None of the sites have been fully evaluated, but they appear to be surficial and are not likely to be eligible for the NRHP.

Historic Resources. Many sites relating to the Historic period in Montana's history occur in the ROI as a result of mining, agricultural, ranching, military, and transportation activities. However, few such resources have been reported in the immediate vicinity of Malmstrom AFB. Only two historic sites have been identified in the immediate vicinity of the proposed impact areas. Segments of the Great Falls Portage, a National Historic Landmark, abut the base on the eastern and western boundaries; the 4.8 miles of the route through the base are not included in the landmark because of the level of disturbance caused by base construction. One historic site (24CA264), a 3.2-mile-long segment of historic railroad, was also recorded immediately north of the base. Five buildings (Nos. 145, 400, 769, 1085, and 3080) would be affected by the Proposed Action. All were built after 1942 and are not old enough to qualify for the National Register of Historic Places (NRHP).

Native American Resources. Native American groups were consulted concerning sacred or traditional use areas. A Native American religious specialist evaluated previously undisturbed impact areas and did not identify any areas of concern. No concern has been expressed for previously disturbed areas where archaeological deposits are not likely to be preserved.

Paleontological Resources. Although several internationally famous paleontological localities are located in Montana, none are in the ROI. Malmstrom AFB is underlain by 30 feet to 100 feet of glacial sediments; therefore, it is unlikely that any paleontological materials would be uncovered as a result of normal construction activities.

4.9.5.3 Impacts of the Proposed Action

The Proposed Action impact areas consist of ground disturbance of approximately 164 acres in the garrison, support facilities, and relocated facilities onbase, and 10 acres offbase in the wye connecting with the Burlington Northern Railroad. New rail line construction consists of 2.5 miles in the garrison zone onbase and 3.2 miles of connector spur offbase. New road construction of approximately 1.5 miles in the garrison and 5 miles outside the garrison would be necessary.

Prehistoric Resources. No NRHP-eligible sites are likely to be affected by the Proposed Action at either the south or east site options. Surveys have been conducted in both areas and no prehistoric sites were found. If potentially eligible sites are located during construction, suitable mitigation measures would be undertaken as necessary.

Historic Resources. None of the structures to be affected by the Proposed Action are considered historically important and no historic sites have been identified at either the south or east site options. The base is visible from some portions of the Great Falls Portage route (site 24CA238) thereby creating a visual intrusion on the landmark. Construction at the east site would be more visible from the landmark than would the garrison at the south site. However, because the garrison would be collocated with the existing weapons storage area, the degree of visual intrusion would be similar to that of present base facilities. Additionally, a radar station, transmission line, and a county road exist east of the base and are visible from the landmark. The Proposed Action would not affect the historic context of the landmark because proposed construction at either site would not add significantly to the existing visual intrusions.

Native American Resources. Impacts on sacred or traditional use areas resulting from the Proposed Action are not expected.

Paleontological Resources. Impacts on paleontological resources are not likely to occur as a result of the Proposed Action.

Summary of Impacts. Long-duration impacts of the Proposed Action on cultural resources would be negligible. No important or sensitive resources would be affected at either the south or east site options. No short-duration impacts have been identified.

4.9.5.4 Impacts of the Alternative Action

An expansion of the garrison area for the Alternative Action would result in additional ground disturbance of approximately 29 acres. However, long-duration impacts would remain negligible because no important or sensitive resources would be affected. No short-duration impacts have been identified.

4.9.5.5 Cumulative Impacts

Known cultural resources consist of one lithic scatter and segments of the Great Falls Portage National Historic Landmark, which abut the base on the eastern and western

boundaries. Addition of the second KC-135R squadron would not affect these sites. Therefore, cultural resources would not be affected by deployment of the Peacekeeper Rail Garrison program and the KC-135R second squadron at Malmstrom AFB for the Proposed Action.

If the Peacekeeper Rail Garrison and Small ICBM programs were sited at Malmstrom AFB, impacts on cultural resources would occur as a result of Small ICBM requirements. This would require the acquisition of approximately 780 acres of offbase land to the southeast and northwest. Although the housing expansion and Hard Mobile Launcher (HML) vehicle operations training areas are presently under cultivation, cultural resources remain. These areas have recently been surveyed, and one small lithic scatter (site 24CA279) in the HML vehicle operations training area would be affected. Lithic scatters and campsites (as opposed to tipi ring sites) may retain considerable research potential because subsurface material is below the depth of agricultural disturbance. Surface and shallow subsurface archaeological sites located in the HML vehicle operations training area may be disturbed or destroyed through crushing and/or the churning of the surface from the wheels.

If the Peacekeeper Rail Garrison program, the second KC-135R squadron, and the Small ICBM were all sited at Malmstrom AFB, long-duration impacts on cultural resources would occur as a result of Small ICBM construction requirements, as previously described. A Programmatic Agreement has been executed by the Air Force, State Historic Preservation Officer, and the Advisory Council on Historic Preservation. Effects of the Small ICBM program have been taken into account, and an Historic Preservation Plan will be prepared for management of resources located during construction. Site 24CA279 has not been tested or fully evaluated for NRHP eligibility. However, it has been disturbed by agricultural activities, and preliminary indications are that it is not eligible. Additional cultural material may be located at depth, and test excavations would be necessary to determine its eligibility. The level of impact (LOI) would be low because lithic scatters are common throughout the ROI. Impacts would not be significant because the affected site is not likely to be eligible for the NRHP. No other sites have been identified in any proposed program area. No impacts are expected to occur on historic, Native American, or paleontological resources. No short-duration impacts would occur.

The LOI and significance of the Alternative Action would be about the same as the Proposed Action for each of the options previously described.

4.9.6 BIOLOGICAL RESOURCES

4.9.6.1 Region of Influence

The ROI for biological resources includes the areas where these resources would be directly affected by the construction of new Air Force facilities onbase and by the construction of a rail spur offbase (Section 4.9, Figure 4.9-1). Areas of indirect disturbance in the ROI where program-induced impacts may occur are the recreational areas within approximately a 1-hour driving time of Great Falls, Montana including the Missouri River, Holter Lake, Freezeout Lake, Benton Lake National Wildlife Refuge, and portions of the Highwood and Little Belt mountains.

4.9.6.2 Existing and Future Baseline Conditions

Biological Habitats. Malmstrom AFB lies within a grassland biome. The undeveloped portion of the base has been seeded with rye and crested wheatgrass. Trees such as ash, American elm, plains cottonwood, honey locust, Russian olive, willow, Scotch pine, and Colorado blue spruce have been planted throughout the cantonment (residential) area, along streets, and other open areas. Much of the area surrounding the base is presently used for agriculture (primarily wheat) (Figure 4.9.6-1). Grassland and forest habitats also

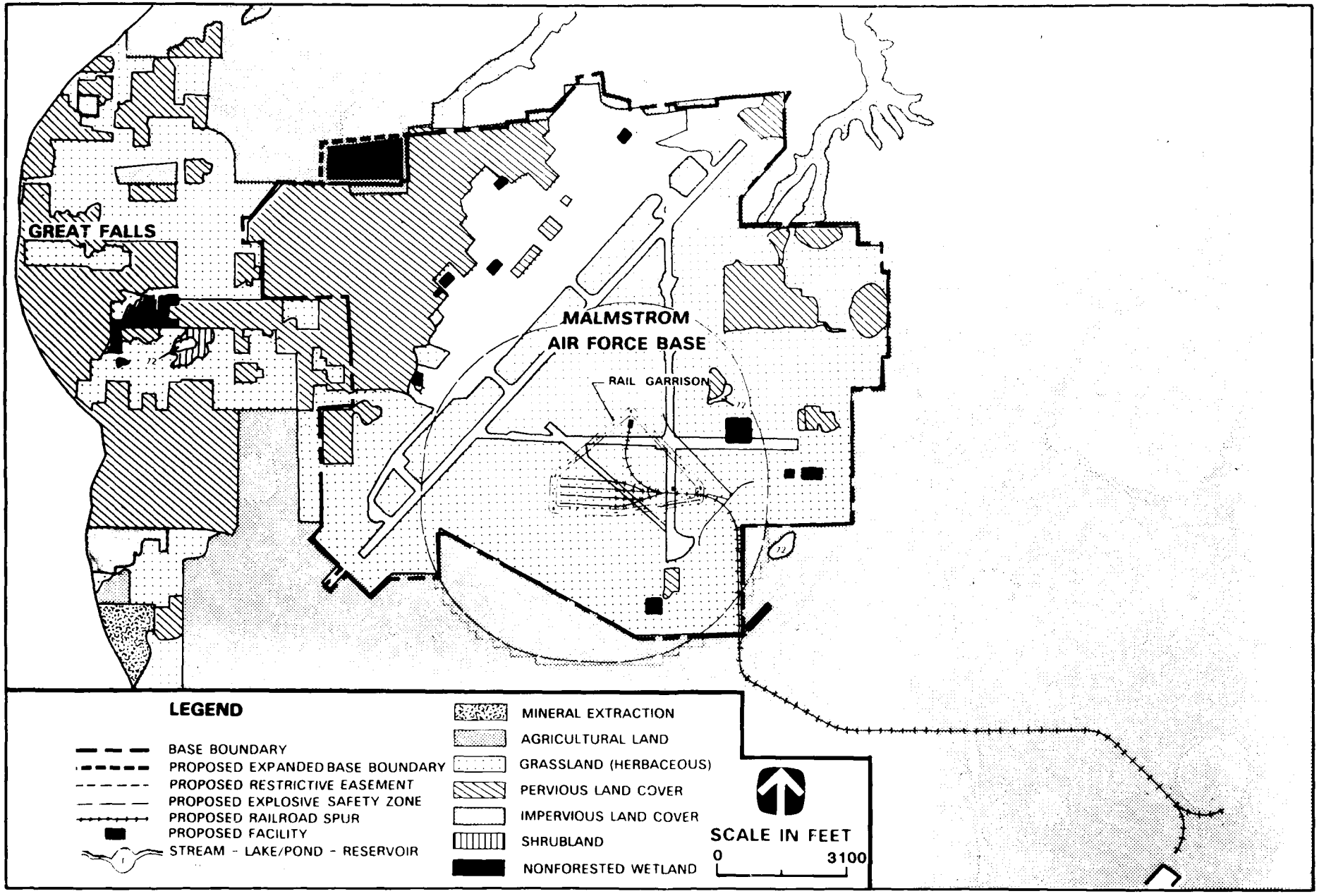


FIGURE 4.9.6-1 HABITAT AND LAND COVER TYPES AND POTENTIAL DISTURBANCE AREAS ON MALMSTROM AFB, MONTANA (SOUTH SITE OPTION) AND IN THE VICINITY

occur within 1 mile of the base boundary. Habitats onbase and near the base support various wildlife species such as the white-tailed jackrabbit, badger, skunk, ground squirrel, and various species of mice, voles, and shrews. A cattail marsh and areas of ponded water occur in a drainage located near the existing weapons storage area (WSA).

The remaining ROI includes agricultural land, native grassland in lowlands, and coniferous forests in mountainous areas. Major rivers and creeks in the ROI include the Missouri, Sun, and Smith rivers, and Belt Creek. Several of these areas support unique and sensitive habitats managed for habitat and wildlife preservation and public recreation. These unique and sensitive habitats include stream riparian zones, Giant Springs State Park, Freezeout Lake, and Benton Lake National Wildlife Refuge. These diverse habitats support abundant wildlife (e.g., white-tailed deer, mule deer, elk, and pronghorn), waterfowl and other bird species, and productive fisheries. The primary recreational use of these resources occurs along rivers, wetlands, and in mountainous areas.

Threatened and Endangered Species. No federally listed threatened and endangered species are known to occur onbase or in potential disturbance areas offbase (Table 4.9.6-1). Three federal-candidate bird species (the ferruginous hawk, long-billed curlew, and the Swainson's hawk) and one state-recognized species (the upland sandpiper) may occasionally occur onbase. Several threatened and endangered, federal-candidate, and state-recognized species occur in the ROI. Only one species, the bald eagle, occurs in common use recreation areas.

4.9.6.3 Impacts of the Proposed Action

Biological Habitats. Construction of Peacekeeper Rail Garrison facilities at Malmstrom AFB and along the rail spur offbase for the south option would result in the disturbance of 316 acres of land, 132.5 acres permanently and 183.5 acres temporarily (Section 4.9, Table 4.9-2). Approximately 158 acres of grassland and 152.7 acres of developed land would be disturbed (Table 4.9.6-2). Destruction of plants and plant cover, increased small mammal mortality, disruption of daily/seasonal behavior, and displacement would occur as a result of disturbance of the grassland habitat on the southeastern part of the base (Table 4.9.6-2). This grassland provides only limited habitat for wildlife because of lack of cover. The small wetland near the existing WSA and the Pow Wow Recreation Area may be influenced by runoff from the construction of garrison facilities. Most of the sedimentation from runoff would be controlled by standard U.S. Army Corps of Engineers construction practices, and is not expected to be enough to affect local wetland populations.

Construction of facilities for the east option would result in the disturbance of 375.6 acres of land, 152.2 acres permanently, and 223.4 acres temporarily. Approximately 173 acres of grassland, 46.1 acres of agricultural land, 154.4 acres of developed land, and a 1.1-acre pond would be disturbed (Table 4.9.6-2). The grassland provides only limited habitat for wildlife because of lack of cover. The small wetland (1.5 acres) south of the existing WSA would be permanently disturbed by construction. Pow Wow Lake (3.2 acres) may be affected by runoff from the construction of garrison facilities. Minor disturbances under either option are not expected to affect biological resources in nearby habitats or substantially diminish biotic diversity. Future baseline conditions onbase are expected to be similar to existing conditions based on current base management plans.

In compliance with Executive Order No. 11990 and according to requirements of Section 404 of the Clean Water Act, alternative sites were considered for location of program facilities. In order to collocate facilities of the proposed program with existing facilities and meet engineering and operational constraints, it was determined that there would be no practicable alternative to the proposed construction of some facilities in wetlands. Furthermore, site-specific program design and construction techniques would include all practicable measures to minimize harm to wetlands.

Table 4.9.6-1

Federally Listed, Federal-Candidate, and State-Sensitive Species
Malmstrom AFB, Montana and Vicinity

Common Name	Scientific Name	Federal Status	State Status	Distribution
Bald eagle	Haliaeetus leucocephalus	E	R	Occurs in region
Canadian toad	Bufo hemiophrys	-	S1	May occur in region
Ferruginous hawk	Buteo regalis	2	R	May occur onbase occasionally
Harlequin duck	Histrionicus histrionicus	-	S2	May occur in region
Long-billed curlew	Numenius americanus	2	U	May occur onbase occasionally
Milk snake	Lampropeltis triangulum	-	S1	May occur in region
Northern swift fox	Vulpes velox hebes	E	U	Occurs in region
Peregrine falcon	Falco peregrinus	E	R	Occurs in region
Preble's shrew	Sorex preblei	2	R	May occur in region
Sage sparrow	Amphispiza belli	-	S2	May occur in region
Spotted bat	Euderma maculatum	2	R	Occurs in region
Swainson's hawk	Buteo swainsoni	2	-	May occur onbase occasionally
Upland sandpiper	Bartramia longicauda	-	SU	May occur onbase occasionally

Notes: E = Endangered
2 = Federal candidate, Category 2
S1 = Critically imperiled
S2 = Endangered in state
SU = Possibly in peril in state; status uncertain
R = Rare
U = Undetermined

Sources: U.S. Forest & Wildlife Service 1984; Montana Department of Fish, Wildlife and Parks 1984.

Program-related growth is expected to result in a slight increase in the population of Cascade County and would be unlikely to result in degradation of biological resources from increased recreational activities (e.g., hunting, fishing, hiking, skiing, snowmobiling, and photography). Giant Springs State Park and portions of the Missouri River in Great Falls would probably receive the greatest increase in use. Biological resources in these habitats are controlled by local and regional management agencies, and small increases in use because of program-related growth should not disturb these resources. Based on projections provided by the Montana Department of Fish, Wildlife and Parks, there should be ample biological resources to handle the hunting and fishing activity produced by the program. Future baseline conditions would be similar to existing conditions based on projections for population increases and increased recreational use in the ROI.

Threatened and Endangered Species. No federally listed threatened or endangered species, federal-candidate species, or state-recognized species would be affected, directly or indirectly, by the proposed program.

Table 4.9.6-2

Habitat and Land Cover Types Potentially Disturbed by the Peacekeeper Rail Garrison Program at Malmstrom AFB, Montana

Habitat Type	Garrison, Support, and Relocation Facilities (acres)	Rail Line (acres)	Total (acres)
	South Option		
Proposed Action			
Grassland	152.3	5.3	157.6
Agriculture	1.4	4.3	5.7
Developed land	119.6	33.1	152.7
TOTAL:	273.3	42.7	316.0
Alternative Action			
Grassland	181.8	5.3	187.1
Agriculture	1.4	4.3	5.7
Developed land	119.6	33.1	152.7
TOTAL:	302.8	42.7	345.5
	East Option		
Proposed Action			
Grassland	169.1	3.4	172.5
Agriculture	34.1	12.0	46.1
Nonforested wetland	1.5	0.0	1.5
Pond	1.1	0.0	1.1
Developed land	139.7	14.7	154.4
TOTAL:	345.5	30.1	375.6
Alternative Action			
Grassland	200.1	3.4	203.5
Agriculture	37.6	12.0	49.6
Nonforested wetland	1.5	0.0	1.5
Pond	1.1	0.0	1.1
Developed land	139.7	14.7	154.4
TOTAL:	380.0	30.1	410.1

Summary of Impacts. Implementation of the program would result in minor disturbance of biological resources on Malmstrom AFB and along the rail spur offbase. Removal of 157.6 acres of grassland for the south option and 172.5 acres of grassland and 1.5 acres of wetland for the east option would not greatly reduce local wildlife populations or diminish regional biological diversity because only small numbers of a few common species would be affected. Indirect impacts on recreation in the ROI would not noticeably degrade biological habitats in the area. Both short- and long-duration impacts for either site option would be low because the grassland habitat that would be affected is of minor habitat value to wildlife and its loss would not affect the integrity of the ecological system.

These impacts would not be significant because the habitats and population that would be affected do not possess unique biological qualities, and these disturbances would not affect regional ecosystems.

4.9.6.4 Impacts of the Alternative Action

The Alternative Action for the south option is not expected to affect the wetland south of the WSA nor any threatened and endangered species. There would be a loss of 187.1 acres of grassland onbase. The grassland habitat is of limited value because it provides only low quality cover and forage for wildlife. The additional loss of grassland habitat would not result in impacts that are substantially greater than those of the Proposed Action.

The Alternative Action for the east option would result in the loss of a 1.5-acre wetland and disturb 203.5 acres of grassland. The additional acreage of grassland and wetland affected would not result in impacts that are substantially greater than those of the Proposed Action for the east option.

4.9.6.5 Cumulative Impacts

Deployment of a second KC-135R squadron in conjunction with the Peacekeeper Rail Garrison program at Malmstrom AFB would result in cumulative impacts on biological resources over and above baseline conditions because of the additional onbase facilities required to meet mission objectives. Construction activities associated with deployment of the second KC-135R squadron would occur in areas of the base that have been previously disturbed (e.g., the flightline), and wildlife habitats onbase would be only minimally affected. Therefore, the cumulative impacts associated with concurrent deployment of the Peacekeeper Rail Garrison program and the second KC-135R squadron would be negligible.

Deployment of the Peacekeeper Rail Garrison program in conjunction with the Small Intercontinental Ballistic Missile (ICBM) program would also cause cumulative impacts on biological resources. Approximately 1,476 acres would be disturbed onbase for deployment of these two programs. The extent of these cumulative impacts would be dependent on the amount of development required to meet the mission objectives of the potential programs. No threatened and endangered species are likely to be affected. The short- and long-duration cumulative impacts would be moderate because of the extent of disturbance which would occur onbase. These impacts would not be significant because the habitats and the populations that would be affected do not possess unique biological qualities, and these disturbances would not affect regional ecosystems.

Cumulative impacts would not be substantially different from the impacts of the two programs (Peacekeeper Rail Garrison and Small ICBM), if all three potential programs (Peacekeeper Rail Garrison, the second KC-135R squadron, and Small ICBM) were deployed at Malmstrom AFB. Although an extensive amount of onbase development would be required to meet the concurrent needs of all three programs, there are no habitats onbase which represent ecologically unique areas. No threatened and endangered species are likely to be affected. Short- and long-duration cumulative impacts would be moderate because of the extent of disturbance which would occur onbase. Impacts would not be significant.

4.9.7 WATER RESOURCES

4.9.7.1 Region of Influence

The boundaries of the ROI for Malmstrom AFB are the Missouri River on the north and west, Boxelder Creek on the east, and Sand Coulee Creek on the south (Figure 4.9.7-1). The ROI has an areal extent of about 70 square miles and contains the major support community of Great Falls.

4.9.7.2 Existing and Future Baseline Conditions

Major Water Users. Total water use in Cascade County, excluding hydroelectric power generation by five dams in the vicinity of Great Falls, amounted to approximately 175,740 acre-feet (acre-ft) in 1985. Agricultural use adjacent to the ROI accounted for about 89 percent of total county water use. Nearly all of the water use within the ROI is municipal and is supplied by the City of Great Falls. The city also supplies water to Malmstrom AFB. Current and projected water use for Malmstrom AFB and Great Falls is presented in Figure 4.9.7-1. Great Falls obtains all of its water from the Missouri River. The water supply of the ROI is adequate to meet its anticipated needs and no major water resource developments are expected to occur during the projected period.

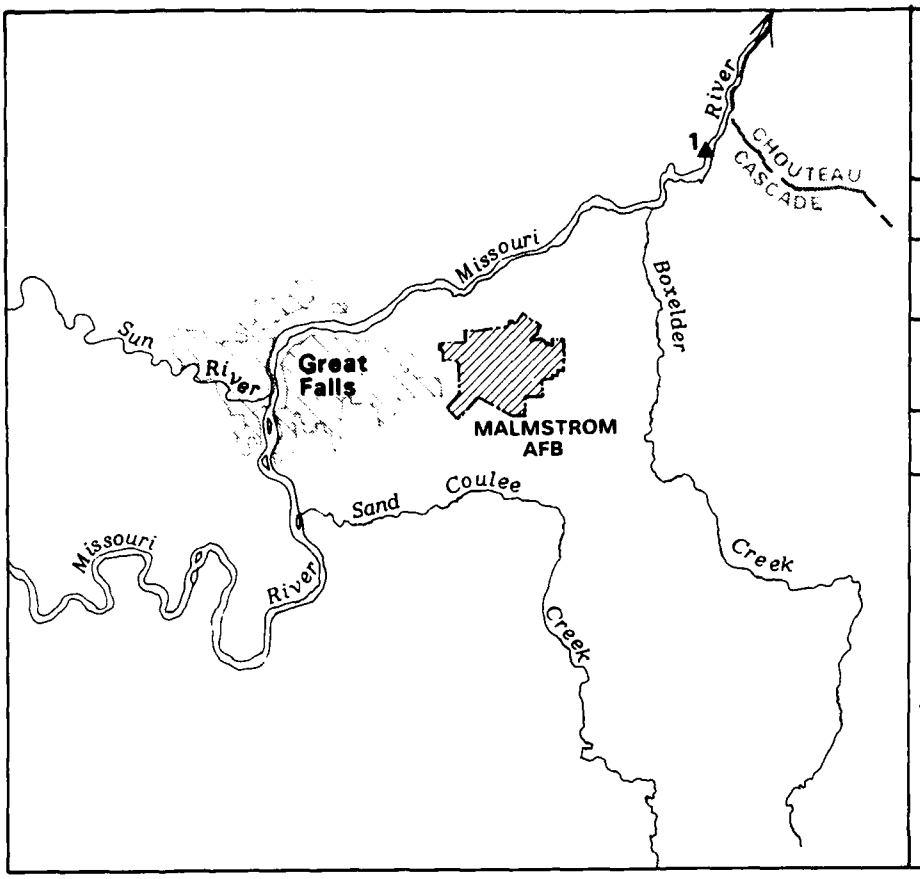
Surface Water Hydrology and Quality. The Missouri River is the principal hydrologic feature of the ROI. It provides nearly all of the water needs of the ROI and receives about 10,550 acre-feet per year (acre-ft/yr) (9.4 million gallons per day [MGD]) of treated wastewater effluent from Great Falls (including 850 acre-ft/yr [0.75 MGD] of sewage generated onbase). The quality of the river water is good in the vicinity of the ROI. Runoff generated within the ROI is relatively low, and the only perennial streams are those which form the borders of the ROI. Most of Malmstrom AFB is drained by a system of intermittent coulees that empty into the Missouri River two miles north of the base. No area on the base occupies any designated floodplain.

Groundwater Hydrology and Quality. Several regional aquifers underlie the ROI at a depth generally greater than 100 feet. The Madison-Swift Aquifer, which has the greatest potential for development, feeds Giant Springs, one of the largest springs in the world. However, given the presence of an ample supply of good-quality surface water, very little groundwater development has occurred in the ROI.

4.9.7.3 Impacts of the Proposed Action

Major Water Users. Total program-related water use would peak at about 190 acre-ft/yr in 1992, and stabilize at about 160 acre-ft/yr during the operations phase with either the south or the east site option (Table 4.9.7-1). All of this water would be obtained from the Missouri River via the Great Falls water supply system whether military housing is provided onbase or offbase in the community of Great Falls. Therefore, only the water requirements of the onbase housing option are discussed here. The program would increase baseline water use at Great Falls by a maximum of one percent. Baseline-plus-program water use in Great Falls (including Malmstrom AFB) would increase to about 14,490 acre-ft/yr (12.9 MGD) in 1993. This amount can be readily supplied since it represents only 20 percent of the 73,120 acre-ft/yr city water rights to the river. Baseline-plus-program water use at Malmstrom AFB would peak at about 1,430 acre-ft/yr (1.27 MGD) in 1992, or ten percent over baseline. The base currently has a contract with the city for the annual delivery of up to 1,410 acre-ft/yr (1.25 MGD). This amount would have to be increased to supply the program. The small increase in ROI water use resulting from the Proposed Action would not interfere with existing major water users.

Surface Water Hydrology and Quality. Program-related increases in withdrawals from the Missouri River would represent less than 0.01 percent of the average annual flow of the river, and would therefore have a negligible effect on its flow. Program-induced increases in treated wastewater discharge to the river would peak at about 120 acre-ft (0.1 MGD) in 1992. Great Falls has adequate treatment capacity to accommodate this increase (Section 4.9.3.3). The treated effluent would be greatly diluted by the river and would result in only minor water quality degradation over the duration of the proposed program.



ANNUAL WATER USE OF SELECTED ENTITIES
(acre-ft/yr)

ENTITY	RECENT USE	PROJECTED USE (1993)
Great Falls*	12,810	14,340
Malmstrom AFB	1,140	1,300

SELECTED HYDROLOGIC CHARACTERISTICS

STATION ▲	DRAINAGE AREA (sq mi)	AVERAGE FLOW (cfs)	10-yr 7-day LOW FLOW (cfs)
1	23,292	8,087	3,777

LEGEND

- COUNTY BOUNDARY
- 1▲ STATION
- STREAM

Note: *Includes Malmstrom AFB

SCALE IN MILES
0 5

MSW-4/1

FIGURE 4.9.7-1 HYDROLOGIC FEATURES OF THE MALMSTROM AFB, MONTANA REGION OF INFLUENCE

Table 4.9.7-1

Program-Related Water Use
Within the Malmstrom AFB Region of Influence
Peacekeeper Rail Garrison Program (Proposed Action)
(values in acre-ft)

	1990	1991	1992	1993 Onwards
Malmstrom AFB				
Construction/Operations	13	32	30	19
Domestic	0	29	101	101
Great Falls Domestic	18	61	55	38
TOTAL:	31	122	186	158

Construction at the south site garrison would result in land disturbance of 142 acres. The site is located in a flat area. The nearest watercourse is a dry coulee 0.5 miles north which runs four miles north to the Missouri River. Under these conditions, relatively little increase in sediment would be expected. Prior to flowing offbase, most of the sediment transported by runoff from this site would settle in a small pond located along the coulee (Section 4.9, Figure 4.9-1), resulting in minimal downstream water quality impact. Construction at the east site garrison would result in land disturbance of 196 acres. The southern edge of this garrison site lies on a moderate slope. The same dry coulee previously discussed extends along the western edge of this garrison site (Section 4.9, Figure 4.9-2). Therefore, there is potential for a substantial short-term increase in sediment yield to the coulee until construction at the site is completed and stabilization measures have taken effect. For security reasons, that portion of the coulee channel lying within the east site garrison may be replaced by an underground pipe approximately 0.6 mile in length. This would have minor effects on the hydrology of the coulee. The water quality effects resulting from construction would be of an infrequent nature, occurring only following periods of heavy rainfall or snowmelt. The impact on the Missouri River would be minor.

If new military housing is constructed onbase, 34 acres in the northwestern corner of the base would be disturbed. This area is also relatively flat and fairly distant (about 1 mi) from the Missouri River. Consequently, program-induced increases in the amount of runoff and sediment flowing to the river would be minor. Construction of approximately four miles of new rail spur connecting either garrison site to the main rail line would occur almost entirely within the Sand Coulee Creek watershed. The spur would cross mostly level land, remote from any water body, and therefore is not expected to affect water quality.

Groundwater Hydrology and Quality. The groundwater resources would not be affected by the proposed program because no groundwater use or program-related hydroecologic changes are expected to occur.

Summary of Impacts. In summary, the water supply of the ROI is adequate to meet program-related water requirements. For either garrison siting option, only minor hydrologic changes and minor degradation of water quality would occur. Therefore, the short- and long-duration impacts on water resources for either garrison option would be low. None of these impacts would be significant.

4.9.7.4 Impacts of the Alternative Action

Major Water Users. Total program water use during the operations phase would be 170 acre-ft/yr, a 10-percent increase over the Proposed Action. Compared to the Proposed Action, baseline-plus-program water use at Malmstrom AFB would increase by an additional one percent. The comparable increase in the Great Falls system would be minor. The available water supply is adequate to meet the water needs of this alternative with no effects on existing major water users.

Surface Water Hydrology and Quality. With six TASs, the disturbed area at the garrison would increase by 20 percent to 171 acres. Short-term sediment yield could be expected to increase by a similar percentage. However, the water quality effects on the nearest stream, the Missouri River, are not expected to be measurably different from those of the Proposed Action. With regard to the east site, the garrison would cover an additional 35 acres as compared to the Proposed Action. Most of this additional acreage would be on moderately sloping land lying along the south side of the garrison site. Additional erosion and sedimentation to the nearby coulee would result. However, the effects on the Missouri River would remain minor.

Groundwater Hydrology and Quality. No groundwater impacts are expected as a result of this alternative.

Summary of Impacts. Impacts on water resources resulting from either siting option are expected to remain essentially the same as for the Proposed Action: short- and long-duration impacts would be low and not significant.

4.9.7.5 Cumulative Impacts

Concurrent deployment of the Peacekeeper Rail Garrison program and a second KC-135R squadron mission would require nearly twice as much water as the Proposed Action. Program-related water use would peak at approximately 340 acre-ft/yr in 1992 and would stabilize at 310 acre-ft/yr in 1993 (Table 4.9.7-2). Great Falls would supply all of these requirements. This would increase baseline water use in the city by 2 percent in 1993 to 14,650 acre-ft/yr (13.1 MGD). This small increase can be readily supplied by the city's allocation to the Missouri River (73,120 acre-ft/yr) and no interference with major water users would occur. Deployment of the KC-135R mission would result in minor land disturbance and associated surface water quality degradation. Consequently, the short- and long-duration impacts on water resources are rated the same as for the Proposed Action: low. These impacts would not be significant.

Should the Peacekeeper Rail Garrison and the Small ICBM programs be deployed simultaneously, water requirements would increase by an order of magnitude over the Proposed Action. Program-related water use would peak at approximately 1,610 acre-ft/yr in 1996 and stabilize at approximately 1,540 acre-ft/yr in 1999 (Table 4.9.7-2). These water requirements would be supplied by Great Falls, and would increase the city's baseline water use by 11 percent in 1998 to 16,080 acre-ft/yr (14.3 MGD). Despite this appreciable increase, only 22 percent of the available supply of Missouri River water would be used as full operations began. Therefore, no interference with other major water users would result.

A 350-acre area at the southeast side of the base would be used as a maintenance and training area for the Hard Mobile Launcher (HML). Offroad training activities would result in a large, permanently disturbed site subject to substantial erosion. However, water quality effects would be minor because of the distance of the nearest stream (Sand Coulee Creek is 6 mi away) and the flat, intervening terrain which would tend to trap soil that has eroded from the site.

In addition to the 34 acres of new housing for Peacekeeper Rail Garrison personnel and families, approximately 330 acres of housing would be constructed for the Small ICBM personnel. This additional housing would be located adjacent to the new family housing shown in Figure 4.9-1 (Section 4.9) and would lie mostly north of the existing railroad tracks. Construction activities would result in small, short-duration increases in sediment yield to the Missouri River due to temporary land disturbance. However, this new development would permanently affect the hydrology of two unnamed coulees which drain this area directly to the river. These two coulees have small drainage areas, substantial portions of which would be covered by the new military housing. Analysis performed using the U.S. Soil Conservation Service rainfall-runoff model, TR-20, indicates that the peak stormwater runoff resulting from a storm with a 1-in-10-year recurrence interval would increase by as much as 40 percent. A flow increase of this magnitude could increase the rate of channel erosion or affect the performance of downstream hydraulic structures. If no military housing is provided onbase, program-related housing is likely to be dispersed among several locations within Great Falls. This housing might require construction or upgrade of stormwater facilities within the city. Consequently, appreciable long-duration hydrologic changes would occur with either housing option. In summary, the short-duration impacts would be low and the long-duration impacts would be moderate. None of these impacts would be significant.

Concurrent deployment of the Peacekeeper Rail Garrison program, the second KC-135R squadron mission, and the Small ICBM program would require substantial amounts of water, which would also be supplied by Great Falls. Cumulative water use would peak at

Table 4.9.7-2

Cumulative Water Use for the Proposed Action, Small ICBM, and KC-135R Squadron at Malmstrom AFB, Montana (in acre-ft)

	1989	1990	1991	1992	1993	1996	1999 Onwards
Peacekeeper Rail Garrison	0	30	120	190	160	160	160
KC-135R Squadron	40	30	70	150	150	150	150
Small ICBM	30	200	310	760	960	1,510	1,380
Peacekeeper Rail Garrison and KC-135R Squadron	40	60	190	340	310	310	310
Peacekeeper Rail Garrison and Small ICBM	30	230	430	950	1,120	1,610	1,540
Peacekeeper Rail Garrison, KC-135R Squadron, and Small ICBM	70	260	500	1,100	1,270	1,820	1,690

about 1,810 acre-ft/yr in 1996 and would stabilize at 1,690 acre-ft/yr in 1999, about 11 times more than the Proposed Action (Table 4.9.7-2). Baseline water use in Great Falls would increase by 13 percent in 1999 to 16,230 acre-ft/yr (14.5 MGD). Despite this substantial increase, the effects on major water users would remain minor because the available supply to the city is adequate. Construction of the HML vehicle operations training area and family housing facilities would result in essentially the same hydrologic effects previously discussed. Therefore, the impacts on water resources would be essentially the same as for the concurrent deployment of the Peacekeeper Rail Garrison and Small ICBM programs: the short-duration impacts would be low and the long-duration impacts would be moderate. These impacts would not be significant.

The Alternative Action would result in minor additional impacts since it would require less than 20 acre-ft/yr over the Proposed Action and would only disturb an additional 30 acres in the same flat area. Therefore, cumulative impacts on water resources associated with the Alternative Action would be essentially the same as the cumulative impacts described for the Proposed Action.

4.9.8 GEOLOGY AND SOILS

4.9.8.1 Region of Influence

The ROI at Malmstrom AFB for geology and soils includes the installation and associated program-related areas in the immediate vicinity. The land within a 1-mile radius of the installation and a 1,000-foot-wide corridor along the connecting rail spur was characterized for purposes of establishing the local baseline context. In addition, a regional ROI was established for geologic hazards for the purpose of developing a regional framework for seismicity at the installation.

4.9.8.2 Existing and Future Baseline Conditions

Malmstrom AFB lies in a region of high plains interrupted by isolated mountain ranges rising 2,000 to 4,000 feet above the surrounding plains. Locally, Quaternary glacial deposits overlie the Early Cretaceous Kootenai Formation which consists mainly of shales and sandstones. The installation lies in seismic zone 2 (Uniform Building Code 1985) in which a maximum credible earthquake with a magnitude of 6.1 is the largest predicted for the area. Maximum horizontal acceleration in rock is expected to be less than 0.10 g, with a 90-percent probability of not being exceeded in 50 years (Algermissen et al. 1982). Active faults have not been identified in the local ROI and the area is not susceptible to liquefaction. Areas susceptible to landslides or terrain failure were not discovered in the ROI.

Energy and Mineral Resources. No oil, gas, or coal leases/fields have been identified in the ROI. No uranium mines/leases, Known Geothermal Resource Areas, or metallic/nonmetallic mineral resource mining operations or leasing activity exist in the ROI.

Soil Resources. The U.S. Soil Conservation Service (SCS) has mapped 14 soil types in the ROI. Five of these soil types occur in areas where the south site option program-related facilities may be located and six soil types occur in program-related areas of the east site option. Soils for either site option occur on level to strongly sloping surfaces, have loamy to clayey textures, and range from poorly drained to well drained. Soil susceptibility was evaluated for wind and sheet erosion. Wind erosion of unvegetated/disturbed ground in the ROI is a major concern of the SCS in Montana and has been identified as a potential problem for soils in the ROI. The prevailing southwesterly wind direction would make northeast-southwest elongated tracts of land susceptible to wind erosion. The proposed garrison for the south site option would be located on soils with a moderate susceptibility to wind and sheet erosion. The proposed rail spur and other facilities would be located on soils with a low to moderate susceptibility to wind erosion and a low to high susceptibility to sheet erosion. For the east site option, the proposed garrison, rail spur, and other facilities would be located on soils with a low to moderate susceptibility to wind erosion and a moderate to high susceptibility to sheet erosion.

4.9.8.3 Impacts of the Proposed Action

Energy and Mineral Resources. No energy or mineral resources have been identified in the ROI. Therefore, impacts on energy and mineral resources are not expected.

Soil Resources. Program-related wind erosion at the proposed garrison, rail spur, and other facilities for either site option is projected to occur at rates of 0.8 to 8.1 tons per acre per year (T/ac/yr) to 8.1 T/ac/yr. The application of one ton per acre (T/ac) of straw mulch would temporarily reduce the rates of erosion for all soils affected to less than 0.1 T/ac/yr. During garrison construction, soil would also erode at a rate of 18.5 T/ac/yr for large exposed areas of a soil type for the south site option and 4.5 T/ac/yr to 18.5 T/ac/yr for the east site option. The application of one T/ac of straw mulch would temporarily reduce these rates to less than 0.1 T/ac/yr. Program-induced sheet erosion at the proposed garrison, rail spur, and other facilities for either site option is projected to occur at rates of 1.7 T/ac/yr to 9 T/ac/yr. The application of one T/ac of straw mulch after construction would temporarily reduce the rates of erosion to 0.4 T/ac/yr to 1.8 T/ac/yr for all soils affected. The range of soil erosion rates identified for either site option (2.5 to 27.5 T/ac/yr) are comparable to those determined for general urban development (16 to 156 T/ac/yr) as supplied by the U.S. Department of Housing and Urban Development (1981).

Soil erosion impacts are based on the combined effects of wind and sheet erosion values and how they compare to the maximum tolerable soil loss for each soil type. Soil erosion rates would exceed the maximum tolerable soil loss (5 T/ac/yr) of the affected soil types during construction. Program-induced soil erosion is therefore expected to cause short-

duration impacts at either site option. Long-duration impacts are not expected at either site option because accelerated rates of erosion would occur for only a short period of time prior to mulching and reestablishing a vegetative cover in disturbed areas.

Summary of Impacts. Overall short-duration impacts of the proposed program for either site option on the geology and soils resource are expected to be high because accelerated rates of erosion during program-related construction would exceed the maximum tolerable soil loss of the soils affected. Long-duration impacts for either site option are expected to be negligible because accelerated rates of erosion would not continue into the operations phase of the program. Short-duration impacts are not expected to be significant because increased rates of erosion would not result in an appreciable net loss of topsoil over the short period of time under consideration.

4.9.8.4 Impacts of the Alternative Action

The Alternative Action would slightly increase the size of the garrison for either site option. Therefore, impacts on the geology and soils resource would be about the same as for the Proposed Action. Consequently, all levels of impact and significance would remain the same as for the Proposed Action. Short-duration impacts would be high and not significant while long-duration impacts would be negligible.

4.9.8.5 Cumulative Impacts

Cumulative impacts of the concurrent deployment of the Peacekeeper Rail Garrison program and the second KC-135R squadron at Malmstrom AFB would not be substantially greater than those of either site option of the Proposed Program. Impacts on energy and mineral resources would remain negligible and short-duration soil erosion impacts would remain high. Construction associated with the second KC-135R squadron may slightly increase the amount of soil eroded, but this activity would be of short-duration only, and would not change the LOI of either site option from those of the Proposed Action. Soil erosion impacts would not be significant since program-related erosion would not result in an appreciable net loss of topsoil.

Cumulative impacts of the concurrent deployment of the Peacekeeper Rail Garrison and Small ICBM programs at Malmstrom AFB would increase the level of impact (LOI) of the south site option of the Proposed Action. Short-duration impacts would be moderate for energy and mineral resources because the Small ICBM program demand for aggregate would exceed the production rates of the producers in the ROI and estimated aggregate reserves would be depleted. Long-duration impacts would not be expected because the area has the potential to develop additional reserves and increase production rates to meet any foreseeable demand. Concurrent basing of these programs would increase the amount of soil eroded because of the permanent disturbance of 350 acres associated with the Small ICBM program. Short-duration impacts would remain high because of the construction of both Peacekeeper Rail Garrison and Small ICBM facilities. Long-duration impacts would be moderate because of long-term rates of erosion at the HML vehicle operations training area, which would be barren for the life of the program. Long-duration impacts are expected to be significant because soil erosion would result in an appreciable net loss of topsoil.

Cumulative impacts of the concurrent deployment of the Peacekeeper Rail Garrison and Small ICBM programs and the second KC-135R squadron would be the same as the cumulative impacts of the Peacekeeper Rail Garrison and Small ICBM programs because the second KC-135R squadron does not substantially influence the geology and soils resource.

Cumulative impacts from the concurrent deployment of the Alternative Action with the second KC-135R squadron mission would be about the same as those of either site option of the Proposed Action with the second KC-135R squadron mission. Consequently, all LOIs and significance would remain the same. Short-duration impacts would remain high and not significant while long-duration impacts would remain negligible.

Cumulative impacts from the concurrent deployment of the Alternative Action with the Small ICBM program would be about the same as those of the south site option of the Proposed Action with the Small ICBM program. Consequently, all LOIs and significance would remain the same. Short-duration impacts would remain high and not significant and long-duration impacts would remain moderate and significant.

Cumulative impacts from the concurrent deployment of the Alternative Action with the Small ICBM program and the second KC-135R squadron mission would be about the same as those of the south site option of the Proposed Action with the Small ICBM program and the second KC-135R squadron mission. Consequently, all LOIs and significance would remain the same. Short-duration impacts would remain high and not significant and long-duration impacts would remain moderate and significant.

Mitigation Measures. Mitigation measures which could reduce long-duration impacts resulting from increased rates of soil erosion during operations of the HML vehicle operations training area for the Small ICBM include the following, along with the agencies responsible for implementation:

- Build sediment traps where appropriate on drainages flowing away from the training area to control the long-duration sediment load potentially leaving the site or entering nearby streams (U.S. Air Force and U.S. Army Corps of Engineers [COE]).

- Reduce the ground slopes to control the rate of runoff, such as routing the runoff across adjacent, gently sloping grassed areas. Reductions in the amount of ground slope often require an increase in disturbed area. Consequently, the benefits of slope reduction are partially offset by the increased lengths of disturbed ground over which runoff would flow (U.S. Air Force and COE).

4.9.9 AIR QUALITY

4.9.9.1 Region of Influence

The ROI for the air quality resource includes Malmstrom AFB, the City of Great Falls, and the surrounding areas of Cascade County.

4.9.9.2 Existing and Future Baseline Conditions

The area that may be affected by air emissions from the proposed program includes Malmstrom AFB and the City of Great Falls; both are included in the Great Falls Intrastate Air Quality Control Region (No. 141). Gates of the Mountains Wilderness, a Prevention of Significant Deterioration (PSD) Class I area, is within 50 miles of the base.

Ambient air quality at Malmstrom AFB has not been monitored. However, ambient concentrations of total suspended particulate (TSP), carbon monoxide (CO), and particulate matter (PM_{10}) levels are monitored in Great Falls two miles from the base. No other criteria pollutants are monitored because of the minimal number of either point or area sources. The air quality measurements in Great Falls indicate that the maximum 24-hour TSP observation was 264 micrograms per cubic meter ($\mu g/m^3$) at Fire Station No. 1. The highest annual TSP geometric average at the fire station was 65.8 $\mu g/m^3$. Both the 24-hour and geometric average for TSP occurred in 1985. The PM_{10} levels were monitored in downtown Great Falls. The maximum recorded 24-hour average was 73 $\mu g/m^3$ and the highest annual geometric mean was 30.1 $\mu g/m^3$, both within the standards.

There are very few year-round pollution sources in the vicinity of Malmstrom AFB. The predominance of southwesterly drainage winds across Malmstrom AFB usually vents pollution from the small industrial sites in the area.

The closest nonattainment area to Malmstrom AFB is in Great Falls. A corridor along 10th Avenue South was declared a nonattainment area for the CO 8-hour standard. The Great Falls downtown area has not achieved the federal secondary standard for TSP, and is designated nonattainment for TSP; however, the U.S. Environmental Protection Agency (EPA) replaced the TSP standard with the PM_{10} standard. Monitored PM_{10} data for Great Falls are below the standards, thereby classifying the city into a Group III PM_{10} category, which is or is presumed to be in compliance with the standards. Malmstrom AFB itself is in attainment status for all criteria pollutants.

The latest annual (1987) Cascade County air quality emissions inventory, extracted from the EPA National Emissions Data System (NEDS), is provided in Table 4.9.9-1. Emissions data were available for TSP, sulfur oxides (SO_x), nitrogen oxides (NO_x), CO, and volatile organic compounds (VOC, a measure of reactive hydrocarbons). The PM_{10} fraction of TSP emissions are not identified in the NEDS.

The emissions data for Cascade County include the four most important source categories, namely fuel combustion in stationary sources, transportation, solid waste disposal, and industrial processes, as well as a fifth source category, miscellaneous. Miscellaneous emission types vary according to the region involved, but most commonly include fugitive dust, solvent evaporation, agricultural burning, forest fires, and structural fires. Existing major point sources of air pollutants include the Montana Refining Company, GTA Feed Company, and Congra Feed Mill, all located in Great Falls.

Future baseline regional emissions will increase due to normal population and industrial growth, but these increases will be minimal because of the low growth potential in these areas.

4.9.9.3 Impacts of the Proposed Action

Direct air emissions would result from program-related construction of a rail spur, the garrison, and support facilities, as well as from operation of the proposed program at Malmstrom AFB. Emission sources associated with construction include light-duty vehicle traffic, diesel trucks, offsite heavy-duty vehicles, diesel construction equipment, and fugitive dust from ground disturbance.

The highest monthly fugitive dust emissions from proposed program construction activity either at the south site or the east site would be about 15 tons. Fugitive dust calculations assume a 50-percent reduction due to watering of the construction sites. All of the fugitive dust emissions at Malmstrom AFB were conservatively assumed to be within the 10-micrometer particle size and referenced against the PM_{10} standard for impact analysis. It is expected that actual PM_{10} emissions would be lower than the emissions calculated under the EPA guidelines for TSP.

Construction-related impacts were calculated for 24-hour and annual averaging periods. A program-related increase of 0.4 $\mu g/m^3$, which includes particulates from combustion products, would occur increasing the 24-hour average background concentrations to 73.4 $\mu g/m^3$. The predicted fugitive dust 24-hour background concentration would not equal or exceed the 24-hour National Ambient Air Quality Standards (NAAQS) of 150 $\mu g/m^3$ (PM_{10}). The annual background concentration would increase to 30.3 $\mu g/m^3$, which would not equal or exceed the PM_{10} standards of 50 $\mu g/m^3$. These fugitive increases would not degrade the air quality at the nearest PSD Class I area (Gates of the Mountains Wilderness) which is located 48 miles from Malmstrom AFB.

Overall short- and long-duration air quality impacts of the Proposed Action for either the south site or east site would be negligible.

Table 4.9.9-1

Cascade County, Montana Air Emissions Inventory, 1987
(tons per year)

Emission Source	TSP	SO_x	NO_x	VOC	CO
Fuel Combustion	427	579	758	861	2,500
Industrial Process	189	1,042	45	2,298	874
Solid Waste Disposal	84	1	3	237	711
Air/Water Transportation	44	10	85	112	497
Land Transportation	1,695	490	5,279	3,201	20,113
Miscellaneous	28,578	1	27	136	959
TOTAL:	31,017	2,123	6,197	6,845	25,654

Source: U.S. Environmental Protection Agency 1988d.

4.9.9.4 Impacts of the Alternative Action

The Alternative Action (6 TASs) for either the south site or east site option would cause a 0.2-percent increase in fugitive dust emission over the Proposed Action. This would result in a total increase of 0.5 $\mu g/m^3$, increasing the 24-hour average ambient concentration to 73.5 $\mu g/m^3$. The short- and long-duration impacts of the Alternative Action for either site option would be negligible and would not cause any violation of the NAAQS.

4.9.9.5 Cumulative Impacts

As shown for the Peacekeeper Rail Garrison Proposed Action, short- and long-duration air quality impacts resulting from fugitive dust would be negligible at south site. The operation of KC-135R aircraft at Malmstrom AFB would cause emission increases of 0.04 percent for CO, 0.01 percent for hydrocarbons and 0.3 percent for NO_x in Cascade County. The cumulative emission increases over baseline county emissions from the Peacekeeper Rail Garrison program and additional KC-135R operations would be minimal. Therefore, both short- and long-duration impacts would remain negligible.

Concurrent deployment of the Peacekeeper Rail Garrison and Small ICBM programs at Malmstrom AFB would result in additional onbase construction activities, creating additional air pollutant emissions. The combined fugitive dust emissions from the Peacekeeper Rail Garrison and Small ICBM programs at the south site would cause a total increase of 9.2 $\mu g/m^3$ in particulate concentrations, increasing the 24-hour average ambient concentration to 82.7 $\mu g/m^3$. The cumulative short-duration impacts would therefore be low. The long-duration impacts would be negligible.

Fugitive dust generated at Malmstrom AFB for the Peacekeeper Rail Garrison (Proposed Action), Small ICBM program and the second KC-135R squadron program during the peak construction year would have low impacts on Great Falls air quality because the EPA minimum threshold levels for fugitive dust would be exceeded. However, these impacts would not be significant because no violation of NAAQS would occur. The long-duration cumulative impacts would be negligible.

The cumulative air quality impacts resulting from the concurrent deployment of the Alternative Action (6 TASs), Small ICBM program, and the second KC-135R squadron program would be about the same as those of the Proposed Action.

4.9.10 NOISE

4.9.10.1 Region of Influence

The ROI for the noise resource is broadly defined as the area where program-related noise level increases would occur. Specifically the ROI includes Malmstrom AFB, the City of Great Falls, and the surrounding areas of Cascade County.

4.9.10.2 Existing and Future Baseline Conditions

The major noise sources in the vicinity of Malmstrom AFB are local highways and onbase flying missions that include rotary wing air traffic. The major locations of motor vehicle-related noise at Malmstrom AFB are the 57th Street (U.S. 87) Bypass, 2nd Avenue North, 10th Avenue South, 10th Avenue North, and primary and secondary streets within the base.

Background noise monitoring was conducted from October 20 to 25, 1986 at ten sites in and around Malmstrom AFB to obtain a representative measure of the existing sound levels during the Small ICBM program Environmental Impact Statement preparation. During the first three days of monitoring, the daytime noise environment was dominated by local street traffic-generated noise peaks, with distant traffic noise and occasional aircraft overflights near the base, especially the temporary KC-135R air refueling mission stationed at Malmstrom AFB. Therefore, representative KC-135R aircraft noise was included in the baseline noise measurements.

The equivalent sound level (24-hr) background concentrations in and around Malmstrom AFB range from a low of 51 decibels on the A-weighted scale (dBA) to a high of 59 dBA. Traffic generated noise level on U.S. 87 Bypass is about 61.0 dBA (L_{dn}). The Draft Malmstrom AFB Air Installation Compatible Use Zone (AICUZ) report was prepared in 1988 and is be based on KC-135R aircraft to be assigned to the base. The new preliminary AICUZ noise contours were compressed due to the quieter KC-135R aircraft and were below 65 dBA expressed as day-night equivalent sound level (L_{dn}) at the sensitive receptors (i.e., residential sites). However, a portion of the base trailer park falls within the 65-dBA (L_{dn}) contour.

4.9.10.3 Impacts of the Proposed Action

Temporary impacts resulting from construction-related noise would occur within the immediate vicinity of construction sites. The various activities that would take place include construction of industrial structures, housing, rail spur lines, roadways (grading, compacting, and paving), landscaping, and cleanup at Malmstrom AFB.

For either the south or east site option, the new family housing area is assumed to be located on the northeastern corner of the Malmstrom AFB. Assuming the simultaneous operation of a bulldozer, a dump truck, a front loader, and a scraper in the proposed new family housing area, the estimated construction noise in the existing residential area would be about 65 dBA, causing an 8-dBA increase above background levels. These short-duration noise impacts would be moderate at these sensitive residential receptors. However, these impacts would not be significant because they would not exceed the 10-dBA criterion.

The TAS construction-related noise at Malmstrom AFB (south site) is not anticipated to affect offbase or base residential areas because such noise levels from point sources attentuate quickly with distance. Potential construction-related noise levels of 80 dBA to 85 dBA at 100 feet from the source within the TAS construction site would be reduced to 47 dBA at the offbase residential areas which are located about 7,500 feet from the construction site would be 49 dBA. The noise levels at the base trailer park, which is located about 5,000 feet from the TAS construction site, would be about 51 dBA. These

noise levels would be masked by ambient noise levels of about 68 dBA (L_{dn}). Once the construction activity ceases, noise levels would return to near ambient conditions. The short-duration noise impacts from all TAS construction activities would be negligible.

During the operational phase, noise would be generated by road and railroad traffic. Additional traffic due to the proposed program would cause approximately a 0.8-dBA (L_{dn}) increase in noise levels at the sensitive receptors (residential areas) within 200 feet of U.S. 87 Bypass. This increase in vehicular noise levels would have negligible impact on the sensitive receptors.

Offbase training train activities would cause minor, temporary increases in average noise levels on sensitive receptors along the main railroad line.

The TAS construction-related noise at Malmstrom AFB (east site) is not anticipated to affect offbase or base residential areas because such noise levels from point sources attentuate quickly with distance. Potential construction-related noise levels of 80 dBA to 85 dBA at 100 feet from the source within the TAS construction site would be reduced to 42 dBA at the offbase residential areas which are located about 14,400 feet from the construction location. The noise levels at base residential area and the hospital which is located about 10,000 feet from the TAS construction site would be 44 dBA (L_{dn}). These noise levels would be masked by ambient noise levels of about 55 dBA (L_{dn}). Once the construction activity ceases, noise levels would return to near ambient conditions. The short-duration noise impacts from all construction activities would be negligible.

During the operational phase, noise would be generated by road and railroad traffic. Additional traffic due to the proposed program (east site) would cause approximately a 0.8-dBA (L_{dn}) increase in noise levels at the sensitive receptors (residential areas) within 200 feet of U.S. 87 Bypass. This increase in vehicular noise levels would have negligible impact on the sensitive receptors.

Offbase training train activities would cause minor, temporary increases in average noise levels on sensitive receptors along the main rail line.

Overall short-duration noise impacts would be moderate and not significant while long-duration would be negligible.

4.9.10.4 Impacts of the Alternative Action

As with the Proposed Action, the short-duration (construction) noise impacts in the existing family housing areas would be moderate. However, these impacts would not be significant because they would not exceed the 10-dBA criterion would be negligible for either site option. The increase in noise levels resulting from the construction of six TASs at the south and east sites would be negligible. Once the construction activity ceases, noise levels would return to near ambient conditions. The long-duration operations noise impacts (vehicular and railroad traffic) would be negligible for both the south and east site options.

4.9.10.5 Cumulative Impacts

Concurrent deployment of the Peacekeeper Rail Garrison program and the second KC-135R squadron would result in additional short-duration impacts from construction activities and long-duration impacts from aircraft flights. Aircraft noise levels would be less than 65 dBA (L_{dn}) at sensitive receptors (residential areas) in the Great Falls area except a portion of the base trailer park which falls within the 65-dBA (L_{dn}) level. The cumulative, short- and long-duration impacts would be negligible.

Concurrent deployment of the Peacekeeper Rail Garrison and Small ICBM programs at Malmstrom AFB (south site) would create a cumulative impact because additional construction activity onbase would create an increase in noise levels. Cumulative noise

impacts would consist of additional noise generated during construction of the Small ICBM facilities. The short-duration (construction) noise impacts in the existing family housing area would be moderate. These impacts would not be significant. The additional noise generated from the onbase construction of other Small ICBM facilities would be negligible. The operations activities of both programs would cause small increases in vehicular traffic noise levels. The cumulative long-duration noise impacts would be negligible.

The deployment of the Peacekeeper Rail Garrison program with the second KC-135R squadron and Small ICBM programs (south site) would create a cumulative impact because additional construction activity onbase would create an increase in noise levels. Cumulative noise impacts would consist of additional noise generated during construction of the Small ICBM and KC-135R facilities. The short-duration noise impacts in the existing family housing area would be moderate. These impacts would not be significant. The additional noise generated from the onbase construction of other Small ICBM and KC-135R facilities would be negligible. The operations activities of all three programs would cause small increases in vehicular traffic noise and railroad noise due to offbase training train activities. The second KC-135R squadron would cause an increase in aircraft operations noise levels. However, these noise levels would be less than 65 dBA (L_{dn}) at sensitive receptors (residential areas) in the Great Falls area, except a portion of the base trailer park which falls within the 65 dBA (L_{dn}) level.

The cumulative noise impacts resulting from deployment of the Alternative Action, the Small ICBM program, and the second KC-135R squadron would be about the same as those of the Proposed Action.

4.9.11 Impacts of the No Action Alternative

With the No Action Alternative, the Peacekeeper Rail Garrison system would not be deployed. Activities at Grand Forks AFB will continue to support other existing or proposed missions. For the host communities in the vicinity of the base, environmental changes would occur as a result of normal community growth. Future baseline conditions reflecting the No Action Alternative were described in earlier portions of this chapter.

4.9.12 Irreversible and Irretrievable Resource Commitments

Deployment of the Peacekeeper Rail Garrison program at Grand Forks AFB would result in the irreversible and irretrievable commitments of some human and natural resources. The affected resources are the following:

- The proposed program requires the use of relatively small amounts of labor, materials, energy, and other economic resources during both the construction and operations phases. The local procurement of building materials (such as cement, sand, and gravel) may alter some resource characteristics in the deployment area. Although these economic factors, once used by the proposed program, generally cannot be recovered for other purposes, the extent of their use would be small in comparison to total resource availability.

- Lands utilized for the program facilities will be irreversibly committed for the duration of the program. Such use of land would not cause an irretrievable commitment because the land can be reclaimed through removal of program facilities and implementation of necessary soil rehabilitation.

- Both irreversible and irretrievable commitments would occur if prehistoric sites eligible for the National Register of Historic Places (NRHP) are destroyed or damaged during construction and operations.

- Both irreversible and irretrievable commitments would occur if NRHP-eligible historic sites and architectural resources are destroyed during construction and operations.

- Both irreversible and irretrievable commitments could occur if sacred or ceremonial areas are destroyed during construction and operations. Any impact may destroy the importance of a sacred area.

- Disturbed biological communities, given sufficient time, can recover to a state approximating predisturbance conditions once the disturbance ends. However, permanent disturbance of the grassland habitat onbase represents an irreversible and irretrievable commitment of biological resources.

- Soils would be permanently disturbed at construction and related sites (e.g., borrow pits, roads, buildings, and rail spur) and may be irreparably damaged during the life of the program if disturbed areas are not mulched or revegetated, especially at the garrison location. Aggregate resources would be used for construction of buildings, roads, and rail spurs.

4.9.13 Relationship Between the Local Short-Term Use of Man's Environment and the Maintenance and Enhancement of Long-Term Productivity

Deployment of the Peacekeeper Rail Garrison program at Malmstrom AFB would result in the short-term use of some human and natural resources that may affect the maintenance and enhancement of long-term productivity. The affected resources are the following:

- Short-duration program-generated traffic would result in some decrease in the comfort, convenience, and safety afforded users of primary roads leading to the base. No effect on long-term productivity is expected.

- Additional information gained during program-related surveys of archaeological, historic, architectural, and paleontological resources may contribute to the data base and improve man's knowledge of the area's history. This would enhance the management of remaining cultural resources in the region.

- The proposed program is not expected to have a long-duration adverse effect on regional biological productivity because this program would disturb relatively small areas and loss of wetlands onbase would not adversely affect overall wetland productivity in the region. In addition, ecological recovery rates in most locations proposed for development are expected to be relatively fast.

- The proposed program is not expected to have a long-duration effect on water use, soil erosion, air quality, and noise; therefore, no effects on the maintenance and enhancement of long-term productivity are anticipated.

4.9.14 Environmental Concerns Associated With a Possible Future Second Rail Connector

A second rail access to Malmstrom AFB could be achieved by providing a northerly rail connector to the main line of the Burlington Northern (BN) Railroad (Figure 4.9.14-1). This connector would require the acquisition of approximately 0.25 acres of land, the construction of 2.2 miles of new track, and the rehabilitation of 3.7 miles of existing track.

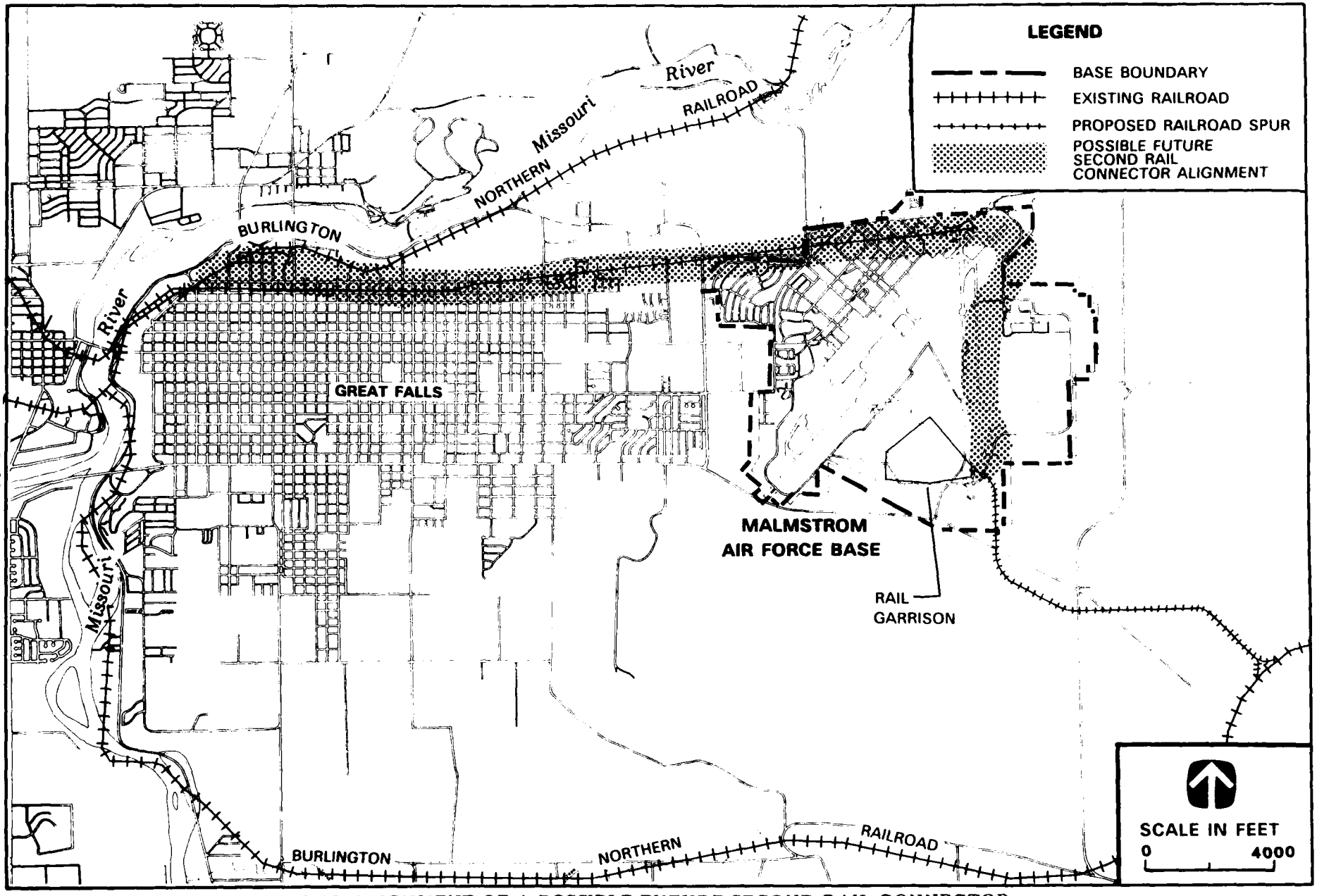


FIGURE 4.9.14-1 CONCEPTUAL ALIGNMENT OF A POSSIBLE FUTURE SECOND RAIL CONNECTOR FOR MALMSTROM AFB, MONTANA

Construction costs for this second rail connector would be approximately $6.7 million (1986 dollars) and would require approximately 45 direct construction workers and 65 secondary workers over a 1-year period. Most of these workers would be from the local area, including Cascade and Lewis and Clark counties, Montana. Since inmigration of labor would be minimal, there would be no major concerns for the socioeconomics, utilities, and transportation resources.

The second rail connector would be accommodated entirely on Malmstrom AFB and would connect to the BN line along the northern base boundary. A right-of-way (ROW) would be required.

The potential for disturbance of historic sites would not be a major concern at Malmstrom AFB. Approximately 1.5 miles of the 2.2 miles of new railroad construction crosses previously disturbed land onbase. The remaining 0.7 mile has low potential for having prehistoric or historic sites. The BN (Chicago, Milwaukee, St. Paul, and Pacific Rail) bed proposed for upgrade is an historic site, 24Ca264, and is potentially eligible for the NRHP. It was constructed between 1906 and 1909, and represents a unique railroad for Montana because it was not a land grant railroad. Depending upon the extent of modification to the existing rail bed, upgrade may not be viewed as an adverse effect by the Montana State Historic Preservation Office because it would keep the railroad in operation.

The rail ROW would traverse grassland habitats and areas which have been previously disturbed by base activities or agricultural use. These areas provide limited habitat for a few wildlife species which would experience some temporary disturbance during construction activities.

Approximately two miles of new track would require new bridges over two dry coulees. This could result in a minor, short-term increase in local sediment transport to the Missouri River, located just two miles to the north.

Areas susceptible to terrain failure will need to be investigated. The route will also encounter soils with a high to moderate shrink-swell potential.

The existing air quality in the Great Falls Intrastate Air Quality Control Region is good. The closest nonattainment area to Malmstrom AFB is in Great Falls. A corridor along 10th Avenue South was declared a nonattainment area for the carbon monoxide 8-hour standard. Monitored particulate matter (PM_{10}) data for Great Falls are below the standards, thereby classifying the city into a Group III PM_{10} category, which is or is presumed to be in compliance with the standards. Malmstrom AFB itself is in attainment status for all criteria pollutants. Construction of the second rail connector would cause local increases in fugitive dust and gaseous pollutant emissions. These emissions should not cause any violations in the National Ambient Air Quality Standards.

Existing noise levels along the second rail connector corridor varies from 60 dBA to 75 dBA (L_{dn}). These levels are the result of base aircraft operations and community noise in Great Falls. Temporary increases in noise levels would result from rail construction and rehabilitation in the vicinity of sensitive noise receptors in Great Falls residential and recreational areas.

4.10 MINOT AIR FORCE BASE, NORTH DAKOTA

Minot Air Force Base (AFB), with an area of approximately 5,050 acres, is located in Ward County in north-central North Dakota. The host organizations at this Strategic Air Command base are the 91st Strategic Missile Wing, supporting 150 Minuteman III missiles, and the 5th Bombardment Wing, with B-52H bomber and KC-135A tanker aircraft. The Minuteman III missile launch facilities are dispersed over 8,000 square miles in north-central North Dakota.

Minot AFB employed a total of 5,979 military personnel (906 officers and 5,073 enlisted), 737 appropriated fund civilian personnel, and 470 other civilian personnel at the end of fiscal year 1987. The deactivation of the Tactical Air Command 5th Fighter Interceptor Squadron in early 1988 reduced the number of personnel at the base by 604 military and 26 civilian. The activation of a 5th Bombardment Wing air-launched cruise missile mission in FY 1988 will increase the number of base personnel by approximately 142 military and 16 civilian. Approximately 68 percent of the military personnel live on Minot AFB and 32 percent live in communities near the base.

The City of Minot, located approximately 13 miles south of the base, is the host community for Minot AFB. Approximately 94 percent of the personnel living offbase reside in Minot. Minot, located along the Souris River Valley in the center of a rich agricultural region, had an estimated population of 33,676 in 1985. Ward County had an estimated population of 61,400 in 1985; the City of Minot and Minot AFB represent approximately 73 percent of the county's population. Major sectors in the region's economy in addition to agriculture, include manufacturing, retail trade, transportation, and government.

The following sections provide a description of activities associated with the deployment of the Peacekeeper Rail Garrison program at Minot AFB for the Proposed Action (4 Train Alert Shelters [TAS]) and the Alternative Action (6 TASs).

Proposed Action. For the Proposed Action at Minot AFB, the Air Force would construct garrison facilities and provide personnel necessary for the deployment and operation of up to four Peacekeeper missile trains. Approximately $74.2 million (in 1986 dollars) of construction would occur at the base for the Proposed Action. Construction activities for the purpose of analysis are assumed to begin in 1990 and be completed in 1992, with full operations beginning in 1993. Direct employment requirements would be 101 in 1990, peak at 440 in 1992, and stabilize at 345 during the full operations phase. Peak construction employment of 208 would occur in 1991. Annual direct employment requirements for the Proposed Action are presented in Table 4.10-1 for site activation, construction, assembly and checkout, and operations activities.

The garrison would be located in the northwestern portion of the base (Figure 4.10-1). Seven buildings (including the 4 TASs), roads, utilities, parking, and approximately 1.3 miles of track would be constructed within the garrison. To accommodate the garrison, acquisition of 317 acres adjacent to the base would be required. Acquisition of restrictive easements on 666 acres adjacent to the northwestern boundary of the base would also be required to accommodate the explosive safety zone (Table 4.10-2). Construction of the garrison would disturb approximately 51 acres permanently and 53 acres temporarily (Table 4.10-3).

The rail spur connecting the garrison to the Burlington Northern main line southeast of the base would use 16.5 miles of existing track (2.7 mi onbase and 13.8 mi offbase) and require the construction of 1.1 miles of new track onbase from the garrison to the existing spur (Figure 4.10-1). The existing track would require upgrading. Approximately 6 acres would be disturbed permanently and 75 acres temporarily outside the garrison for the connector spur (Table 4.10-3).

Table 4.10-1

Annual Direct Employment (Military and Civilian) for the Peacekeeper Rail Garrison Program in the Minot AFB Area by Calendar Year (Full-Time Equivalent Jobs)

	1989	1990	1991	1992	1993[1]
Proposed Action					
Site Activation	1	15	24	11	0
Construction	0	85	208	83	0
Assembly & Checkout	0	1	18	1	0
Operations	0	0	101	345	345
TOTAL:	1	101	351	440	345
Alternative Action					
Site Activation	1	15	24	11	0
Construction	0	103	222	83	0
Assembly & Checkout	0	2	27	2	0
Operations	0	0	111	380	380
TOTAL:	1	120	384	476	380

Note: [1]Employment would continue at these levels for the life of the program.

Table 4.10-2

Offbase Land Acquisition and Easement Requirements Peacekeeper Rail Garrison Program Minot AFB, North Dakota (acres)

	Proposed Action	Alternative Action
Land Acquisition		
Garrison Area	317	329
Rail Spur	0	0
Housing Area	0	0
Relocated Facilities	0	0
TOTAL:	317	329
Restrictive Easements	666	718

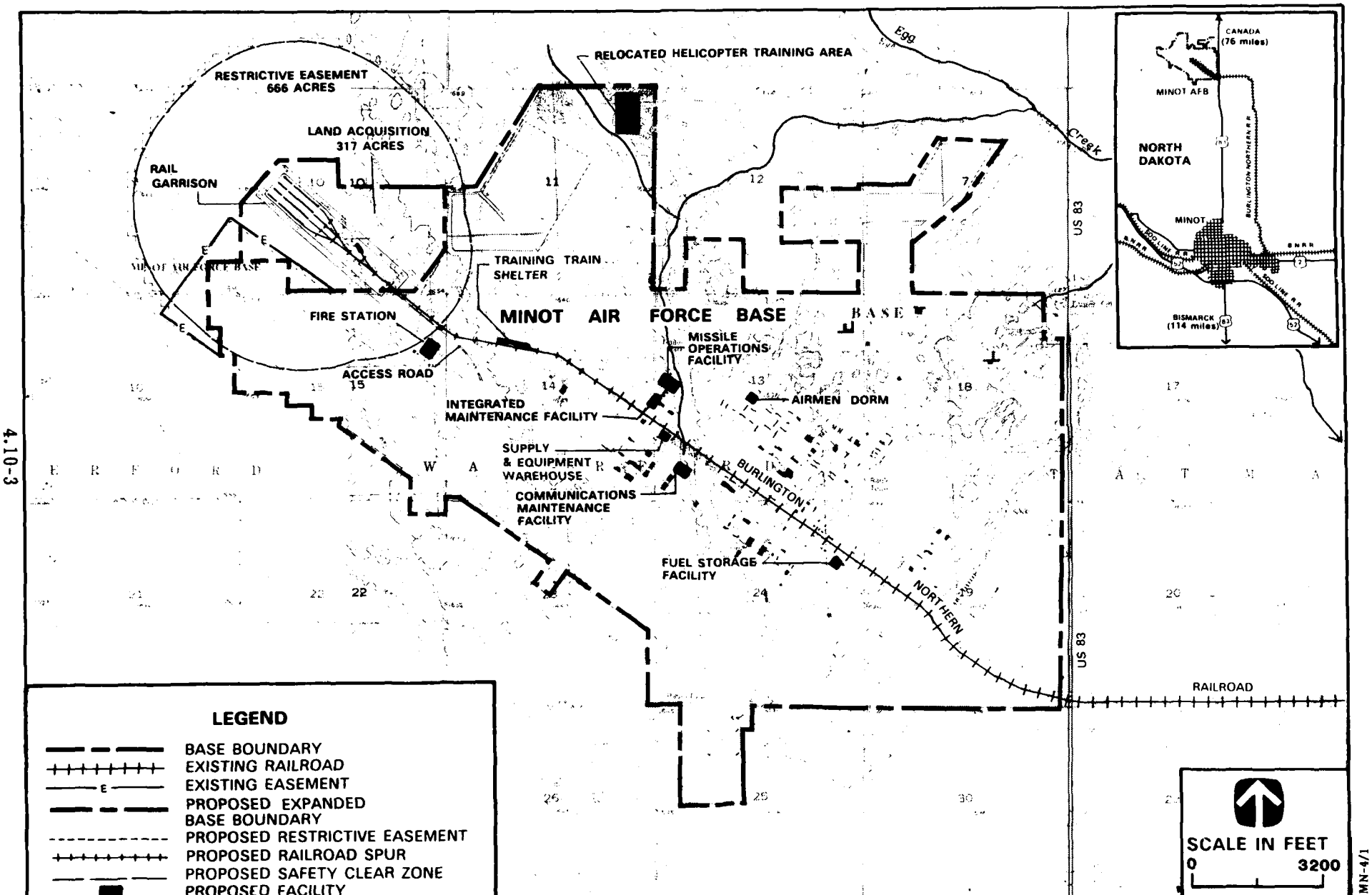


FIGURE 4.10-1 PROPOSED PEACEKEEPER RAIL GARRISON FACILITIES AT MINOT AFB, NORTH DAKOTA

Table 4.10-3

Summary of Area Disturbed by the Peacekeeper Rail Garrison Program
Minot AFB, North Dakota
(Proposed and Alternative Actions)

Facility Group	Area Disturbed (acres)		
	Permanent	Temporary	Total
Proposed Action			
Garrison Facilities	51.4	52.6	104.0
Rail Spur	6.0	74.7	80.7
Support Facilities	43.1	70.7	113.8
Relocated Facility	0.0	0.0	0.0
TOTAL:	100.5	198.0	298.5
Alternative Action			
Garrison Facilities	56.9	75.1	132.0
Rail Spur	6.0	74.7	80.7
Support Facilities	43.1	70.9	114.0
Relocated Facility	0.0	0.0	0.0
TOTAL:	106.0	220.7	326.7

The Proposed Action would require the construction of support facilities with a total floor space of approximately 95,100 square feet. To provide access to the Training Train Shelter, a 0.1-mile rail spur would be constructed from the connector spur. In addition, approximately 1.5 miles of new base boundary fencing would be required. Construction of the support facilities, fencing utilities, roads, and parking would permanently disturb approximately 43 acres and temporarily disturb 71 acres (Table 4.10-3).

The Proposed Action would also require the relocation of a helicopter training area to a new location (Figure 4.10-1). Relocation of this facility would not result in any additional ground disturbance (i.e., area has been previously disturbed).

Alternative Action. For the Alternative Action, the Air Force would construct garrison facilities and provide personnel for the deployment and operation of up to six Peacekeeper missile trains. Approximately $88.2 million (in 1986 dollars) of construction would occur at Minot AFB for the Alternative Action. Construction and operations activities are assumed to occur in the same time frame as the Proposed Action. Annual direct employment requirements for the Alternative Action are presented in Table 4.10-1.

The garrison would contain six TASs (instead of 4) and would be constructed in approximately the same location as the Proposed Action (Figure 4.10-2). Nine buildings (including the 6 TASs), roads, utilities, parking, and approximately 1.8 miles of track would be constructed within the garrison. To accommodate the garrison, acquisition of an additional 12 acres (329 acres total) adjacent to the base would be required for the Alternative Action. Acquisition of restrictive easements on an additional 52 acres (total of 718 acres) would be required to accommodate the explosive safety zone (Table 4.10-3). Construction of the six-TAS garrison would disturb approximately 6 additional acres permanently (56.9 acres total) and 23 acres temporarily (75.1 acres total) (Table 4.10-2).

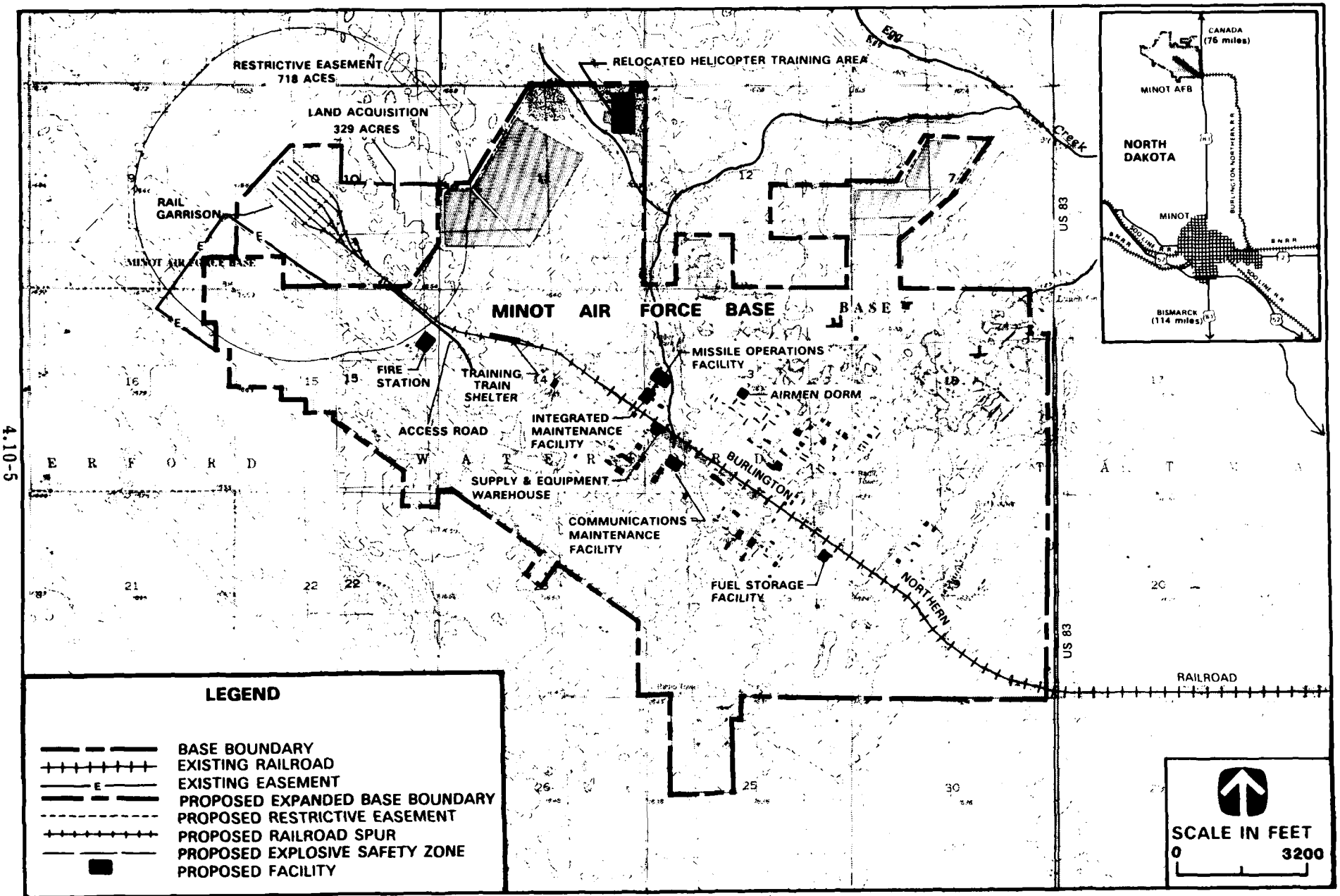


FIGURE 4.10-2 PROPOSED PEACEKEEPER RAIL GARRISON FACILITIES AT MINOT AFB, NORTH DAKOTA (ALTERNATIVE ACTION)

For the Alternative Action, technical and personnel support facility requirements, the rail spur connecting the garrison to the Burlington Northern main line, and the relocation of the existing facility would be similar to the Proposed Action.

Summary of Program Impacts. The Proposed Action at Minot AFB would not result in significant impacts on any resource.

Both short- and long-duration beneficial socioeconomic effects would be generated by the Proposed and Alternative Action, including increases in employment and income, and greater utilization of temporary and permanent housing.

4.10.1 SOCIOECONOMICS

4.10.1.1 Region of Influence

The Minot AFB Region of Influence (ROI) for the employment and income element includes Bottineau, McHenry, McLean, Renville, and Ward counties, North Dakota. The ROI for housing is the City of Minot and for the remaining elements includes Ward County and the City of Minot.

4.10.1.2 Existing and Future Baseline Conditions

Employment and Income. Total employment in the ROI increased 2.4 percent, from 45,942 in 1980 to 47,067 in 1984. The services sector, with a 17-percent increase in employment, was the top gainer and was followed by the finance, insurance, and real estate sector with a 10-percent gain and the government sector with a 5-percent gain. The construction, transportation and utilities, and farm sectors each had employment losses of over 11 percent during the 1980 to 1984 period. Construction employment in the ROI declined from 2,565 jobs in 1980 to 2,219 jobs in 1984. The unemployment rate in the ROI was 6.6 percent in 1984.

Total employment in Ward County was 32,507 in 1984, a 4.3-percent increase over the 1980 employment level of 31,181. The government, retail trade, and service sectors were the top three industry sectors and accounted for over 78 percent of the total employment in 1984. In 1984, sectoral employment in the ROI was similar to that in Ward County with two exceptions. The farm sector accounted for 12.5 percent of the employment in the ROI and only 4.7 percent in Ward County, and the share of the government sector employment in the ROI was smaller than in the county.

Total employment in the ROI is projected to reach 47,965 in 1990 and 49,671 in 1995. The projected unemployment rate in the ROI is 7.3 percent in 1990 and 6.8 percent in 1995.

From 1980 to 1984, total earnings (in current dollars) in the ROI increased from $531 million to $753 million and in Ward County from $386 million to $523 million. Discounting for inflation, these increases in total earnings represented, respectively, 14.0-percent and 8.2-percent growth over the 1980 to 1984 period. Per capita personal income in the ROI increased from $8,622 in 1980 to $12,407 in 1984 and in Ward County from $8,991 in 1980 to $12,027 in 1984.

Per capita personal income (in 1986 dollars) in the ROI is projected to decline from $13,108 in 1984 to $11,988 in 1990 and $11,582 in 1995. Ward County's per capita personal income is expected to follow the trend in the ROI and is projected at $11,857 in 1990 and $11,539 in 1995.

Population and Demographics. Ward County's population in 1985 was estimated at 61,400, an increase of 3,008 over the 1980 population of 58,392. The county's population is projected to increase to 65,220 by 1990 and to 68,670 by 1995. The City of

Minot had an estimated population of 33,676 in 1985, an increase of 833 from the 1980 population of 32,843. The City of Minot's population is projected to increase to 34,929 by 1990 and then to 36,757 by 1995. Military personnel and their dependents accounted for 31 percent of the area's estimated 43,464 population (city residents plus onbase personnel and dependents) in 1986.

Housing. The 1980 Census estimate of permanent year-round housing units in Minot was 13,106, 580 of which (4.4%) were vacant and available. In 1987, the City of Minot had 14,101 housing units, an increase of 994 from the 1980 total. Housing in Minot consisted of 8,853 single-family, 3,737 multifamily, 314 public housing units, and 1,197 mobile homes. The average available vacancy rate for rental units in the City of Minot has ranged from eight percent to ten percent in the last several years and is currently estimated to be nine percent. Total vacancies are estimated to be 6.5 percent or just over 900 units, while available vacancies are estimated to be 4.6 percent or 648 units. Temporary housing units available include 23 hotels/motels with approximately 1,370 rooms and about 370 sites in 6 private campgrounds. During the summer months, the period of minimum vacancies, about 15 percent (260) of these rooms/sites are available.

Minot AFB has 2,470 family housing units and a mobile home park that will accommodate 164 trailers. The average waiting time for military family housing is 30 days. Minot AFB has unaccompanied enlisted personnel housing facilities for 102 officers and 2,040 enlisted personnel. These facilities are fully occupied. Minot AFB also has 40 units available for transient families, officers, and enlisted personnel.

By 1990, the number of permanent year-round housing units in the City of Minot is expected to be 14,330. Of these units, 829 (5.8%) are expected to be vacant and available. The number of permanent year-round units will have increased to 15,060 by 1995 and available vacancies will number 863 (5.7%) in that same year. No new temporary facilities are expected in Minot by 1995.

Education. Minot School District No. 1 serves the City of Minot and Minot AFB. Minot School District No. 1 operates 13 elementary schools, 3 junior high schools, and 2 high schools. Two of the elementary schools and one junior high school are located on Minot AFB, all of which have excess capacity. In the 1987-88 school year, the school district enrolled approximately 7,930 students (an increase of about 200 students from the early 1980s) and employed approximately 410 teachers. Approximately 37 percent of the school district's enrollment are dependents of federal employees. Under P.L. 81-874 guidelines the district is classified as a "Super A" district. Current overall pupil-to-teacher ratios at the elementary level are 24.2-to-1, below a weighted average state standard of 27-to-1. Enrollment is projected to increase to 8,225 by 1990 and to 8,660 by 1995, and staffing will increase to maintain existing pupil-to-teacher ratios.

Public Services. The City of Minot currently employs 270 full-time employees, a decrease of 19 from 1980. The largest departments include Public Works (96 employees), Police (70), and Fire (46). The Minot Fire Department operates three stations. Ward County employs approximately 155 people in 17 departments. The Ward County Sheriff's Department currently has 45 personnel (15 sworn officers). The city and the county employ 6.2 and 2.5 personnel per 1,000 population, respectively. To maintain these levels, city staffing would have to increase from 270 to 276 by 1990 and to 288 by 1995. If no additional personnel were hired, the number of city personnel per 1,000 population for those two years would drop to 6.1 and 5.8, respectively. In order to maintain existing service levels, county staffing would have to increase from 155 to 163 by 1990 and to 172 by 1995, or the number of county personnel per 1,000 population would drop to 2.4 and 2.3, respectively.

Public Finance. Services provided by the City of Minot are funded principally through general and special revenue funds. In 1986, expenditures from these funds were

$7.2 million, with outlays for public safety and highway and street maintenance services accounting for a majority of these expenditures. Revenues totaled $8.5 million in 1986. Intergovernmental revenue, property taxes, and sales taxes are the principal revenue sources for the city. The year-end balance of $3.2 million represented approximately 45 percent of the total expenditures from these funds in 1986. The city had $3.4 million in general obligation bonds outstanding at the end of 1986. Net bonded indebtedness totaled $3.1 million, representing less than one percent of the city's assessed valuation of $407.4 million, or $94 per capita. Reserve bonding capacity is estimated at $27.2 million. The Minot School District's budgeted revenues and expenditures are approximately $21.2 million in fiscal year (FY) 1988, representing about $2,600 per pupil. Year-end fund balances are estimated at $3.5 million, representing 16 percent of expenditures for this year.

4.10.1.3 Impacts of the Proposed Action

For the Proposed Action, a brief summary of the program-related effects on key socioeconomic indicators is presented in Table 4.10.1-1.

Employment and Income. The Proposed Action would create jobs ranging from 192 in 1990 to 648 in 1992, and stabilizing at 469 in 1993 and thereafter. During the peak construction year (1991), of the 609 new jobs created, 351 would be direct (260 civilian and 91 military) and 258 would be secondary. All direct and most secondary jobs would occur in Ward County. The number of local hires would be 419. Of the 469 new jobs created during the operations phase beginning in 1993, 345 would be direct jobs (287 military and 58 civilian) and 124 secondary jobs. The number of local hires would be 141. Total new jobs as a percent of the total baseline jobs in the ROI would range from 0.4 in 1990 to 1.3 in 1992, and 1.0 in 1993 and thereafter.

The Proposed Action would generate personal income (in 1986 dollars) ranging from $4.9 million in 1990 to $14.5 million in 1991, and stabilizing at $8.8 million in 1993 and thereafter in the ROI. Ward County's share of that personal income would vary from $4.5 million in 1990 to $13.5 million in 1991, and to $8.5 million during the operations phase. Also, program-related spending in the ROI would range from $4.3 million in 1990 to $12.8 million in 1991, and stabilize at $6.9 million in 1993 and thereafter.

Population and Demographics. All the program-related population effects would be felt in Ward County. Inmigration to Ward County would range from 98 in 1990 to 941 in 1992, then stabilize at 855 during the operations phase. As a result, Ward County's baseline population would increase ranging from 0.2 percent in 1990 to 1.4 percent in 1992, and stabilizing at 1.3 percent during operations. The number of weekly commuters would be less than 20 during the construction phase from 1990 to 1992.

Of the 855 inmigrants (representing 1.3% of the baseline population) to Ward County during the operations phase, 86 would live onbase and the remaining 769 would reside in the City of Minot.

Because of inmigration, increases in the baseline population of the Minot area (city population plus onbase residents) would be 2.1 percent in 1992 and 1.9 percent in 1993 and thereafter. However, inmigrants living offbase in the City of Minot would increase the city's baseline population by 2.4 percent in 1992 and 2.1 percent in 1993 and thereafter. Military personnel and their dependents would account for approximately 31 percent of the population in the Minot area in 1993.

Housing. All program-related civilian and some military households would be housed in offbase permanent housing units and temporary facilities in Minot. About 90 percent of the unaccompanied military personnel would be housed in newly constructed unaccompanied enlisted personnel housing facilities.

Table 4.10.1-1

Selected Socioeconomic Indicators, Peacekeeper Rail Garrison Program
Minot AFB, North Dakota, 1990-1993
Proposed Action

	1990	1991	1992	1993[1]
Region of Influence				
Employment (Jobs)				
Total Program-Related Jobs	192	609	648	469
Direct Jobs	101	351	440	345
Civilian	95	260	151	58
Military	6	91	289	287
Secondary Jobs	91	258	208	124
Local Hires	152	419	285	141
Program-Related Spending (000s 86$)	$4,319	$12,756	$10,975	$6,931
Personal Income (000s 86$)				
Direct	$2,862	$ 8,977	$ 9,079	$6,386
Secondary	2,013	5,532	4,266	2,452
Total Personal Income	$4,875	$14,509	$13,345	$8,838
City of Minot [2]				
Population				
Baseline Population	44,548	44,906	45,268	45,634
Program-Related Change	98	482	941	855
Change as % of Baseline	0.2	1.1	2.1	1.9
Housing Demand				
Temporary Units	9	25	20	11
Permanent Units	29	137	258	233
Total Units	38	162	278	244
School District Enrollment				
Elementary	7	39	81	75
Secondary	6	32	67	62
Total Enrollment	13	71	148	137

Notes: [1]Program-related effects would continue at these levels throughout the life of the program.
[2]Includes Minot AFB for population and school enrollment.

Of the 941 inmigrants to Ward County during the operations phase, 95 would reside onbase and 846 in the City of Minot. The inmigration-related increase over the baseline population of the Minot area would be 2.3 percent in 1992 and 2.1 percent in 1993 and thereafter.

The offbase program-related demand for housing is expected to begin in 1990. In that year, 30 permanent units (4.6% of available vacancies) and 10 temporary facilities (3.8% of available vacancies) would be required. The peak demand for temporary facilities would occur in 1991. This short-duration demand would be for 25 facilities (7.7% of the available vacancies) in that year. The long-duration demand would be minimal. The peak demand for permanent units would be experienced in 1992. This short-duration demand would be for 266 units (out of 843 available or 31.6%) and would

decline to the long-duration demand of 235 units (out of 849 available units or 28.4%) by the following year. The short-duration demand would decrease the available vacancy rate from 5.8 percent to 3.9 percent, and the long-duration demand would decrease the available vacancy rate from 5.8 to 4.1 percent.

The short- and long-duration demand for temporary facilities would not cause a shortage even during periods of peak baseline occupancy. Therefore, these demands are considered to be beneficial effects of the program. Likewise, the short- and long-duration demands for permanent units are considered beneficial because they would remove excess vacancies from the local market.

Education. Minot School District No. 1 enrollment is projected to increase by approximately 135 students as a result of the program during the operations phase. These students are expected to be dispersed throughout schools within the district, lessening the possibility of overcrowding at selected schools. The addition of these students to the school district is expected to increase elementary level pupil-to-teacher ratios from 24.2-to-1 to 24.6-to-1 during the operations phase. This would still be below the weighted average state standard of 27-to-1. These increases in class size are not expected to have a measurable effect on educational service levels in the area. Some faculty additions may be needed, but current facilities would be adequate.

Public Services. Program-related increases in population would lead to increases in demands for public services provided by the City of Minot of 1.9 percent over baseline levels in 1993. The increased service demands would be experienced by a majority of the departments now providing service to area residents. To maintain the current service level of 6.2 personnel per 1,000 population, city staffing levels would have to increase from a baseline level of 283 to 288 by 1993. Most of the additional staffing would be needed in the Police, Fire, and Public Works departments. If no additional personnel were hired, the number of personnel per 1,000 population would drop from 6.2 to 6.1. This reduction in the number of personnel per 1,000 population would not result in an appreciable deterioration of the community's current level of public service provision.

Program-related increases in population would lead to a 1.3-percent increase in demand for public services provided by Ward County over baseline levels in 1993. To maintain existing service levels, county staffing would have to increase from a baseline level of 168 to 170 by 1993. Even without additional staffing, however, the number of county personnel per 1,000 population would remain at 2.5. This level of population increase would not affect the county's ability to deliver public services at current levels to area residents.

Public Finance. Program-related increases in expenditures would be limited to costs for additional personnel (up to $120,000 for the city and less than $50,000 for the county during operations). These increases would represent about a 1.6-percent increase over projected baseline expenditure levels in the city and less than a 1-percent increase in the county. With reserve funding levels of $3.2 million in the city and $1.5 million in the county, as well as additional revenues from sales taxes and miscellaneous charges, fines, and fees, existing revenue sources should be able to meet these expected outlays.

Based on an average per pupil cost of $2,600, program-related school district expenditure increases would range up to $380,000 in the peak year and $360,000 during operations. These increases would represent 1.7- and 1.6-percent increases over projected baseline levels. Entitlements from P.L. 81-874 programs would be relatively minor (under $10,000 during the operations phase). Temporary revenue shortfalls (up to $120,000 in FY 1992) could occur during the buildup phase as state foundation program monies lag behind the additional enrollment. Reserve funding levels of approximately $3.5 million would be adequate to cover potential shortfalls.

Summary of Impacts. For the Proposed Action at Minot AFB, short- and long-duration socioeconomic impacts would be low because inmigration would cause population in the Minot area to increase by 2.1 percent over baseline forecasts during the peak inmigration year (1992) and by 1.9 percent during program operations (beginning in 1993). This level of program-induced population growth would result in low impacts on housing, education, public services, and public finance within the Minot AFB area for both the peak and succeeding years. Impacts would not be significant because the increased demand for housing would be met by available vacancies, existing educational facilities would absorb program-related enrollment increases, no new public services facilities would need to be constructed, and existing revenue sources of the jurisdictions would be adequate to meet program-related expenditures.

Both short- and long-duration beneficial socioeconomic effects would be generated by the Proposed Action, including an increase in employment and income in the ROI and greater utilization of temporary and permanent housing vacancies within the Minot AFB area.

4.10.1.4 Impacts of the Alternative Action

For the Alternative Action, a brief summary of the program-related effects on key socioeconomic indicators is presented in Table 4.10.1-2.

Employment and Income. Impacts of the Alternative Action on employment and income in the ROI would be greater than the Proposed Action. During the construction phase, the Alternative Action would create new jobs ranging from 224 in 1990 to 697 in 1992, which is 32 to 49 more than the Proposed Action. Of the 658 new jobs during the peak construction year (1991), 384 would be direct (285 civilian and 99 military) and 274 secondary. The number of local hires would be 449, which is 30 more than the Proposed Action. During the operations phase, total new jobs created by the Alternative Action would number 517, which is 48 more than the Proposed Action. Of these 517 new jobs, 380 would be direct (64 civilian and 316 military) and 137 would be secondary. Local hires would number 155 which is 14 more than with the Proposed Action.

During the construction phase, the Alternative Action would generate personal income (in 1986 dollars) ranging from $5.7 million in 1990 to $15.7 million in 1991 in the ROI, which is $0.8 million to $1.2 million more than the Proposed Action. Ward County's share of that personal income would range from $5.3 million in 1990 to $14.6 million in 1991. During operations, the Alternative Action would generate $9.7 million personal income for the ROI and $9.3 million of that personal income would go to Ward County. In the ROI, the program-related spending would range from $5.0 million in 1990 to $13.6 million in 1991, and then stabilize at $7.6 million during the operations phase.

Population and Demographics. The population increase associated with the Alternative Action in the ROI would range from 112 in 1990 to 1,029 in 1992, which is 14 to 88 more than the Proposed Action. During the operations phase, total inmigrants to the ROI would number 941, which is 86 more than the Proposed Action. Both during the construction and operations phase, full effects of inmigration would be experienced by Ward County. However, the change in the baseline population of the county would be only 1.5 percent at its peak in 1992. The proportional share of military personnel and their dependents in the Minot area population would not change from the Proposed Action.

Housing. The Alternative Action would not change the expected program-related occupancy patterns within the Minot area. An additional 11 unaccompanied military personnel would live in existing onbase unaccompanied enlisted personnel housing facilities. All additional accompanied personnel would live offbase in the City of Minot.

Table 4.10.1-2

Selected Socioeconomic Indicators, Peacekeeper Rail Garrison Program
Minot AFB, North Dakota, 1990-1993
Alternative Action

	1990	1991	1992	1993[1]
Region of Influence				
Employment (Jobs)				
Total Program-Related Jobs	224	658	697	517
Direct Jobs	120	384	476	380
Civilian	114	285	158	64
Military	6	99	318	316
Secondary Jobs	104	274	221	137
Local Hires	178	449	300	155
Program-Related Spending (000s 86$)	$4,975	$13,623	$11,687	$7,632
Personal Income (000s 86$)				
Direct	$3,406	$ 9,825	$ 9,757	$7,034
Secondary	2,295	5,867	4,515	2,699
Total Personal Income	$5,701	$15,692	$14,272	$9,733
City of Minot[2]				
Population				
Baseline Population	44,598	44,906	45,268	45,634
Program-Related Change	112	531	1,029	941
Change as % of Baseline	0.3	1.2	2.3	2.1
Housing Demand				
Temporary Units	11	27	21	12
Permanent Units	33	152	280	256
Total Units	44	179	301	268
School District Enrollment				
Elementary	8	43	89	83
Secondary	7	35	73	68
Total Enrollment	15	78	162	151

Notes: [1]Program-related effects would continue at these levels throughout the life of the program.
[2]Includes Minot AFB for population and school enrollment.

The initial demand for housing in the City of Minot would increase by five permanent units in 1990, reducing available vacancies by a total of 5.3 percent in that year. The additional workers would require few additional temporary facilities in 1991 and during operations. The short-duration demand for permanent units would occur in 1992. Five more units (reducing available vacancies by a total of 32.1%) would be required in this year. The long-duration operations demand would be 15 units greater than for the Proposed Action, reducing available vacancies by a total of 28.9 percent. This long-duration demand for 256 units would decrease the available vacancy rate from 5.8 to 4.1 percent during operations.

The additional demand for temporary and permanent units can easily be met from the projected vacancies in Minot. Therefore, effects on both the temporary and permanent housing markets in Minot are considered to be beneficial.

Education. The Alternative Action would increase enrollment by 15 students above those levels identified for the Proposed Action. Schools within the district should be able to accommodate this influx. Overall districtwide pupil-to-teacher ratios would remain essentially the same as those identified for the Proposed Action.

Public Services. The slightly higher population inmigration with this alternative would not result in a measurable increase in city or county personnel levels over what is projected for the Proposed Action. The number of personnel per 1,000 population for both the city and the county would not differ from those identified for the Proposed Action.

Public Finance. Because public service staffing levels would remain essentially unchanged with this alternative, expenditure increases of potentially affected jurisdictions would remain at levels estimated for the Proposed Action.

Summary of Impacts. For the Alternative Action at Minot AFB, short- and long-duration socioeconomic impacts would be low because inmigration would cause population in the Minot area to increase by 2.3 percent over baseline forecasts during the peak inmigration year (1992) and 2.1 percent during program operations (beginning in 1993). This level of program-induced population growth would result in low impacts on housing, education, public services, and public finance within the Minot area for both the peak and succeeding years. Impacts would not be significant because the increased demand for housing would be met by available vacancies, existing educational facilities would absorb program-related enrollment increases, no new public service facilities would need to be constructed, and existing revenue sources of the jurisdictions would be adequate to meet program-related expenditures

Both short- and long-duration beneficial socioeconomic effects would be associated with the Alternative Action, including an increase in employment and income in the ROI and greater utilization of temporary and permanent housing vacancies within the Minot AFB area.

4.10.2 UTILITIES

4.10.2.1 Region of Influence

The utilities ROI for Minot AFB includes the host community of Minot and the base.

4.10.2.2 Existing and Future Baseline Conditions

Potable Water Treatment and Distribution. The City of Minot supplies potable water for its residents and those of Minot AFB. The water is derived from a series of wells in two aquifers and the Souris River. The treatment plant has a capacity of 18 million gallons per day (MGD), but the distribution system can deliver only 14 MGD. The average daily demand for 1987 was 6.4 MGD, or 36 percent of the treatment system's capacity. The existing distribution system is being improved to increase its capacity. The city has 14.75 million gallons (MG) of potable water storage which is sufficient to handle the larger summer demands. Average daily demands in 1990 and 1994 are projected to be 6.3 and 6.5 MGD, respectively.

Minot AFB has a potable water contract with the city for 2.59 MGD. The average daily demand for 1987 was 1.67 MGD, or 63 percent of the volume allowed the base by its contract. Water shortages are occasionally experienced during peak summer periods and the need for additional storage has been identified. The future demands for the base without the program are expected to remain constant or decrease slightly.

Wastewater. Wastewater treatment for the City of Minot and Minot AFB is handled through sewage lagoons. The 1987 average daily flow was 4.27 MGD or 93 percent of the

lagoon's capacity, and a study is being prepared to plan for its expansion. Wastewater flows for the city are expected to increase to 4.54 MGD by 1990 and 4.73 MGD by 1994. The city's lagoons discharge into the Souris River. The base's 1987 average daily flow was estimated to be 1.17 MGD. The lagoon system is operating near capacity and expanded capacity is being considered to process baseline flows. Wastewater from the base is discharged into Egg Creek and flows without the program are expected to remain constant or decrease slightly.

Solid and Hazardous Waste. Solid waste collection for the City of Minot is provided by the city and five private firms. The city generates an estimated 120 tons per day (T/day) and it is expected this amount will increase to 122 T/day in 1990 and to 127 T/day by 1994. The city and local area use a landfill owned and operated by the city with an expected lifespan of 28 years. Solid waste from Minot AFB is collected by a private contractor and disposed of at a private landfill with an expected lifespan of 26 years. The base generates seven T/day of solid waste and this amount is expected to remain constant or decrease slightly.

Onbase hazardous wastes are managed by Minot AFB; the Defense Reutilization and Marketing Office is responsible for providing for the proper handling of wastes and arranging for transport to treatment and disposal facilities. The base stores the wastes in a conforming storage facility. The wastes include sodium chromate, batteries and battery acid, oils, paints, thinners, solvents, and other regulated materials.

Energy Utilities. Northern States Power (NSP) Company provides electricity to a four-state region including the Minot area. Peak demand for the entire system in 1986 was 6,012 megawatts (MW), while system capacity was 6,889 MW. Peak demand for the NSP Company Minot division was 49 MW in 1987, and the company has adequate capacity to meet peak demands of 51 MW in 1990 and 54 MW in 1994. Minot AFB receives its electricity from Verendrye Electric Cooperative through two substations with a total capacity of 25 megavolt-amperes. In FY 1987, the base consumed 72,381,800 kilowatt-hours. The south substation, serving base activities, operates at 54 percent, while the north substation, serving the housing area, operates at 40 percent.

Montana-Dakota Utility Company supplies natural gas to the City of Minot, the base, and other areas in a four-state region. In 1987, total gas sales for the company were 28,133 million cubic feet (MMcf) with average annual residential use at 92 thousand cubic feet. Various factors including increased competition due to lower oil prices and unusually warm weather have reduced consumption to the lowest level in five years. Projected natural gas use is not anticipated to exceed system capacity in the foreseeable future.

In FY 1987, Minot AFB consumed 819 MMcf of natural gas to heat residential areas and for use in the central heat plant. The central heat plant, with a capacity of 167 million British thermal units per hour, is supplied interruptible gas by Montana-Dakota Utility Company via a 6-inch high pressure line. A study was recently completed that determined the capacity of the plant, the existing load, and the need for additional capacity.

Diesel fuel storage capacity at Minot AFB is 25,000 gallons. In 1987, diesel consumption was 240,000 gallons.

4.10.2.3 Impacts of the Proposed Action

Potable Water Treatment and Distribution. In 1992, average daily requirements for the City of Minot would increase from a baseline of 6.36 MGD to a peak of 6.51 MGD. Program-related demands onbase and in the city would be 0.15 MGD, or a 2.4-percent increase. The city's treatment facilities, with a 15-MGD capacity, would be operating at 44 percent and storage would be adequate to meet summer demands. Daily

requirements at Minot AFB would increase from a baseline level of 1.37 MGD to 1.48 MGD, or 8.3 percent in the same year. Average demands of 1.48 MGD would be met through the 2.59-MGD water contract with the city. The existing contract with the city is adequate.

Wastewater. Average daily flows for the City of Minot would increase from a baseline level of 4.63 MGD to a peak of 4.67 MGD in 1992 because of a 0.04-MGD or 0.8-percent program-related increase. The existing lagoon system, with 4.6-MGD capacity, would be operating at 102 percent. The city is aware that future treatment capacity of their lagoon system is limited, and is studying alternatives to alleviate the problem. wastewater flows at Minot AFB would increase from a baseline level of 0.98 MGD to 1.06 MGD or 8.2 percent in 1992. The existing lagoon system onbase is operating near capacity and may not be adequate to handle the increased flow. The base is aware of the limits of the lagoon's treatment capacity and is considering expansions to the system.

Solid and Hazardous Waste. Solid waste generation would increase by one T/day or less than one percent for the City of Minot in 1992. Solid waste generation at the base would increase by 2.3 T/day or 6.8 percent in the same year. With the city and private haulers already adequately collecting and disposing of 120 T/day, the program-related increase should require no additional equipment or personnel. The city's landfill has a projected lifespan of 28 years, and the private landfill where the base solid waste is disposed has a lifespan of 26 years; both should be able to handle the increased flow without affecting their lifespan. Program-related hazardous waste generation at the base would be incorporated into the existing management system, stored onbase, and then transported to treatment and disposal facilities.

Energy Utilities. Program-related electricity demands for the City of Minot would peak in 1992 with an increase of 0.17 MW. This demand would increase the projected peak demand of 52 MW for the NSP Company system by 0.3 percent. The NSP Company system has adequate power supplies to meet this increase. Electrical requirements at Minot AFB would equal 2.67 MW or a 20-percent increase to 15.86 MW in 1993. The collective capacity of the base substations is 25 megavolt-amperes which should be adequate to handle the increased demand. Verendrye Electric Cooperative supplies electricity to the base and has adequate supplies to meet the increases. Natural gas consumption in the program area would increase by 37 MMcf. Montana-Dakota Utility Company has an adequate infrastructure and reserves to meet the new demand. Natural gas use at the base would increase from a projected demand of 819 MMcf to 844 MMcf, or by 3.1 percent. As a result of the program, diesel fuel consumption at Minot AFB would increase. Supplies would continue to be filled by the Defense Fuels Supply Center through contracts with local and regional suppliers.

Summary of Impacts. Utility requirements associated with the Peacekeeper Rail Garrison program would increase demands on the City of Minot potable water system by less than three percent in 1992 (the peak year). During the operations phase, demands would be approximately two percent above baseline. For all other municipal systems and during the operations phase, the increases would be less than one percent. Both peak year and operations requirements of energy utilities servicing the City of Minot would be less than one percent. Because the peak year requirements would not be substantially greater than the impacts associated with the operations requirements, all utility impacts would be of long duration. The long-duration impacts associated with the increased demands for utility service in the City of Minot would be low because the increases would be less than five percent. These impacts would not be significant because potable water, wastewater, solid waste, and energy utility systems will have adequate capacity to meet the increased demand.

4.10.2.4 Impacts of the Alternative Action

Potable Water Treatment and Distribution. With the additional construction associated with six Train Alert Shelters (TASs) and the operations personnel to support the program, potable water requirements would be 0.17 MGD, which is 0.02 MGD greater than the Proposed Action. Adequate capacity is available in the City of Minot treatment and distribution system to process the additional demand.

Wastewater. Average daily flows to the City of Minot lagoon system would peak in 1991 at 4.93 MGD, which is 0.04 MGD greater than the flow identified for the Proposed Action. The City of Minot is currently studying plans to provide adequate treatment capacity to treat baseline flows. Wastewater flows at the base would be 1.07 MGD, which is 0.01 MGD greater than the Proposed Action. The base lagoon system is currently operating near capacity and expansion of the system is under consideration.

Solid and Hazardous Waste. Solid waste generation from the increased construction and operations activities would be slightly greater than the Proposed Action. Solid waste generation for both the city and the base would be 0.4 T/day greater during the construction and operations phases. These increases would not adversely affect the city or private haulers. Adequate landfill space would continue to be available. Hazardous waste generation would be slightly greater than the Proposed Action as a result of the maintenance activities associated with the additional trains. These wastes would be incorporated into the existing management system and transported to treatment and disposal facilities.

Energy Utilities. Demands for electricity in the City of Minot would be 0.02 MW greater for the Alternative Action than the Proposed Action. The NSP Company's current generation and transmission system has adequate capacity to meet the increased demands. Onbase demands for electricity would be 0.6 MW greater than the Proposed Action, and the Verendrye Electric Cooperative has adequate supplies to meet this demand. Demands for natural gas would be three MMcf greater for the Alternative Action than the Proposed Action. The Montana-Dakota Utility Company has an adequate infrastructure and reserves to meet these increased demands. Diesel fuel consumption would be greater than the Proposed Action. Supplies would continue to be filled by the Defense Fuels Supply Center through contracts with local and regional suppliers.

Summary of Impacts. Utility requirements associated with the Alternative Action would be slightly greater than those identified for the Proposed Action. Because the peak year requirements would not be substantially greater than the impacts associated with the operations requirements, all utility impacts would be of long duration. The long-duration impacts would remain low because the increases would be less than five percent. These impacts would not be significant because all utility systems have adequate capacity to meet the increased demands.

4.10.3 TRANSPORTATION

4.10.3.1 Region of Influence

The ROI for transportation includes the principal city streets in Minot, North Dakota and the primary highways leading to Minot AFB.

4.10.3.2 Existing and Future Baseline Conditions

The principal city streets in Minot consist mainly of segments of the primary highways that pass through the city. Broadway Street, part of U.S. 83, had segments with an average annual daily traffic (AADT) of 26,300 to 31,000 within the central business district (CBD) in 1987. Outside of the CBD, U.S. 83, which proceeds north to Minot AFB, had an AADT decreasing from 22,400 in the vicinity of Minot International Airport

to 9,100 near the base in 1987. The section of U.S. 2/52 that passes through the city had an AADT of 11,900 to 19,900 within the CBD in 1987. U.S. 2/52, which skirts through the southern part of the city, had an AADT ranging from 4,000 to 13,200 in 1987.

Current level of service (LOS) ratings at these principal city streets vary from free-flowing to unstable flow conditions. Sections of Broadway Street within the CBD had an LOS of D and E during the peak hours in 1987. (Refer to Section 3.4.4 and Table 3.4.4-1 for descriptions of LOS letter scores.) Outside of the CBD, Broadway Street (U.S. 83) had an LOS of C near Minot International Airport and an LOS of A near the base. Sections of U.S. 2/52 had an LOS varying from B to C during the peak hours. Based on population projections for the city, traffic volumes on these principal streets are only expected to increase slightly and the resulting LOS ratings would remain the same through 1994.

Primary access to the base is provided by U.S. 83, which proceeds north from the city to Minot AFB and Canada, and southward across the United States. The base has two gates: the main gate through Missile Avenue and the south gate through Bomber Boulevard. Both roads connect to U.S. 83. The main gate had an AADT of 6,900 in 1985 and was estimated to provide service at LOS A during the peak hours.

4.10.3.3 Impacts of the Proposed Action

During the construction phase, an increase in incoming vehicular traffic would occur as a result of the movement of construction workers, materials, and equipment. Construction activities would require an estimated 440 program-related personnel during the peak employment year (1992). Of these, 281 program-related employees would reside in the City of Minot and commute daily to the base. They would generate an additional 255 passenger vehicle trips to the base during the peak hours in 1992. This increase in traffic would add to delays and queues at the main gate to Minot AFB. Additional heavy-vehicle trips to the base would also increase traffic volumes at the gate. However, these movements could occur during off-peak hours and would not cause additional delays at the main gate during rush hours. In addition, construction vehicles and equipment could use the south gate through Bomber Boulevard. Program-related commuters would not reduce the LOS ratings along the principal city streets in Minot during the peak hours. However, traffic would increase at the main gate and along U.S. 83, which leads to the base, reducing its LOS rating from A to B.

During the operations phase, an estimated 244 out of 345 program-related employees would reside in the City of Minot. They are expected to add 222 passenger vehicle trips to the base and they would slightly increase congestion and delays along U.S. 83, and would reduce its LOS from A to B. Increased queues and waiting times would also occur at the main gate. In addition, occasional program-related deliveries of supplies and equipment could also increase traffic volumes at the gates. However, deliveries are expected to occur during off-peak hours and could use other access routes to the base.

Interruptions to vehicular flow along public roads where the rail spur crosses would also occur. The trains would only move out of the garrison when either major maintenance or repair necessitates that they be transported to the Main Operating Base or depot facilities, or when directed to disperse during times of national need. In addition, a training train would travel periodically to the garrison installation to accomplish operations, security, and maintenance training. These train interruptions at railroad/road crossings would not substantially delay vehicular traffic.

Both short- and long-duration impacts on transportation would be low because the LOS rating would drop from A to B along U.S. 83 near the main gate. A slight increase in queues and waiting times could occur at the main gate but this would not continue indefinitely. Program-related commuters from the City of Minot would not change the LOS ratings along the principal city streets. Impacts would not be significant.

4.10.3.4 Impacts of the Alternative Action

Compared to the Proposed Action (4 TASs), the Alternative Action (6 TASs) would require slightly more program-related personnel. During the construction phase, an estimated 476 program-related personnel would be needed in 1992 (the peak employment year). Of these employees, 305 are expected to reside in the City of Minot. They are estimated to add 277 passenger vehicle trips to the base during the peak hours in 1992. There would be increased delays and queues at the entrance gate as with the Proposed Action. The LOS rating along U.S. 83 near the main gate would be reduced from A to B. Program-related personnel commuting from the City of Minot would not reduce the LOS rating along the principal city streets.

During the operations phase, an estimated 268 out of 380 program-related personnel may reside in the City of Minot. They are expected to add 243 passenger vehicle trips (7 more than for the Proposed Action) to the base during the peak hours, and would cause additional delays and congestion along U.S. 83 and at the main gate. Peacekeeper and training train impacts on vehicular traffic at road crossings would be about the same as the Proposed Action. The increase in vehicular traffic at the main gate and along U.S. 83 would reduce the LOS from A to B.

Commuting associated with the Alternative Action would be slightly greater than that associated with the Proposed Action. However, both short- and long-duration impacts on transportation would remain about the same as the Proposed Action. Both short- and long-duration impacts would be low and not significant.

4.10.4 LAND USE

4.10.4.1 Region of Influence

The land use ROI includes the western portion of Minot AFB and adjacent private lands located both northwest and south of the affected areas of the base. A connector rail spur right-of-way already exists and extends south from the base to the main line of the Burlington Northern Railroad.

4.10.4.2 Existing and Future Baseline Conditions

Minot AFB is located in Ward County, which does not have a comprehensive plan. Ward County has, however, adopted Zoning Resolution No. 1, which restricts private development around Minot AFB. The intent of the resolution is to protect the base from urban encroachment and restrict the surrounding area to agricultural uses.

Figure 4.10.4-1 presents a generalized overview of land use on the base and surrounding areas. The primary uses are military (associated with Minot AFB) and rural (on private land). The cultivation of barley, sunflowers, and wheat on nonirrigated cropland constitutes the primary rural land use. All land in the vicinity of the base is designated prime farmland. Another land use activity is a small livestock operation located northwest of the base. One inhabited building and farm complex is located 1.3 miles north of the base. The ROI also contains one underground electrical distribution line, one aboveground electrical distribution line, and four unpaved county roads, offbase.

The visual attributes of the ROI are typical of the Great Plains Physiographic Province. The area has flat to gently rolling terrain which was originally vegetated with native short grasses. Most of this vegetation has been removed and replaced with cropland and pasture. The ROI landscape forms are flat to very gently rolling, and lines are straight to slightly curving. Colors are mostly light greens and gold, with white being dominant in winter; well-ordered, smooth textures are present. Except for onbase housing, which adjoins U.S. 83 (AADT 9,100) and water towers, other onbase structures are not noticeable from that highway because they are located at least one mile away. U.S. 83 is

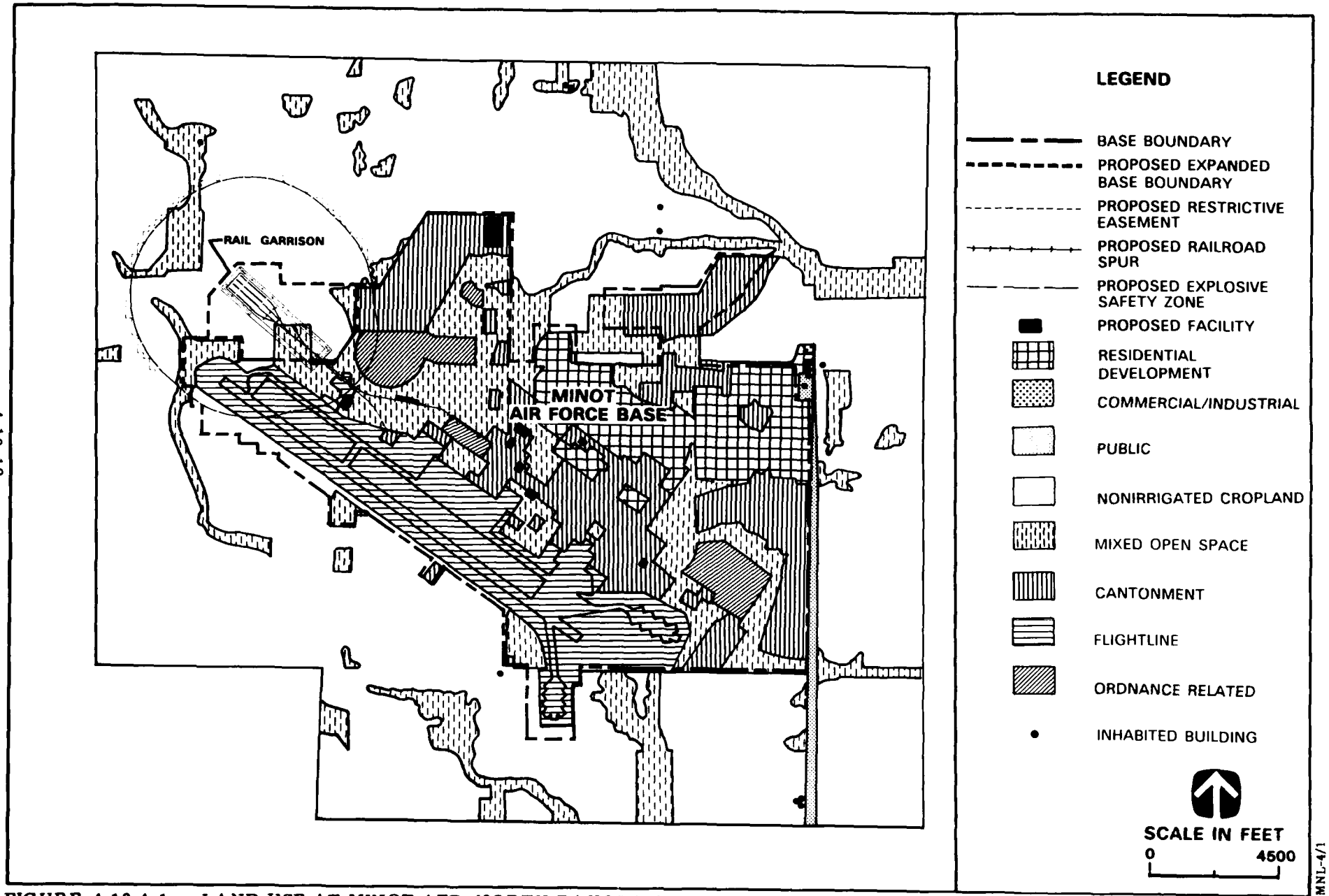


FIGURE 4.10.4-1 LAND USE AT MINOT AFB, NORTH DAKOTA AND VICINITY

the key observation point for Minot AFB. There are a few farm structures scattered along U.S. 83 in the vicinity of the base.

4.10.4.3 Impacts of the Proposed Action

The proposed site of the garrison is located adjacent to the northwestern end of Minot AFB. The proposed program would include the expansion of Minot AFB with fee simple acquisition of approximately 315 acres of nonirrigated cropland which is designated prime farmland. No unique farmland exists in the area. The proposed program would also require the acquisition of approximately 665 acres of restrictive easement northwest of the base. About 30 acres within the explosive safety zone are already in a flight clear zone easement. A small, abandoned agricultural structure is located within the easement, but there are no inhabited buildings. The existing agricultural uses within the proposed restrictive easement would not be affected. The existing connector spur is located offbase and is owned by the Burlington Northern Railroad. Construction activities associated with the rehabilitation of the existing track would require no acquisition of private land. The helicopter training area would require relocation to accommodate the Peacekeeper Rail Garrison program. Deployment of the proposed program would be compatible with the adjoining Ward County zoning.

The TASs at Minot AFB would be located about 18,600 feet west of U.S. 83, the key observation point for the base. At this distance, the TASs would not be noticeable from that highway, nor would they be noticeable from the closest farmsteads in the area.

Summary of Impacts. The approximately 315 acres of nonirrigated cropland that would be acquired in fee simple for base expansion is about 0.03 percent of such cropland in Ward County and about 0.1 percent of the prime farmland. No inhabited buildings would require relocation nor would the TASs be noticeable from the key observation point. For these reasons, both short- and long-duration impacts on land use would be negligible.

4.10.4.4 Impacts of the Alternative Action

Impacts of the Alternative Action at Minot AFB would be about the same as for the Proposed Action with two exceptions: the fee acquisition required would be about 330 acres and the offbase restrictive easement would be about 720 acres. No inhabited buildings would require relocation. Therefore, the short- and long-duration impacts of the Alternative Action would be negligible.

4.10.5 CULTURAL RESOURCES

4.10.5.1 Region of Influence

The ROI for Minot AFB includes that portion of the Drift Prairie bounded by the Souris River on the east, the Missouri Escarpment on the south and west, and the Canadian border on the north. The Drift Prairie is characterized by low relief, numerous potholes, and a poorly drained gently rolling plain; major drainages are the Souris and Des Lacs rivers. The ROI contains various topographic settings known to have influenced prehistoric and historic settlement such as drainages, prairie potholes, sloughs, and the Missouri Escarpment.

4.10.5.2 Existing and Future Baseline Conditions

Prehistoric Resources. Locally, systematic cultural resource surveys have been confined mainly to the Souris River Valley, seven miles south and west of the base. Most recorded sites are surficial stone circles, but some buried kill or processing sites have also been identified along the floodplains. Some cultural resources in North Dakota have not been fully documented and are considered site leads by the State Historic Preservation Office. According to the North Dakota state site files, 7 prehistoric sites and 62 site

leads occur in the vicinity of the base. Most of the prehistoric resources are listed as habitation/occupation sites (51), most likely lithic scatters. The seven documented sites included five tipi ring sites and two lithic scatters. Prehistoric site types anticipated in upland areas include small surficial lithic scatters and small stone circle sites representing temporary camps. Archaeological survey work has been initiated in proposed program impact and fee acquisition areas, but no cultural resources have yet been identified.

Historic Resources. State archives list only 3 historic sites and 31 historic site leads near Minot AFB. The three historic sites consist of a log house, a homestead, and a Civilian Conservation Corps camp. Most of the historic site leads (24) are early twentieth-century homesteads. Some homesteads containing early historic or original structures are still occupied; some are nothing more than trash scatters, depressions, and foundations. None of these sites have been evaluated for National Register of Historic Places (NRHP) eligibility. Military structures on Minot AFB do not qualify for the NRHP because they were constructed in the last 32 years.

Native American Resources. Several Native American groups have historical associations with the ROI. The Souris River Valley is considered the traditional territory of the Hidatsa. Other groups, such as the Mandan, Assiniboine, Chippewa, and Yanktonai Dakota, may have used the ROI for hunting and trading activities. In 1862, the Arikara, Mandan, and Hidatsa (The Three Tribes) banded together for protection against the Dakota (Sioux) and established a village near Fort Berthold, 65 miles south of Minot AFB on the Missouri River. The Three Tribes currently reside on the Fort Berthold Reservation and have expressed concern specifically regarding treatment of burials on reservation lands. No Native American resources have yet been identified in the program area.

Paleontological Resources. According to existing records based on a statewide paleontological report, no paleontological materials or localities have been recorded in the vicinity of Minot AFB. The Cannonball Formation is known to occur in Ward County, but outcrops are extremely rare. This formation contains pelecypods, gastropods, ostracods, worm casts, shark's teeth, and foraminifera, and would provide valuable scientific information on the last continental sea. Outcrops of the Cannonball Formation are not expected to be affected at Minot AFB because the area contains from 50 to 200 feet of glacial till.

4.10.5.3 Impacts of the Proposed Action

Program impact areas comprise 298.4 acres of facilities and fee acquisition lands, including 1.34 miles of proposed railroad spur. The majority of the program areas are located on the northwestern portion of the base, north of the flightline.

Prehistoric Resources. Prehistoric sites which could be identified in the program areas would most likely consist of small surficial lithic scatters or small stone circle sites. In previous cultural resource studies, only prehistoric sites with intact subsurface deposits have been recommended as eligible for the NRHP. Therefore, it is not likely that any important sites would be affected by the proposed program.

Historic Resources. Few historic resources are expected to occur in program areas and would most likely be isolated scatters. These scatters would not be considered eligible for the NRHP.

Native American Resources. Although the study area is within the traditional territory of the Hidatsa, specific Native American resources such as sacred areas have not been identified. Therefore, none would be affected by the Proposed Action.

Paleontological Resources. No paleontological localities are anticipated on the Drift Prairie near Minot AFB.

Summary of Impacts. Long-duration impacts of the Proposed Action on cultural resources would be negligible because no important or sensitive resources are likely to be disturbed. No short-duration impacts would occur.

4.10.5.4 Impacts of the Alternative Action

The Alternative Action consists of expanding the garrison an additional 28 acres beyond the program areas identified in the Proposed Action. No additional cultural resources are expected to be affected by the Alternative Action; therefore, impacts would be negligible.

4.10.6 BIOLOGICAL RESOURCES

4.10.6.1 Region of Influence

The ROI for biological resources that would be affected by the proposed program at Minot AFB is defined as the areas where these resources would be directly affected by the construction of new facilities and upgrade of 16.5 miles of rail spur (Section 4.10, Figure 4.10-1). Areas of indirect disturbance where program-induced impacts may occur are defined as those recreational areas within an approximately 1-hour driving time of Minot, North Dakota, and include J. Clark Sayer National Wildlife Refuge, Upper Souris National Wildlife Refuge, Lake Darling, Buffalo Lodge Lake, the Souris and Des Lacs rivers, Audubon Lake, and Lake Sakakawea.

4.10.6.2 Existing and Future Baseline Conditions

Biological Habitats. Minot AFB is located in an area which was native grassland (e.g., blue grama and western wheat grass) prior to development. Much of the base has been developed and very little native grassland still exists onbase. Agricultural activities also occur on parts of Minot AFB. Nonnative species such as barnyard grass, downy brome, green foxtail, and crested wheatgrass have been seeded throughout the base. Trees such as spruce, green ash, Russian olive, and juniper have been planted to provide windbreaks and landscaping. Much of the area surrounding the base has been converted to agriculture (Figure 4.10.6-1). Areas of native vegetation occur in only a few areas. Wildlife species occurring on Minot AFB and in the surrounding area include the white-tailed jackrabbit, cottontail rabbit, pocket gopher, skunk, and numerous species of birds. Several species of reptiles and amphibians also occur in the area. Numerous prairie potholes and 3.8 miles of streams and ditches occur onbase. Prairie potholes are also common in the base vicinity. The vegetation found in the prairie pothole basins is controlled primarily by water permanence. The potholes vary in size from small basins that have standing water for only a few day of the year to larger areas that are permanently flooded. Vegetation commonly found in the prairie potholes includes cattail, bulrush, water plantain, water milfoil, reed canarygrass, forbs, and sedges. Future baseline conditions onbase are expected to be similar to existing conditions based on current base management plans.

The remaining ROI includes agricultural land, riparian woodlands in bottomlands along rivers and streams, and native grasslands. There are numerous prairie potholes in the ROI which are used extensively by waterfowl and shorebirds, particularly during spring and fall migration periods along the Central Flyway. The prairie potholes are also important nesting areas for various bird species. The Souris and Des Lacs rivers support warmwater fisheries and riparian zones which are also important biological habitats for wildlife. Other unique and sensitive areas that occur in the ROI include several national wildlife refuges (Upper Souris, Shell Lake, Audubon, and J. Clark Slayer national wildlife refuges). The diverse habitats that occur in these refuges support a variety of wildlife

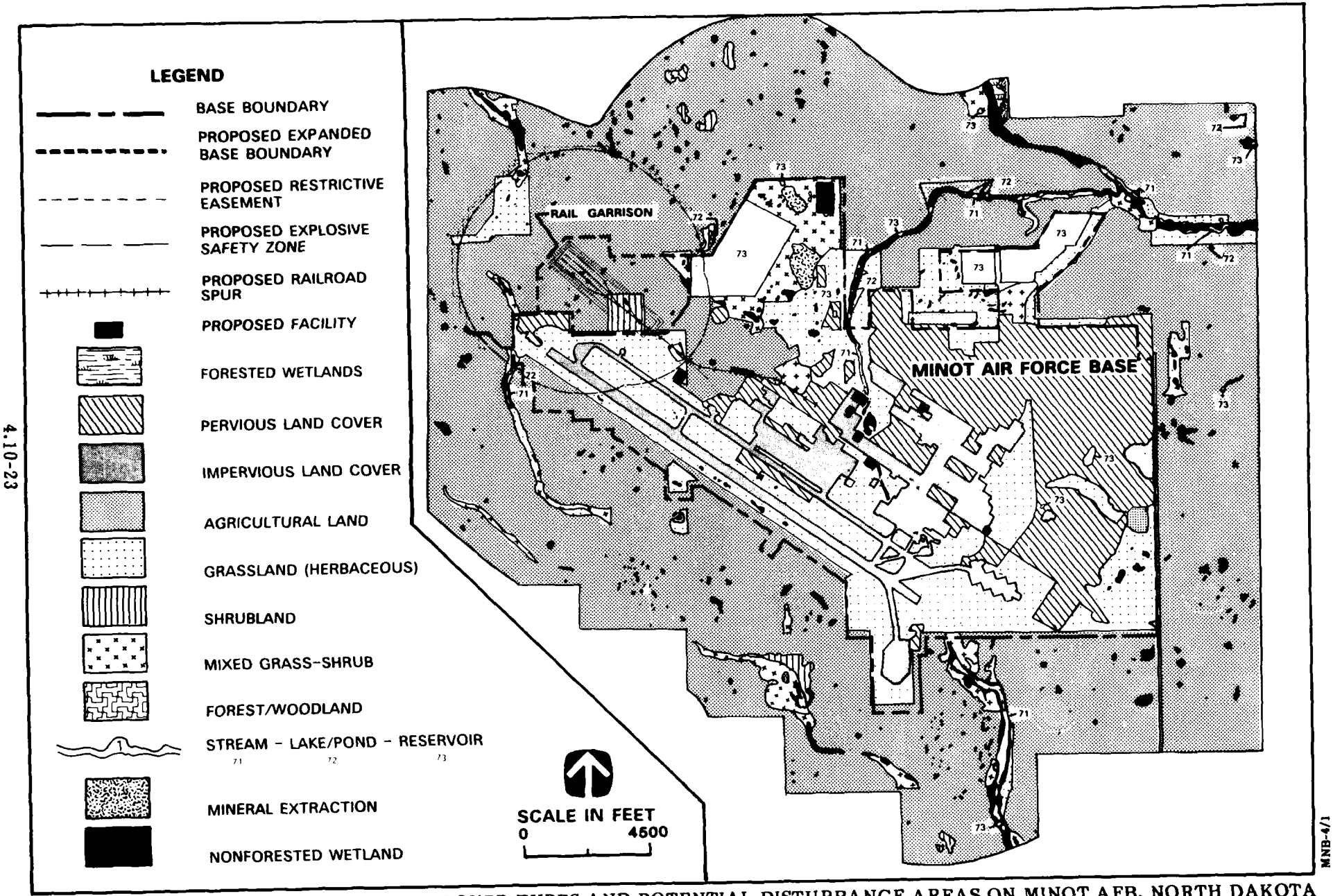


FIGURE 4.10.6-1 HABITAT AND LAND COVER TYPES AND POTENTIAL DISTURBANCE AREAS ON MINOT AFB, NORTH DAKOTA AND IN THE VICINITY

species. Primary recreational use in the ROI occurs along rivers, wetlands, lakes, and in the wildlife refuges. Future baseline conditions are expected to be similar to existing conditions based on projections for population increases and increased recreational use in the ROI.

Threatened and Endangered Species. No federally listed threatened or endangered species or candidate species are known to occur on Minot AFB. Three state-sensitive species are known or thought to occur onbase (Table 4.10.6.1). Several federally listed threatened and endangered, federal-candidate, and state-recognized species occur in the ROI (Table 4.10.6-1). Suitable habitat for these species does not occur in areas proposed for construction.

4.10.6.3 Impacts of the Proposed Action

Biological Habitats. Construction of garrison facilities and rail lines at Minot AFB would permanently disturb 100.5 acres of land and temporarily disturb 198.0 acres (Section 4.10, Table 4.10-3). Part of the area (197.0 acres) was previously disturbed during construction of facilities for onbase programs (Table 4.10.6-2). Other areas that would be disturbed include 70.7 acres of agricultural land, 22.2 acres of shrubland, and 6.3 acres of grassland. Approximately 2.2 acres of prairie potholes would also be eliminated by construction activities. These wetlands are utilized by waterfowl and shorebirds which would be displaced by construction. In compliance with Executive Order No. 11990 and according to Section 404 of the Clean Water Act, alternative sites were considered for location of program facilities. In order to collocate facilities of the proposed program with existing facilities, meet engineering and operational constraints, and keep as much of the program within existing base boundaries as possible, it was determined that there was no practical alternative to the proposed construction of some facilities in wetlands.

Furthermore, the site-specific program design and construction techniques would include all practical measures to minimize harm to wetlands.

Direct impacts that would result from the program include destruction of plants and plant cover, increased small mammal mortality, disruption of daily/seasonal behavior, and displacement. Construction activities would affect biological resources on Minot AFB; however, these impacts are not expected to substantially diminish biological diversity.

Implementation of the Peacekeeper Rail Garrison program would result in a small population increase in Ward County, which could cause a slight increase in recreational activities. Increases in recreational activities (e.g., hunting, fishing, snowmobiling, and hiking) are unlikely to result in degradation of biological resources. Recreational areas that may receive the greatest increase in use include Upper Souris National Wildlife Refuge, Lake Darling, Buffalo Lodge Lake, Lake Sakakawea, and Audubon Lake. Biological resources in these recreational areas are unlikely to be affected because the expected increases in recreational activities would be very small and would be distributed throughout the ROI.

Threatened and Endangered Species. No impacts on federally listed threatened and endangered or candidate species are expected to result from the program at Minot AFB. The three state-sensitive species which are known or thought to occur onbase may receive some minor impacts.

Summary of Impacts. Biological resources on Minot AFB would receive minor impacts as a result of the program. In addition to the loss of grassland and shrubland habitat, 2.2 acres of prairie potholes wetlands would be filled. Indirect impacts would be minor

Federally Listed, Federal-Candidate, and State-Sensitive Species Minot AFB, North Dakota and Vicinity

Common Name	Scientific Name	Federal Status	State Status	Distribution
American peregrine falcon	Falco peregrinus anatum	E	E	May occur in region as migrant
Arctic peregrine falcon	Falco peregrinus tundrius	T	E	May occur in region as migrant
Bald eagle	Haliaeetus leucocephalus	E	E	May occur in region as migrant
Black-footed ferret	Mustela nigripes	E	E	May occur in region
Burrowing owl	Athene cunicularia	-	P	May occur onbase
Cattle egret	Bubulcus ibis	-	P	Occurs in region
Chestnut sided warbler	Dendroica pensylvanica	-	P	Occurs in region
Common goldeneye	Bucephala clangula	-	P	Occurs in region
Ferruginous hawk	Buteo regalis	2	-	May occur in region
Forester's tern	Sterna forsteri	-	P	May occur in region
Golden eagle	Aquila chrysaetos	-	T	Occurs in region
Hooded merganser	Lophodytes cucullatus		P	May occur in region
Kangaroo rat	Dipodomys ordii	-	P	Occurs in region
Least tern	Sterna antillarum	E	E	May occur in region as migrant
Long-billed curlew	Numenius americanus	2	-	May occur in region
Long-eared owl	Asio otus	-	P	Occurs in region
McCown's longspur	Calcarius mc'cownii	-	T	May occur onbase
Merlin	Falco columbarius	-	T	May occur onbase as migrant
Mountain plover	Charadrius montanus	2	-	May occur in region
Northern swift fox	Vulpes velox hebes	E	E	May occur in region
Piping plover	Charadrius melodus	T	T	May occur in region
Poor-will	Phalaenoptilus nuttallii	-	P	Occurs in region
Prairie falcon	Falco mexicanus	-	T	Occurs in region
Prairie skink	Eumeces septentrionalis	-	P	Occurs in region
Pygmy shrew	Microsorex hoyi	-	P	May occur in region
Red-necked grebe	Podiceps grisegena	-	P	May occur in region
River otter	Lutra canadensis	-	P	May occur in region
Sagebrush lizard	Sceloporus graciosus	-	P	Occurs in region
Swainson's hawk	Buteo swainsoni	2	-	May occur in region
White-winged scoter	Melanitta fusca	-	E	Occurs in region
Whooping crane	Grus americana	E	-	May occur in region
Yellow rail	Corturnicops noveboracensis	-	T	Occurs in region
Yellow-rumped warbler	Dendroica coronata	-	P	Occurs in region

Notes: E = Endangered
T = Threatened
2 = Federal Candidate, Category 2
P = Peripheral

Source: U.S. Fish and Wildlife Service 1984; U.S. Air Force 1986c.

Table 4.10.6-2

Habitat and Land Cover Types Potentially Disturbed by the Peacekeeper Rail Garrison Program at Minot AFB, North Dakota

Habitat Type	Garrison, Support, and Relocated Facilities (acres)	Rail Lines (acres)	Total (acres)
Proposed Action			
Agriculture	67.5	3.2	70.7
Nonforested Wetland	2.1	0.1	2.2
Shrubland	22.2	0.0	22.2
Grassland	5.5	0.8	6.3
Developed Land	120.5	76.6	197.1
TOTAL:	217.8	80.7	298.5
Alternative Action			
Agriculture	90.7	3.2	93.9
Nonforested Wetland	2.9	0.1	3.0
Shrubland	22.2	0.0	22.2
Grassland	6.3	0.8	7.1
Developed Land	123.9	76.6	200.5
TOTAL:	246.0	80.7	326.7

because a very slight increase in recreational activities is expected. Therefore, short-duration impacts would be low and long-duration impacts would be moderate. Short- and long-duration impacts would not be significant.

4.10.6.4 Impacts of the Alternative Action

The Alternative Action would disturb 326.7 acres of land including 3 acres of prairie pothole wetlands. The additional disturbance is not substantially greater than the amount of disturbance for the Proposed Action. In addition, no federally listed or candidate threatened and endangered species would be affected and impacts to state-sensitive species would be minor. Therefore, impacts of the Alternative Action would be similar to those described for the Proposed Action. Short-duration impacts would be low and long-duration impacts would be moderate. Both short- and long-duration impacts would not be significant.

4.10.7 WATER RESOURCES

4.10.7.1 Region of Influence

The approximate boundaries of the Minot AFB ROI for water resources are Renville County and Egg Creek to the north, Interstate 2 to the south, McHenry County to the east, and the Town of Burlington to the west (Figure 4.10.7-1). The ROI is located in the Souris River Basin and covers an area of about 260 square miles, including the support community of Minot.

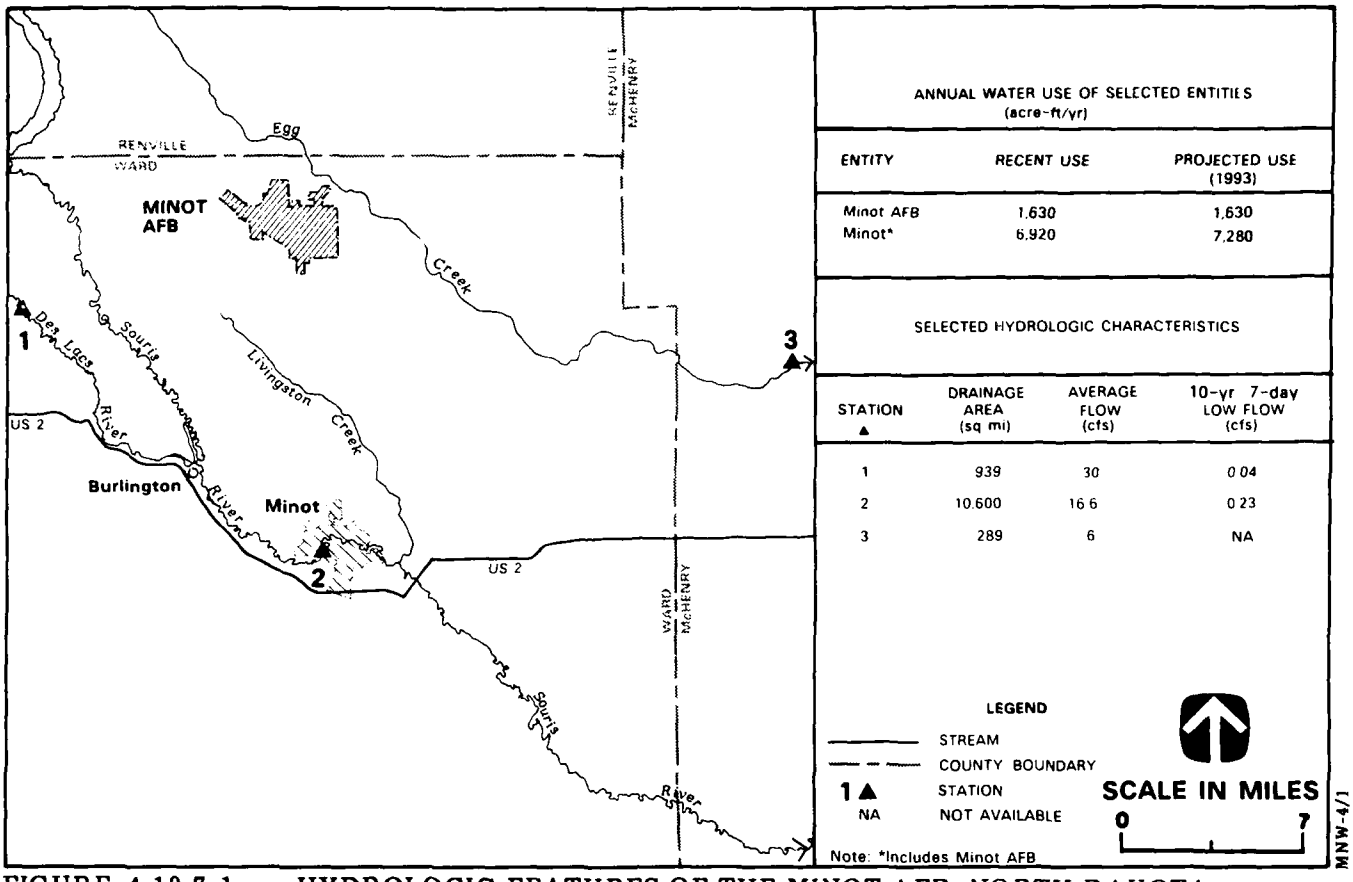


FIGURE 4.10.7-1 HYDROLOGIC FEATURES OF THE MINOT AFB, NORTH DAKOTA REGION OF INFLUENCE

Table 4.10.7-1

Program-Related Water Use
Within the Minot AFB Region of Influence
Peacekeeper Rail Garrison Program (Proposed Action)
(values in acre-ft)

	1990	1991	1992	1993 Onwards
Minot AFB				
Construction/Operations	22	32	28	19
Domestic	0	4	14	13
City of Minot Domestic	15	72	134	121
TOTAL:	37	108	176	153

4.10.7.2 Existing and Future Baseline Conditions

Major Water Users. Total water use in Ward County amounted to approximately 11,300 acre-feet (acre-ft) in 1985. Municipal water use accounted for about 52 percent of the total, most of which was supplied by the City of Minot. Agricultural use accounted for about 19 percent, rural-domestic use accounted for about 15 percent, and military use was 15 percent. The City of Minot currently obtains about 75 percent of its water from groundwater resources and the remaining 25 percent from the Souris River. A new pump station will be built by 1988 to increase the city's withdrawals from the Souris River because this water is generally more economical to treat than the water obtained from city wells. The city's future water supply will be split 40 percent and 60 percent between the river and the city wells, respectively. The City of Minot supplies water to Minot AFB. Current and projected water use for Minot AFB and the City of Minot is presented in Figure 4.10.7-1. The water supply of the ROI is adequate to meet all anticipated needs and no major water resources developments are expected to occur during the projected period.

Surface Water Hydrology and Quality. The Souris River is the only perennial stream in the ROI. It supplies a portion of the potable water needs of the City of Minot and also receives the city's treated wastewater effluent (which amounts to about 2,850 acre-feet per year [acre-ft/yr] [2.5 MGD]). The quality of the river is fair, though it may be seasonally high in total dissolved solids and nutrient concentrations. The Souris River is subject to wide variations in flow and Minot has suffered extensive flooding several times. Minot AFB wastewater is treated onbase and discharged into Egg Creek. Approximately 1,140 acre-ft/yr (1 MGD) are discharged into the creek, which also receives most of the base drainage. Egg Creek flows east for about 30 miles to North Lake which, in turn, drains north into the Souris River. No area of the base occupies any designated floodplain, though ponding does occur in natural potholes located within the base.

Groundwater Hydrology and Quality. Glacial deposits contain the most productive aquifers in the ROI. The Sundre and Minot aquifers are the principal deposits and supply more than half of the water needs of the ROI. Approximately 67 percent of the city's pumpage comes from the Sundre Aquifer, and the remaining 33 percent comes from the Minot Aquifer. Moderate historical declines in the potentiometric elevation of these aquifers have been reported; however, groundwater levels have stabilized in recent years. Several regional bedrock aquifers also underlie the ROI at a depth generally greater than 200 feet. Although these aquifers are relatively productive, their poor water quality generally limits their use to livestock watering and domestic consumption in areas where no other source is available.

4.10.7.3 Impacts of the Proposed Action

Major Water Users. Total program-related water use would peak at about 180 acre-ft/yr in 1992 and stabilize at about 150 acre-ft/yr during the operations phase (Table 4.10.7-1). All of this water would be supplied by the City of Minot Water Department. The program would increase baseline water use at Minot by a maximum of two percent. Baseline-plus-program water requirements at Minot (including Minot AFB) would amount to about 7,430 acre-ft (6.6 MGD) in 1993. The city has water rights to the Souris River and to the Sundre and Minot aquifers amounting to 23,350 acre-ft/yr. Therefore, the city's current water supply is adequate to accommodate the proposed program. Baseline-plus-program water use at Minot AFB would peak at 1,670 acre-ft/yr (1.5 MGD) in 1992. The base has a contract with the city for an annual supply of 2,800 acre-ft/yr (2.5 MGD), which is adequate to meet program needs. The small increase in ROI water use resulting from the Proposed Action would not interfere with existing major water users.

Surface Water Hydrology and Quality. Program-related increases in withdrawals from the Souris River would be about 70 acre-ft/yr. This represents less than 0.1 percent of

the average annual flow of the river and should have a negligible effect on its hydrology. Under low flow conditions, the city currently withdraws all the water it can from the river (as river quality permits). Therefore, program-related requirements would have a negligible effect on the seasonal low flows of the river as any additional water use in periods of low flow would be supplied by groundwater. Program-induced increases in treated wastewater discharge to the Souris River would peak at about 70 acre-ft in 1992, a 2-percent increase over the baseline discharge of 3,110 acre-ft/yr (2.8 MGD). Although the wastewater treatment system for the City of Minot is approaching capacity (Section 4.10.2.3) few violations of effluent standards have recently occurred. The city discharges only during the higher streamflow periods of spring and fall which achieves greater river dilution. The small additional discharge to the Souris River should not materially degrade its baseline water quality.

During the peak year of 1992, Egg Creek would also receive about 30 acre-ft/yr (0.03 MGD) of program-induced wastewater effluent generated and treated onbase, a 3-percent increase over the baseline discharge of 1,140 acre-ft/yr. The base's existing wastewater treatment system is operating nearly at its design capacity (Section 4.10.2.3). Occasional violations of its effluent standards for total suspended solids and biochemical oxygen demand have been recorded during the past year. Increased wastewater resulting from the Proposed Action may tend to increase the frequency of effluent standard violations. Egg Creek is not classified for any particular use, but must meet the general standards that apply to all state surface waters. Water quality in the creek may decline slightly as a result of increased wastewater discharge from the base.

Construction of the garrison site at Minot AFB would result in land disturbance and associated erosion on approximately 104 acres in the Egg Creek drainage. Approximately 1.2 miles of new rail spur would also be constructed in this drainage to connect the garrison site to an existing rail line. The proposed garrison site and the connecting rail spur are located in a relatively flat area that generates little stormwater runoff. In addition, they are fairly distant (about 3 mi) from Egg Creek (Section 4.10, Figure 4.10-1). Therefore, program-induced erosion and associated sediment transport to Egg Creek is expected to be limited and to have only minor and intermittent effects on the water quality of the creek. Most sediments reaching the creek would settle in the reservoirs constructed along its drainage prior to reaching the Souris River, which is located about 60 miles downstream.

Approximately 14 miles of existing railroad track would be upgraded along a relatively flat area in the drainage of Livingston Creek, an intermittent stream that joins the Souris River just downstream of Minot. This activity would result in limited, temporary land disturbance and associated sedimentation during infrequent periods of stormwater runoff until stabilization measures have taken effect. Consequently, program-induced sedimentation of the Souris River would be minor and of short duration.

Groundwater Hydrology and Quality. Program-induced groundwater withdrawals would be relatively small (peaking at about 110 acre-ft/yr in 1992) and represent an increase of about two percent over the baseline pumpage of the city's wells. The effects on the available quantity and quality of the local groundwater resources are expected to be minor. Program-related pumpage from the Sundre Aquifer would be about 70 acre-ft/yr. The average annual natural recharge to the aquifer is about 6,700 acre-ft/yr, which is more than twice its anticipated baseline-plus-program pumpage for 1992 (2,920 acre-ft/yr). The Minot Aquifer would supply the remaining 40 acre-ft/yr of program-induced pumpage. This aquifer has an average annual natural recharge of about 3,400 acre-ft/yr, which is also more than twice its anticipated baseline-plus-program pumpage for 1992 (1,470 acre-ft/yr). Program-related withdrawals from either aquifer would therefore not substantially affect groundwater levels.

Summary of Impacts. The water supply of the ROI is adequate to meet program-related water requirements. Only minor hydrologic changes and minor degradation of water quality would occur. The short- and long-duration impacts on water resources would therefore be low. None of these impacts would be significant.

4.10.7.4 Impacts of the Alternative Action

Major Water Users. Total program water use during the operations phase would be about 170 acre-ft/yr, a 13-percent increase over the Proposed Action. Baseline-plus-program water use at Minot AFB would increase by an additional 0.1 percent compared to the Proposed Action. The comparable increase in the City of Minot's water supply system would also be minor. The available water supply is adequate to meet the water needs of this alternative with no effects on existing major water users.

Surface Water Hydrology and Quality. With 6 Train Alert Shelters (TASs), the disturbed area at the garrison would increase by 27 percent to about 132 acres. Short-term sediment yield could be expected to increase by a similar percentage. However, the water quality effects on Egg Creek are not expected to be substantially different from those of the Proposed Action.

Groundwater Hydrology and Quality. Program-induced groundwater pumpage would increase by about ten acre-ft/yr over the Proposed Action. This small increase would not result in any additional impacts on the Minot and Sundre aquifers.

Summary of Impacts. Short- and long-duration impacts on water resources are expected to remain low. These impacts would not be significant.

4.10.8 GEOLOGY AND SOILS

4.10.8.1 Region of Influence

The ROI at Minot AFB for geology and soils includes the installation and associated program-related areas in the immediate vicinity. The land within a 1-mile radius of the installation and a 1,000-foot-wide corridor along the connecting rail spur was characterized for purposes of establishing the local baseline context. In addition, a regional ROI was established for geologic hazards for the purpose of developing a regional framework for seismicity at the installation.

4.10.8.2 Existing and Future Baseline Conditions

Minot AFB lies within nearly level glacial plains with rolling and undulating topography of the Western Lake section of the Central Lowland Physiographic Province. Surficial deposits of black loamy soils formed in Quaternary alluvium and glacial till of the Coleharbor Group and Oahe Formation occur onbase. Granite bedrock lies approximately 200 feet below the surface. The installation lies in seismic zone 1 in which a maximum credible earthquake with a magnitude of 6.1 is the largest predicted for the area. Maximum horizontal acceleration in rock is expected to be less than 0.04 g, with a 90-percent probability of not being exceeded in 50 years (Algermissen et al. 1982). Active faults have not been identified in the local ROI and the area is not susceptible to liquefaction. Areas susceptible to landslides or terrain failure were not discovered in the ROI.

Energy and Mineral Resources. Oil and gas resources have been identified in the ROI. Oil and gas leases occur at the proposed garrison site and north and west of the base. No uranium or coal mines/leases have been identified. No Known Geothermal Resource Areas have been identified in the ROI; however, the base is located adjacent to an area with geothermal gradients favorable for the discovery of low-temperature (100°C at

depths of 1 km) geothermal water (National Oceanic and Atmospheric Administration 1981). No metallic/nonmetallic mineral resource mining operations or leasing activities exist in the ROI.

Soil Resources. The U.S. Soil Conservation Service (SCS) has mapped 28 soil types in the ROI. Eleven of these soil types occur in areas where program-related facilities may be located. They occur on nearly level to gently sloping surfaces with some surfaces described as irregularly sloping to undulating. They have a loamy texture and are poorly drained or moderately to well drained. Saline soils have also been identified. Soil erosion susceptibility was evaluated for wind and sheet erosion. Wind erosion of unvegetated/disturbed ground in the ROI is a major concern of the SCS in North Dakota and has been identified as a potential problem for soils in the ROI. The prevailing northwesterly wind direction would make northwest-southeast elongated tracts of land susceptible to wind erosion. The proposed garrison would be located on soils with a low susceptibility to wind erosion and a low to moderate susceptibility to sheet erosion. The rail spur and other facilities would be located on soils with a low to moderate susceptibility to both wind and sheet erosion.

4.10.8.3 Impacts of the Proposed Action

Energy and Mineral Resources. The proposed location of the garrison facility is currently under oil and gas lease agreements which would result in long-duration impacts because leases would be terminated for the life of the program. Impacts on mineral resources are not expected because mineral resources have not been identified in the ROI.

Soil Resources. Program-related wind erosion at the proposed garrison, other facilities, and rail spur is projected to occur at rates of 1.2 tons per acre per year (T/ac/yr) to 5.2 T/ac/yr. The application of one ton per acre (T/ac) of straw mulch would temporarily reduce the rates of erosion for all soils affected to less than 0.1 T/ac/yr. During garrison construction, soil would also erode at a rate of 5.8 T/ac/yr for large exposed areas of a soil type. The application of one T/ac of straw mulch would temporarily reduce the rate to less than 0.1 T/ac/yr. Program-related sheet erosion at the proposed garrison site is projected to occur at rates of 1.8 T/ac/yr to 2.7 T/ac/yr. Soils along the rail spur are projected to erode at rates of 1.5 T/ac/yr to 5.9 T/ac/yr and at rates of 1.8 T/ac/yr to 9.9 T/ac/yr at the other proposed facility sites. The application of one T/ac of straw mulch after construction would temporarily reduce the rates of erosion to 0.3 T/ac/yr to 2.0 T/ac/yr for all soils affected. The range of soil erosion rates identified for the proposed program (2.7 to 15.7 T/ac/yr) are comparable to those determined for general urban development (16 to 156 T/ac/yr) as supplied by the U.S. Department of Housing and Urban Development (1981).

Soil erosion impacts are based on the combined effects of wind and sheet erosion values and how they compare to the maximum tolerable soil loss for each soil type. Soil erosion rates would exceed the maximum tolerable soil loss (5 T/ac/yr) of the affected soil types during construction. Program-related soil erosion is therefore expected to cause short-duration impacts. Long-duration impacts are not expected because accelerated rates of erosion would occur for only a short period of time prior to mulching and reestablishing a vegetative cover in the disturbed areas.

Summary of Impacts. Overall short-duration impacts from the proposed program on geology and soils are expected to be high because accelerated rates of erosion during program-related construction would exceed the maximum tolerable soil loss of the soils affected. Long-duration impacts are expected to be moderate because offbase oil and gas leases in the ROI would be terminated for the life of the program. These impacts are not expected to be significant because increased rates of erosion would not result in an

appreciable net loss of topsoil over the short period of time under consideration and the potential oil and gas resources of the leases do not appear to represent a major contribution to state or local reserves.

4.10.8.4 Impacts of the Alternative Action

The Alternative Action would slightly increase the size of the garrison. Therefore, impacts on geology and soils would be about the same as for the Proposed Action. Consequently, all levels of impact and significance would remain the same as for the Proposed Action. Short-duration impacts would be high and not significant while long-duration impacts would be moderate and not significant.

4.10.9 AIR QUALITY

4.10.9.1 Region of Influence

The ROI for the air quality resource includes Minot AFB, the City of Minot, and the interstate highways and principal arterials in Ward County.

4.10.9.2 Existing and Future Baseline Conditions

Minot AFB is located within the North Dakota Intrastate Air Quality Control Region (No. 172). There are no Prevention of Significant Deterioration Class I areas within 50 miles of the base. Ambient air quality for total suspended particulates (TSP) and particulate matter (PM_{10}) was monitored in the City of Minot 13 miles from Minot AFB. The 1987 air quality measurements in Minot indicate the maximum recorded 24-hour PM_{10} average was 111 micrograms per cubic meter ($\mu g/m^3$). The annual average was not available because data recovery was less than 75 percent.

The entire State of North Dakota is in attainment status for all criteria pollutants. Minot AFB and the surrounding areas have good air quality.

Ward County TSP, sulfur oxides (SO_x), nitrogen oxides (NO_x), volatile organic compounds (VOC, a measure of reactive hydrocarbons), and carbon monoxide (CO) emissions are shown in Table 4.10.9-1.

Changes in the future baseline air quality due to the construction of additional commercial facilities would be minor in Ward County.

4.10.9.3 Impacts of the Proposed Action

Direct air emissions would result from construction of the rail spur line and support facilities and operation of the proposed program at Minot AFB. Emission sources associated with construction include light-duty vehicle traffic, diesel trucks, offsite heavy-duty vehicles, diesel construction equipment, and fugitive dust from ground disturbance.

The highest monthly fugitive dust emissions from proposed program construction activity would be about 13 tons. Fugitive dust calculations assume a 50-percent reduction due to watering of the construction sites. All of the fugitive dust emissions at Minot AFB were conservatively assumed to be within the 10-micrometer particle size and referenced against the PM_{10} standard for impact analysis. It is expected that PM_{10} emissions would be smaller than the emissions calculated under the U.S. Environmental Protection Agency (EPA) guidelines for TSP.

Table 4.10.9-1

Ward County, North Dakota Air Emissions Inventory, 1987
(tons per year)

Emission Source	TSP	SO_x	NO_x	VOC	CO
Fuel Combustion	116	1,354	1,025	51	319
Industrial Process	--	--	--	943	--
Solid Waste Disposal	124	4	18	254	772
Air/Water Transportation	217	18	139	290	846
Land Transportation	1,052	296	3,198	1,847	11,258
Miscellaneous	65,726	0	2	13	71
TOTAL:	67,235	1,672	4,382	3,398	13,266

Source: U.S. Environmental Protection Agency 1988d.

Construction-related impacts were calculated for 24-hour and annual averaging periods. A program-related increase of 0.2 $\mu g/m^3$ would occur increasing the 24-hour average background concentration to 111.2 $\mu g/m^3$. The predicted 24-hour fugitive dust background concentrations would not equal or exceed the 24-hour National Ambient Air Quality Standards (NAAQS) of 150 $\mu g/m^3$ (PM_{10}). Fugitive dust generated for the peak construction year would have negligible impacts on Minot AFB air quality. The EPA-minimum threshold levels for fugitive dust would not be exceeded, and no violation of NAAQS would occur.

Overall short- and long-duration air quality impacts would be negligible.

4.10.9.4 Impacts of the Alternative Action

The Alternative Action (6 TASs) would cause a 0.1-percent increase in fugitive dust emissions over the Proposed Action. This would result in a total increase of 0.3 $\mu g/m^3$, increasing the 24-hour average ambient concentration to 111.3 $\mu g/m^3$. Both the short- and long-duration impacts would be negligible and would not cause any violation of the NAAQS.

4.10.10 NOISE

4.10.10.1 Region of Influence

The ROI for the noise resource is broadly defined as the area where program-related noise level increases occur. Specifically, the ROI includes Minot AFB, the City of Minot, and the interstate highways and principal arterials in Ward County.

4.10.10.2 Existing and Future Baseline Conditions

Air Force aircraft are the major noise source in the vicinity of Minot AFB base. The City of Minot is located 12 miles south of the base and is not affected by take off and landing noise. Noise levels in the vicinity of the base range from 50 decibels on the A-weighted scale (dBA) to 65 dBA expressed as day-night equivalent sound level (L_{dn}). The areas affected by base-generated noise are primarily agricultural.

A large family housing area located onbase is primary noise-sensitive area. Offices and support areas throughout the base are subject to normal aircraft noise. Three schools and a hospital are located onbase.

4.10.10.3 Impacts of the Proposed Action

Temporary impacts resulting from construction-related noise would occur within the immediate vicinity of construction sites. The various activities that would take place include construction of industrial structures, the rail spur line, roadway (grading, compacting, and paving), landscaping and cleanup at Minot AFB.

Construction-related noise from the TAS at Minot AFB is not anticipated to affect offbase or onbase residential areas because such noise levels from point sources attentuate quickly with distance. Potential construction-related noise levels of 80 dBA to 85 dBA at 100 feet from the source within the TAS construction site would be reduced to 45 dBA at the base residential areas which are located two miles from the construction location. The noise levels at base residential areas which is located about 2,200 feet from the rail spur corridor would be 58 dBA. These noise levels would be masked by ambient noise levels of about 65 dBA (L_{dn}). Once construction activity ceases, noise levels would return to near ambient conditions. The short-duration noise impacts from all construction activities would be negligible.

During the operations phase, noise would be generated by program-related increases in training train activities. Offbase training train activities would cause minor, temporary increases in average noise levels on sensitive receptors along the main rail line. These impacts would be negligible.

Overall short- and long-duration noise impacts would be negligible.

4.10.10.4 Impacts of the Alternative Action

The noise levels resulting from the construction of six TASs at the garrison site would be about the same as the proposed program. The short- and long-duration noise impacts at the onbase residential receptors would be negligible.

4.10.11 Impacts of the No Action Alternative

With the No Action Alternative, the Peacekeeper Rail Garrison system would not be deployed. Activities at Minot AFB will continue to support other existing or proposed missions. For the host communities in the vicinity of the base, environmental changes would occur as a result of normal community growth. Future baseline conditions reflecting the No Action Alternative were described in earlier portions of this chapter.

4.10.12 Irreversible and Irretrievable Resource Commitments

Deployment of the Peacekeeper Rail Garrison program at Minot AFB would result in the irreversible and irretrievable commitments of some human and natural resources. The affected resources are the following:

- The proposed program requires the use of relatively small amounts of labor, materials, energy and other economic resources during both the construction and operations phases. The expected population inmigration and the local procurement of building materials (such as cement, sand, and gravel) may alter some resource characteristics in the deployment area. Although these economic factors, once used by the proposed program, generally cannot be recovered for other purposes, the extent of their use would be small in comparison to total resource availability.

- Lands utilized for the program facilities will be irreversibly committed for the duration of the program. Such use of land would not cause an irretrievable commitment because the land can be retrieved through removal of program facilities and implementation of necessary soil rehabilitation.

- Both irreversible and irretrievable commitments would occur if prehistoric and historic sites eligible for the National Register of Historic Places (NRHP) are disturbed. However, no NRHP-eligible sites are expected to be identified in program areas.

- Disturbed biological communities, given sufficient time, can recover to a state approximating predisturbance conditions once the disturbance ends. However, filling of wetlands represents, for all practicable purposes, an irreversible and irretrievable loss of habitat. Creation of newly created wetland will not fully compensate these impacts because the newly created habitat is unlikely to have the same ecological value as the habitats lost.

- Soils would be permanently disturbed at construction and related sites (e.g., borrow pits, roads, buildings, and rail spur) and may be irreparably damaged during the life of the program if disturbed areas are not mulched or revegetated, especially at the garrison location. Aggregate resources would be used for construction of buildings, roads, and rail spurs.

4.10.13 Relationship Between the Local Short-Term Use of Man's Environment and the Maintenance and Enhancement of Long-Term Productivity

Deployment of the Peacekeeper Rail Garrison program at Minot AFB would result in the short-term use of some human and natural resources that may affect the maintenance and enhancement of long-term productivity. The affected resources are the following:

- Short-term program-generated disruptions and delays of traffic would result in a decrease in the comfort, convenience, and safety afforded users of primary roads leading to the base. No effect on long-term productivity is expected.

- Additional information gained during program-related surveys of archaeological and historic resources may contribute to the data base and improve man's knowledge of the area's history. This would enhance the management of remaining cultural resources in the region.

- Areas temporarily disturbed by the construction activities would result in short-term losses of biological habitats. However, recovery rates are expected to be relatively fast and no effect on long-term productivity is expected.

- Soil erosion during construction would increase sedimentation to local streams resulting in short-term deterioration of surface water quality. However, the additional loss of soil would not affect soil productivity or the long-term quality of streams.

- Reductions in air quality levels would result from fugitive dust during construction. However, no long-term reduction in air quality is expected.

4.10.14 Environmental Concerns Associated With a Possible Future Second Rail Connector

A second rail access to Minot AFB could be achieved by providing a northerly rail connector to the main line of the Burlington Northern Railroad (Figure 4.10.14-1). This

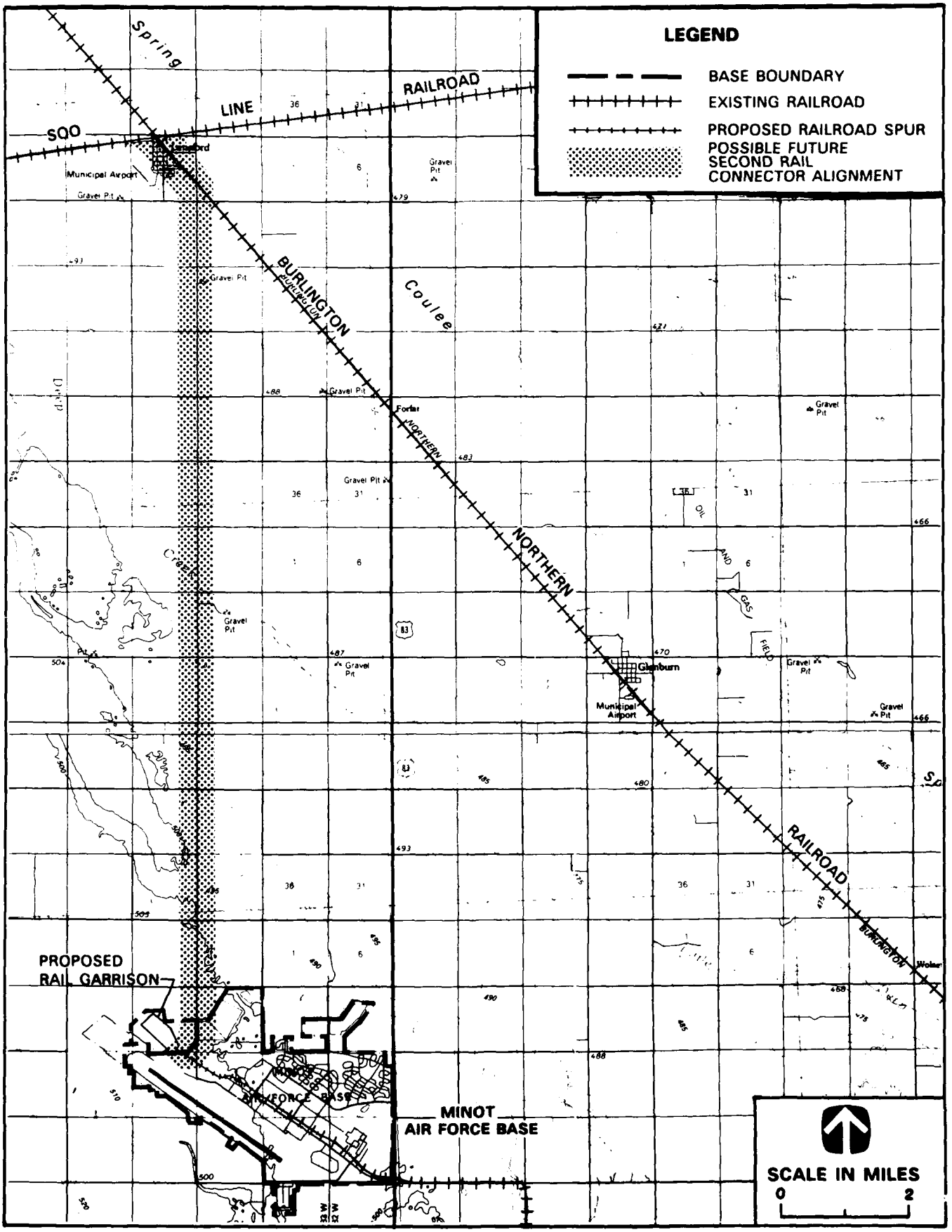


FIGURE 4.10.14-1 CONCEPTUAL ALIGNMENT OF A POSSIBLE FUTURE SECOND RAIL CONNECTOR FOR MINOT AFB, NORTH DAKOTA

connector would require the acquisition of about 152 acres of land and the construction of 13 miles of new track. Additionally, two 50-foot bridges and one 75-foot bridge would be required for stream crossings.

Construction costs for this second rail connector would be approximately $16.2 million (1986 dollars) and would require approximately 120 direct construction workers and 120 secondary workers over a 1-year period. Most of these workers would be from the local area, including Ward, Bottineau, McHenry, McLean, and Renville counties in North Dakota. Since inmigration of labor for this construction would be minimal, there would be no major concerns for the socioeconomics, utilities, and transportation resources.

The 13 miles of new right-of-way (ROW) would be north of the base and pass through a rural area with mostly nonirrigated cropland, some mixed open space, and scattered farmhouses. The ROW would use about 152 acres of land and could probably be sited to avoid scattered farmhouses. There could, however, be a conflict with existing structures or roads at Lansford where a wye would be constructed to connect to the Soo Railroad main line.

The proposed northern connector to Lansford crosses the glaciated uplands which exhibit numerous prairie potholes. The route would cross two small drainages, Egg Creek, and Little Deep Creek. Local prehistoric settlement is concentrated around water sources including small drainages and prairie potholes. Most of these sites contain small lithic scatters or stone circle sites. Few historic homesteads are expected but could occur along the route. Any disturbance to prehistoric or historic sites would adversely affect the regional data base. Native American groups in North Dakota are likely to express a high level of concern if any burials were encountered.

Construction activities would impact some important biological habitats offbase. Bridge construction across Little Deep Creek, Egg Creek, and an unnamed creek would temporarily disturb wildlife species living in the riparian areas along those streams. Prairie potholes supporting nonforested wetlands would be drained and filled resulting in impacts on the species that live in those habitats. Some threatened and endangered species may be disturbed as a result of the construction activities.

None of these streams requiring bridges have state-designated uses, indicating that they are not particularly sensitive streams. Water quality degradation in the streams could be greatly reduced if bridge construction occurs during periods of no flow.

Oil and gas production/leases will need to be investigated to determine any offbase conflicts. Low temperature potential geothermal lands also exist in the rail connector corridor. Minor increases in sedimentation due to soil erosion may affect several drainages. Aggregate (rail ballast) production may be an issue due to substantial construction requirements. Soils that have a moderate shrink-swell potential will also be encountered.

Minot AFB is located within the North Dakota Intrastate Air Quality Control Region. The entire state of North Dakota is in attainment for all criteria pollutants. Minot AFB and the surrounding areas have good air quality. Construction of the second rail connector would cause temporary local increases in fugitive dust and gaseous pollutant emissions. These emissions should not cause any violations in the National Ambient Air Quality Standards.

Existing noise levels along the second rail corridor range from 50 decibels on the A-weighted scale (dBA) to 65 dBA (L_{dn}) near the base and from 45 to 50 dBA (L_{dn}) in the rural areas. Temporary increases in noise levels would result from the construction of the wye in the vicinity of sensitive residential noise receptors in Lansford.

4.11 WHITEMAN AIR FORCE BASE, MISSOURI

Whiteman Air Force Base (AFB), with an area of 5,097 acres (4,730 acres are fee owned and 367 acres are leased), is located in Johnson County in central Missouri. The host organization of this Strategic Air Command base is the 351st Strategic Missile Wing, supporting 150 Minuteman II missiles. The Minuteman II launch facilities are dispersed throughout an approximate 10,000-square-mile area in central Missouri. Whiteman AFB has been designated for deployment of the B-2 bomber in the early 1990s.

Whiteman AFB employed 3,408 military personnel (443 officers and 2,593 enlisted), 572 appropriated fund civilian personnel, and 529 other civilian personnel at the end of fiscal year 1987. Approximately 52 percent of the military personnel live on Whiteman AFB and 48 percent live in communities near the base. The B-2 bomber mission will increase personnel at Whiteman AFB beginning in late 1988 and continuing to 1995. Operations personnel will include approximately 2,300 military and 100 civilians.

The City of Knob Noster, located two miles north of the base, is the host community for Whiteman AFB (Figure 4.11-1). Approximately half of the personnel living offbase reside in the Knob Noster area and about 40 percent live in the City of Warrensburg, 10 miles west of the base. In addition, some personnel live in the communities of Sedalia and LaMonte in Pettis County. Knob Noster and Warrensburg had 1985 populations of 1,972 and 13,601, respectively. Johnson County had an estimated 1985 population of 37,815. The economy of the region is primarily based on agriculture. However, communities in the region provide a varied economic base: Sedalia's economy is based on wholesale trade and manufacturing; Warrensburg is an education center (Central Missouri State University); and Knob Noster and LaMonte are largely service-based communities.

The following sections provide a description of activities associated with the deployment of the Peacekeeper Rail Garrison program at Whiteman AFB for the Proposed Action (4 Train Alert Shelters [TASs]) and the Alternative Action (6 TASs). In addition, the deployment of the B-2 bomber mission at Whiteman AFB is discussed.

Proposed Action. For the Proposed Action at Whiteman AFB, the Air Force would construct garrison facilities and provide personnel necessary for the deployment and operation of up to four Peacekeeper missile trains. Approximately $100.6 million (in 1986 dollars) of construction would occur at the base for the Proposed Action. Construction activities, for the purpose of analysis, are assumed to begin in 1990 and be completed in 1992, with full operations beginning in 1993. Direct employment requirements would be 229 in 1990, peak at 441 in 1991, and stabilize at 339 during the full operations phase. Peak construction employment of 300 would occur in 1991. Annual direct employment requirements for the Proposed Action are presented in Table 4.11-1 for site activation, construction, assembly and checkout, and operations activities.

The garrison would be located in the eastern portion of the base and collocated with the existing weapons storage area (Figure 4.11-1). To accommodate the garrison, acquisition of 128 acres adjacent to the base would be required. Acquisition of restrictive easements on 330 acres adjacent to the eastern boundary of the base would be required to accommodate the explosive safety zone (Table 4.11-2). One inhabited building would be located within this area. Seven buildings (including the 4 TASs), roads, utilities, parking, and approximately 1.2 miles of track would be constructed within the garrison. Construction of the garrison would disturb approximately 83 acres permanently and 99 acres temporarily (Table 4.11-3).

The rail spur connecting the garrison to the Union Pacific main line north of the base would use 1.2 miles of an existing U.S. government-owned spur offbase and require the construction of 2.3 miles of new track (1.5 mi onbase and 0.8 mi offbase) from the garrison to the existing track (Figure 4.11-1). Approximately one mile of the existing

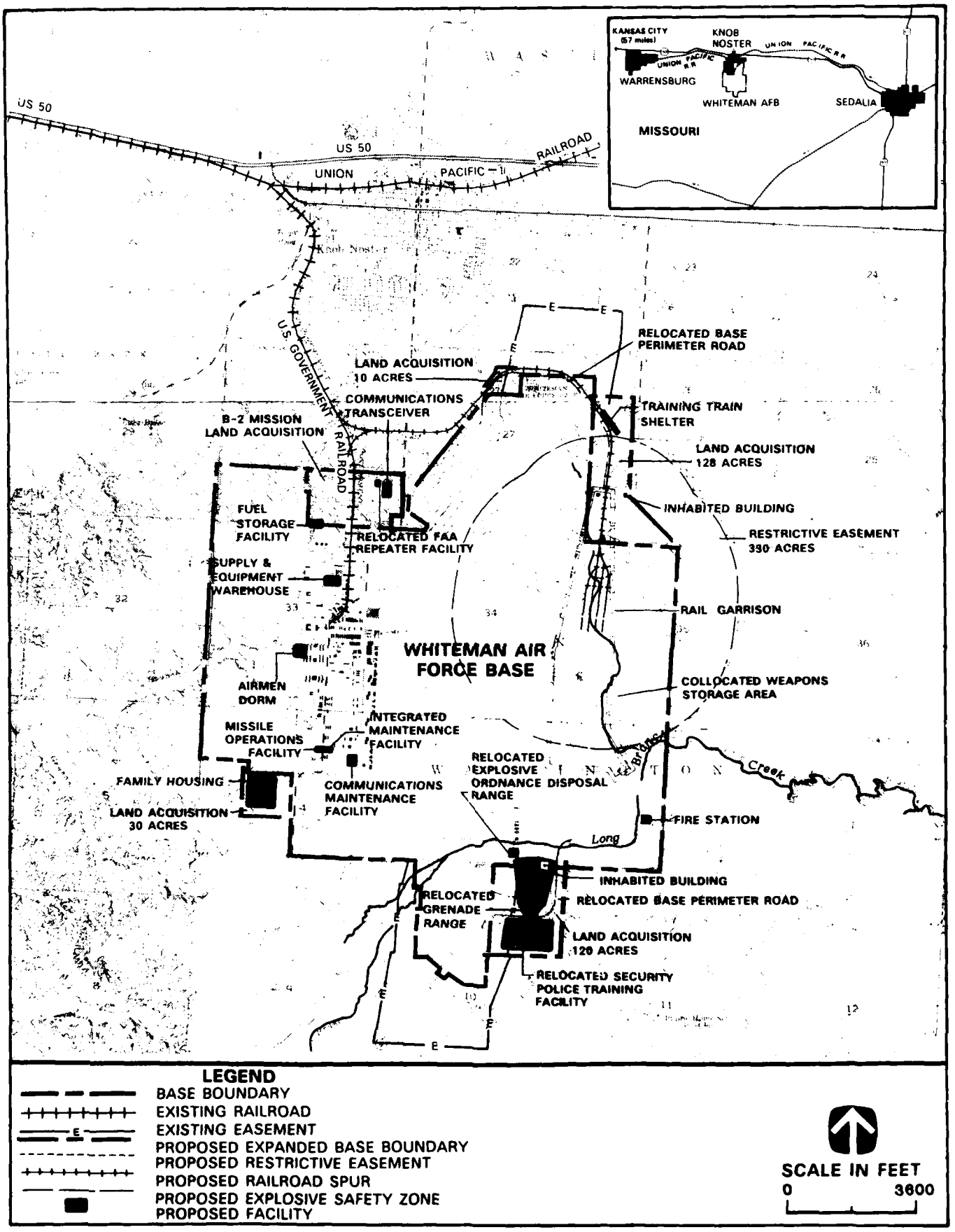


FIGURE 4.11-1 PROPOSED PEACEKEEPER RAIL GARRISON FACILITIES AT WHITEMAN AFB, MISSOURI

Annual Direct Employment (Military and Civilian) for the Peacekeeper Rail Garrison Program in the Whiteman AFB Area by Calendar Year (Full-Time Equivalent Jobs)

	1989	1990	1991	1992	1993[1]
Proposed Action					
Site Activation	1	15	24	11	0
Construction	0	213	300	86	0
Assembly & Checkout	0	1	18	1	0
Operations	0	0	99	339	339
TOTAL:	1	229	441	437	339
Alternative Action					
Site Activation	1	15	24	11	0
Construction	0	231	314	86	0
Assembly & Checkout	0	2	27	2	0
Operations	0	0	109	373	373
TOTAL:	1	248	474	472	373

Note: [1]Employment would continue at these levels for the life of the program.

Table 4.11-2

Offbase Land Acquisition and Easement Requirements Peacekeeper Rail Garrison Program Whiteman AFB, Missouri (acres)

	Proposed Action	Alternative Action
Land Acquisition		
Garrison Area	128	128
Rail Spur	22	22
Housing Area	30	30
Relocated Facilities	120	120
TOTAL:	300	300
Restrictive Easements	330	405

Table 4.11-3

Summary of Area Disturbed by the Peacekeeper Rail Garrison Program
Whiteman AFB, Missouri
(Proposed and Alternative Actions)

Facility Group	Area Disturbed (acres)		
	Permanent	Temporary	Total
Proposed Action			
Garrison Facilities	82.6	98.7	181.3
Rail Spur	12.5	14.0	26.5
Support Facilities	49.5	87.8	137.3
Relocated Facilities	6.3	6.8	13.1
TOTAL:	150.9	207.3	358.2
Alternative Action			
Garrison Facilities	86.9	152.0	238.9
Rail Spur	12.5	14.0	26.5
Support Facilities	49.5	87.8	137.3
Relocated Facilities	6.3	6.8	13.1
TOTAL:	155.2	260.6	415.8

track would require upgrading. Construction of the new track offbase and a wye at the existing spur would require the acquisition of 22 acres, including 10 acres adjacent to the northern base boundary. Approximately 13 acres would be disturbed permanently and 14 acres temporarily outside the garrison for the connecting spur and wye (Table 4.11-3).

The Proposed Action would require the construction of support facilities with a total floor space of approximately 93,500 square feet. To provide access to the Training Train Shelter, a 0.1-mile rail spur would be constructed from the connector spur (Figure 4.11-1). If additional military family housing is provided onbase, 120 family housing units (1,100 sq ft each) would be constructed on 30 acres acquired adjacent to the southwestern boundary of the base. In addition, approximately 2.4 miles of new base boundary fencing would be required. Construction of the support facilities, fencing, utilities, roads, and parking would permanently disturb approximately 50 acres and temporarily disturb 88 acres (Table 4.11-3).

The Proposed Action would also require the relocation of several existing base facilities, including some roads and utilities, to new locations (Figure 4.11-1). Relocation of two facilities (the Security Police Training Facility and grenade range) would require acquisition of 120 acres adjacent to the southern boundary of the base. One inhabited building would be located within this area. Two facilities (a Federal Aviation Administration repeater facility and a communications transceiver) would be relocated on land acquired for the B-2 mission. Relocation of the existing base facilities would permanently disturb approximately six acres and temporarily disturb seven acres (Table 4.11-3).

Alternative Action. For the Alternative Action, the Air Force would construct garrison facilities and provide personnel for the deployment and operation of up to six Peacekeeper missile trains. Approximately $114.6 million (in 1986 dollars) of construction would occur at Whiteman AFB for the Alternative Action. Construction and operations activities are assumed to occur in the same time frame as the Proposed Action. Annual direct employment requirements for the Alternative Action are presented in Table 4.11-1.

The garrison would contain six TASs (instead of 4) and would be constructed in approximately the same location as the Proposed Action (Figure 4.11-2). Acquisition of additional land (total of 128 acres) would not be required. Acquisition of restrictive easements on an additional 75 acres (total of 405 acres) would be required to accommodate the explosive safety zone (Table 4.11-2). Nine buildings (including the 6 TASs), roads, utilities, parking, and approximately 1.7 miles of track would be constructed within the garrison. Construction of the six-TAS garrison would disturb approximately 4 additional acres permanently (86.9 acres total) and 53 acres temporarily (152 acres total) (Table 4.11-3).

For the Alternative Action, technical and personnel support facility requirements, the rail spur connecting the garrison to the Union Pacific main line, and the relocation of existing facilities would be similar to the Proposed Action.

Other Air Force Programs. The B-2 mission will be deployed at Whiteman AFB beginning in the fall of 1988, with a majority of the base personnel buildup taking place over a 7-year period from 1988 to 1995. Construction activities will occur from 1988 to 1993. During the operations phase, approximately 2,400 additional personnel (military and civilian) will be employed at Whiteman AFB. The total operations-related population (including dependents) is projected to be approximately 8,000. Approximately $553 million (in then year dollars) of construction will occur at the base for B-2 bomber mission facilities.

Impacts of this program are included in the future baseline conditions section of this chapter.

Summary of Program Impacts. The Proposed Action at Whiteman AFB would result in significant impacts on two resources: land use and biological resources. Short- and long-duration land use impacts would be low because it may be necessary to relocate two inhabited buildings from the proposed explosive safety zone or from land acquired. These impacts would be significant because inhabited buildings may require relocation. Long-duration biological resources would be moderate because important wetland and forest habitat would be lost and the wildlife inhabiting those areas would be affected. These impacts would be significant because of the ecological importance of the habitats affected and the level of concern these potential impacts would elicit from natural resource management agencies.

Impacts on all other resources would not be significant.

The Alternative Action at Whiteman AFB would not alter the level of impact or significance ratings for any resource.

Both short- and long-duration beneficial socioeconomic effects would be generated by the Proposed and Alternative Actions, including increases in employment and income, and greater utilization of temporary and permanent housing.

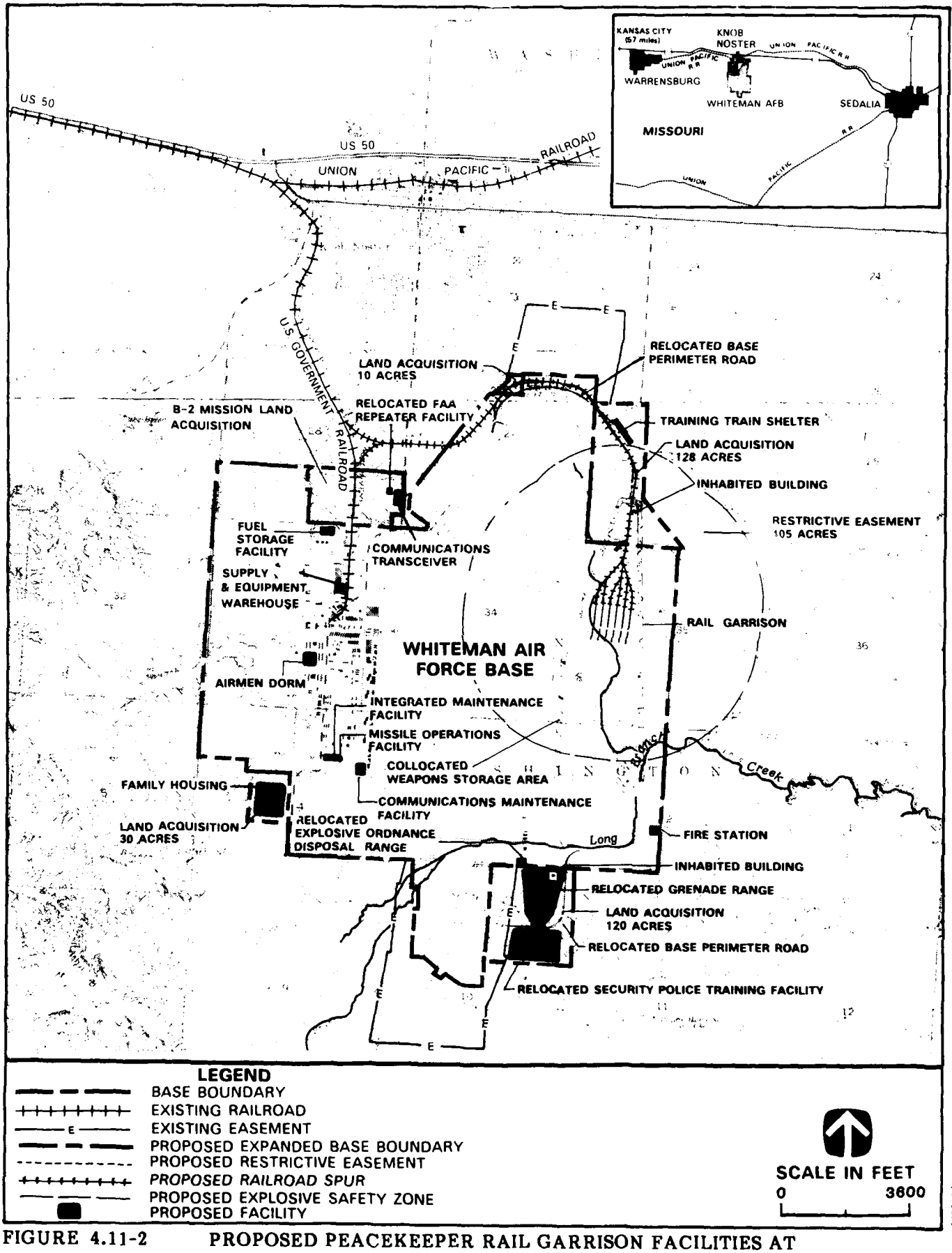


FIGURE 4.11-2 PROPOSED PEACEKEEPER RAIL GARRISON FACILITIES AT WHITEMAN AFB, MISSOURI (ALTERNATIVE ACTION)

4.11.1 SOCIOECONOMICS

4.11.1.1 Region of Influence

The Whiteman AFB Region of Influence (ROI) for the employment and income element includes Cass, Henry, Jackson, Johnson, Lafayette, Pettis, and Saline counties in Missouri, and Wyandotte County, Kansas. For housing, the ROI consists of the cities of Knob Noster, Warrensburg and Sedalia. The ROI for the remaining elements includes the cities of Knob Noster, Warrensburg, and Sedalia, as well as Johnson and Pettis Counties.

4.11.1.2 Existing and Future Baseline Conditions

Employment and Income. Total employment in the ROI declined by almost 1,200 jobs, from 596,454 in 1980 to 595,255 in 1984. Only the construction sector gained new jobs (3.6%) during the 1980 to 1984 period. The retail trade sector was the leading employer with 21.5 percent of the total jobs in 1984, followed by the manufacturing and government sectors, each with 16 percent of the total jobs. Combined, the three sectors accounted for over 53 percent of the total employment in 1984.

Total employment in Johnson County was estimated at 19,207 in 1984, an 11.7-percent increase from the 1980 employment level of 17,195. The government sector, with 41 percent of the total county employment, was the largest employer in 1984 and was followed by retail trade and services with 14 percent and 13 percent of the total county employment, respectively. Combined, the three sectors accounted for 68 percent of the total county employment in 1984.

Total employment in the ROI is projected to reach 624,700 in 1990 and 642,070 in 1995. These projections include the employment effects of the B-2 bomber mission over the 1989 to 1994 period. The ROI unemployment rate is projected to decline to 5.0 percent in 1990 and 4.6 percent in 1995, from 6.3 percent in 1984.

From 1980 to 1984, total earnings (in current dollars) in the ROI increased from $8.8 billion to $11.0 billion and in Johnson County from $156 million to $219 million. Discounting for inflation, these increases in total earnings represented a 0.3-percent decline in the ROI and a 12.1-percent growth in Johnson County over the the 1980 to 1984 period. Per capita personal income in the ROI increased from $9,268 in 1980 to $12,217 in 1984 and in Johnson County from $6,792 in 1980 to $9,244 in 1984.

Total earnings (in 1986 dollars) in the ROI are projected to increase to $12.3 billion in 1990 and $12.7 billion in 1995, from $11.6 billion in 1984. The corresponding per capita personal income is projected at $12,832 in 1990 and $12,830 in 1995. Per capita personal income in Johnson County is projected at $9,961 in 1990 and $9,555 in 1995.

Population and Demographics. Johnson County's population in 1985 was estimated at 37,815, a decrease of 1,244 since 1980. The county's population is projected to increase to 39,620 by 1990 and 43,134 by 1995. The 1985 populations of Knob Noster and Warrensburg were estimated to be 1,972 and 13,601, respectively. These represent slight declines from 1980 populations of 2,040 in Knob Noster and 13,807 in Warrensburg. Warrensburg's population is projected at 14,241 in 1990 and 16,241 in 1995. The corresponding population numbers for Knob Noster are 2,123 and 2,600, respectively. In 1985, the population of Sedalia (Pettis County) was estimated at 20,258. It is projected to increase to 22,079 by 1990 and to 25,476 by 1995. These projections assume that 60 percent of the B-2 bomber mission-related personnel will inmigrate to Sedalia, 32 percent to Warrensburg, and the remaining 8 percent to Knob Noster. Military personnel and their dependents accounted for approximately 19 percent of the urban area's population (onbase residents plus populations of Sedalia, Warrensburg, and Knob Noster) in 1987.

Housing. In 1980, the permanent year-round housing stock was estimated at 4,531 units in Warrensburg and 905 units in Knob Noster. Of the total units in Warrensburg, 404 (8.9%) were vacant and 294 (6.5%) were available. Vacancies in Knob Noster numbered 120 units (13.3%), 80 (8.8%) of which were available. It is likely that up to 700 units would probably be privately supplied in Warrensburg to offset the housing needs of the B-2 bomber personnel, and the remaining deficit would be met either through the use of new mobile homes or existing units in Pettis County, near Knob Noster. Temporary facilities in Knob Noster consist of two motels with a total of 20 rooms; Warrensburg has four additional motels with a total of 164 rooms. An additional 40-room motel in Knob Noster was completed recently. It is assumed that with the B-2 mission, no available temporary facilities would be available.

Whiteman AFB onbase family housing consists of 162 two-bedroom, 698 three-bedroom, and 132 four-bedroom units. By 1989, the onbase unaccompanied enlisted personnel housing facilities will have space for 1,250 enlisted personnel and officers. These facilities will be fully occupied. The housing referral office has listings of 86 offbase rental units. Of these, 16 are one-bedroom, 56 are two-bedroom, 13 are three-bedroom, and 1 is a four-bedroom unit.

With the B-2 bomber mission at Whiteman AFB, the Air Force will provide up to 900 family housing units in the area. These units would be completed in time to meet the needs of Air Force personnel. It is assumed that 600 of these units would be constructed in Sedalia by the year 1994 and that the remaining 300 units would be constructed in Warrensburg by the same year. It is further assumed that the private sector would provide about 130 units by 1993 in Sedalia for higher ranking personnel and their families. However, current data suggest that the Air Force would have to provide at least 990 units (387 in Knob Noster and 703 in Warrensburg) to assure that all B-2 program-related personnel would be suitably housed.

Given the above assumption, 442 units (45 in Knob Noster, 172 in Warrensburg, and 225 in Sedalia) would be available in 1990 out of a total stock of 14,911 units (852 in Knob Noster, 4,480 in Warrensburg, and 9,579 in Sedalia). In the year 1994, no suitable housing units would be available in the 3-city area. The housing situation would stabilize by the year 1996. In this year, year-round units would number 16,093; 884 in Knob Noster, 4,952 in Warrensburg, and 10,257 in Sedalia. Available vacancies would number 203 units (1.3%); 21 (2.4%) in Knob Noster, 79 (1.6%) in Warrensburg, and 103 (1.0%) in Sedalia.

Education. Knob Noster School District R-VIII enrolled approximately 1,675 students for the 1987-88 school year. The district operates two elementary schools (1 of which is located onbase), one middle school, and one high school. Current overall pupil-to-teacher ratios at the elementary level are 14.8-to-1. Approximately 73 percent of the district's enrollment are dependents of federal employees. Under P.L. 81-874 guidelines, the district is classified as both a "Super A" and "Super B" district. Enrollment projections, including the effects of the B-2 bomber mission, indicate 1,730 students by 1990 and 1,845 by 1995. Approximately 100 students would be brought in with the B-2 bomber mission. This would cause pupil-to-teacher ratios at the elementary level to increase from 14.8-to-1 to 15.7-to-1.

Warrensburg School District R-VI enrolled approximately 2,400 students for the 1987-88 school year. The district operates four elementary schools, one middle school, and one high school. Current overall pupil-to-teacher ratios at the elementary level are 16-to-1. Approximately 15 percent of the school district's enrollment are dependents of federal employees. Enrollments are expected to reach 2,520 by 1990 and 2,845 by 1995. The B-2 bomber mission is expected to bring in about 380 new students to the school district. Without additional staffing, pupil-to-teacher ratios at the elementary level would rise from 16-to-1 to 18.9-to-1. These increases in enrollment, mainly associated with the B-2 bomber mission, would begin to strain the capacity of school facilities in Warrensburg. Plans for facility expansion are currently underway in these two communities.

Sedalia No. 200 School District enrolled approximately 4,000 students in the 1987-88 school year. The district operates five elementary schools, one middle school, and one high school. Local officials indicate that the average pupil-to-teacher ratio at the elementary level is 25-to-1. Enrollments are expected to increase to about 4,285 by 1990 and to 4,835 by 1995. This large increase in enrollments is mainly attributable to the B-2 bomber mission which is projected to bring in about 725 school-age children. This influx of students would increase pupil-to-teacher ratios from 25-to-1 to 30.1-to-1. School officials have indicated that existing facilities could accommodate an additional 400 students. A bond issue to fund the construction of two new elementary schools is going up for voter approval in June.

Public Services. The City of Knob Noster employs 14 full-time personnel. Public safety is provided by five sworn officers in the Police department and 22 volunteers in the Fire department. Warrensburg has 73 full-time employees working out of five departments. Public safety is provided by 20 sworn officers and a Fire Department staffed by 14 full-time and 15 volunteer firefighters. Johnson County employs approximately 100 personnel in 17 departments.

Current personnel per 1,000 service population for the cities of Knob Noster and Warrensburg, as well as Johnson County are 2.8, 5.4, and 2.6, respectively. In addition to normal population growth, the influx of people associated with the B-2 bomber mission will cause increased demands for services in the area. To maintain existing service levels, Knob Noster's staffing would have to increase from 14 to 16 by 1995, Warrensburg's from 73 to 88, and Johnson County's from 100 to 112 by 1995.

The City of Sedalia employs approximately 210 full-time personnel and an additional 40 seasonal personnel. Police and Fire Department staffing account for almost one-half of the total (47 and 41 personnel, respectively). This staffing level provides the area with 10.2 personnel per 1,000 population. To maintain these service levels, the city would have to increase staffing from 210 to 211 by 1990 and to 214 by 1995. Pettis County employs approximately 80 people in 13 departments. The Sheriff's Department is staffed by 13 personnel. This staffing level provides the county with 2.2 personnel per 1,000 population. To maintain current service levels, as measured by the county's 2.2 personnel per 1,000 population, staffing levels would have to increase from 80 to 81 by 1990 and to 82 by 1995.

Public Finance. Services provided by the City of Knob Noster are funded principally through the general fund. In 1986, general fund revenues and expenditures were approximately $320,000. The year-end fund balance was $160,000, representing approximately 50 percent of expenditures in that year. Over the 1990 to 1995 period, revenues and expenditures are projected to grow to $340,000 to $470,000. The city has no general obligation bond indebtedness. Services provided by the City of Warrensburg are funded principally through the general fund, parks fund, and sales tax fund. In 1986, revenues from these funds were $2.8 million and expenditures were $3 million. Year-end balances were $3.6 million, representing 120 percent of expenditures in that year. Revenues and expenditures are projected to reach approximately $3.8 million by fiscal year (FY) 1995. The city has no general obligation bond indebtedness.

Knob Noster School District R-VIII had revenues of approximately $4.9 million and expenditures of $5.0 million in FY 1987. Entitlements from P.L. 81-874 programs were approximately $1.2 million. Expenditures per pupil were approximately $2,900. Year-end fund balances were $3.6 million, representing about 72 percent of expenditures in that year. Revenues and expenditures are projected to reach $5.6 million by FY 1995. Warrensburg School District R-VI had revenues and expenditures of $7 million and $6.9 million, respectively, in FY 1987. Year-end fund balances were $330,000, representing about five percent of expenditures in that year. Revenues and expenditures are projected to reach $9 million by FY 1995.

Johnson County revenues and expenditures were approximately $3.4 million in FY 1986. Year-end fund balances amounted to approximately $1.3 million, representing about 38 percent of expenditures in that year. Revenues and expenditures are projected to reach approximately $3.9 million by FY 1995.

Services provided by the City of Sedalia are funded principally through the general and special revenue funds. In FY 1987, revenues and expenditures from these funds were approximately $5.9 million. The year-end fund balances were about $1.0 million, representing 17 percent of expenditures in that year. Over the 1990 to 1995 period, revenues and expenditures are projected to grow to approximately $7.0 million. Services provided by Pettis County are funded principally through the general and special revenue funds. In 1986, revenues and expenditures from these funds were approximately $3.5 million. The year-end fund balances were about $1.7 million, representing 48 percent of expenditures in that year. Sedalia No. 200 School District budgeted revenues and expenditures are approximately $13.0 million in FY 1988, representing approximately $3,200 per pupil.

4.11.1.3 Impacts of the Proposed Action

For the Proposed Action, a brief summary of the program-related effects on key socioeconomic indicators is presented in Table 4.11.1-1.

Employment and Income. The Proposed Action would create new jobs ranging from 503 in 1990 to 900 in 1991, and then stabilizing at 494 in 1993 and thereafter. Of the 900 new jobs during the peak construction year (1991), 441 would be direct jobs (89 military and 352 civilian) and 459 would be secondary. All direct and most secondary jobs would occur in Johnson County. The number of local hires would be 684. During the operations phase (beginning in 1993), there would be 339 direct jobs (281 military and 58 civilian) and 155 secondary jobs out of a total of 494 new jobs. Local hires would number 172. The new jobs would account for only 0.1 percent of the total baseline jobs in the ROI in any given year. Given the relatively small number of these new jobs, unemployment rates in the ROI would remain unaffected.

The Proposed Action would affect personal income in the ROI, especially Johnson and Pettis counties. The Proposed Action would generate personal income (in 1986 dollars) ranging from $11.8 million in 1990 to $20.4 million in 1991, and then stabilizing at $9.3 million during the operations phase. Johnson County's share of that personal income would decline from a peak $8.8 million in 1991 to $6.6 million in 1993 and thereafter. Pettis County's share of the personal income would similarly decline from to $2.9 million in 1991 and to $425,000 in 1993 and thereafter. In addition, program-related spending in the ROI would range from $10.5 million in 1990 to $18.0 million in 1991, and stabilize at $6.8 million during the operations phase.

Population and Demographics. The Proposed Action would generate inmigration to the ROI ranging from 192 in 1990 to 928 in 1992, and stabilizing at 840 during the operations phase. Of this total, Johnson County's share would vary from 121 in 1990 to 820 in 1992, and then stabilize at 766 in 1993 and thereafter. As a result, the change in the county baseline population would range from 0.3 percent in 1990 to 1.9 percent in 1992, and stabilize at 1.8 percent during the operations phase. The number of weekly commuters would be under 25 during the construction phase.

Of the 766 inmigrants to Johnson County during the operations phase, 489 inmigrants would live onbase, 151 in Knob Noster, and 126 in Warrensburg. An additional 61 persons would live in the City of Sedalia which is in Pettis County.

The inmigration would increase the baseline population of the Whiteman AFB area (Knob Noster, Warrensburg, Sedalia, and the base) by two percent in 1992 and 1.7 percent in 1993 and thereafter. Inmigrants living offbase in Knob Noster would change the baseline

Table 4.11.1-1

Selected Socioeconomic Indicators, Peacekeeper Rail Garrison Program
Whiteman AFB, Missouri, 1990-1993
Proposed Action

	1990	1991	1992	1993[1]
Region of Influence				
Employment (Jobs)				
Total Program-Related Jobs	503	900	707	494
Direct Jobs	229	441	437	339
Civilian	223	352	154	58
Military	6	89	283	281
Secondary Jobs	274	459	270	155
Local Hires	425	684	349	172
Program-Related Spending (000s 86$)	$10,464	$17,987	$11,286	$6,792
Personal Income (000s 86$)				
Direct	$ 6,194	$11,110	$ 8,927	$ 6,281
Secondary	5,634	9,328	5,358	3,014
Total Personal Income	$11,828	$20,438	$14,285	$ 9,295
Knob Noster[2]				
Population				
Baseline Population	2,123	2,363	2,447	2,594
Program-Related Change	66	180	182	151
Change as % of Baseline	3.1	7.6	7.3	5.8
Housing Demand				
Temporary Units	7	11	4	1
Permanent Units	18	44	58	49
Total Units	25	55	62	50
School District Enrollment				
Elementary	4	23	57	55
Secondary	4	19	47	45
Total Enrollment	8	42	104	100
Warrenburg				
Population				
Baseline Population	14,241	15,192	15,553	16,150
Program-Related Change	55	151	151	126
Change as % of Baseline	0.4	1.0	1.0	0.8
Housing Demand				
Temporary Units	6	9	4	1
Permanent Units	15	36	48	41
Total Units	21	45	52	42
School District Enrollment				
Elementary	4	10	14	12
Secondary	3	8	12	10
Total Enrollment	7	18	26	22
Sedalia				
Population				
Baseline Population	22,079	23,722	24,335	25,399
Program-Related Change	17	45	87	61
Change as % of Baseline	0.0	0.2	0.4	0.2
Housing Demand				
Temporary Units	7	10	5	3
Permanent Units	14	30	27	21
Total Units	21	40	32	24
School District Enrollment				
Elementary	1	3	4	4
Secondary	1	2	4	3
Total Enrollment	2	5	8	7

Notes: [1]Program-related effects would continue at these levels throughout the life of the program.
[2]Includes Whiteman AFB for school enrollment.

population by 7.3 percent in 1992 and 5.8 percent in 1993 and thereafter. The corresponding numbers for Warrensburg would be 1.0 and 0.8 percent, respectively and for Sedalia would be 0.4 and 0.2 percent, respectively. Military personnel and their dependents would account for 34 percent of the population in the Whiteman AFB area in 1993.

Housing. For the Proposed Action, the Air Force has programmed for up to 120 family housing units to be constructed either on Whiteman AFB or in the proximity of the base. Since housing conditions may change, the Air Force will monitor the housing market in the area and will increase or decrease the extent of its participation as necessary to prevent adverse housing impacts in the community.

Most program-related civilian and some military households would attempt to find privately owned permanent housing units and temporary facilities in Knob Noster and Warrensburg. Some additional program-related households would live in surrounding communities and rural areas. The remaining households (120 accompanied and 86 unaccompanied personnel) would be housed onbase in newly constructed family housing units and unaccompanied enlisted personnel housing facilities.

The offbase program-related demand for housing is expected to begin in 1990. In this year, 45 permanent units (20 in Knob Noster, 15 in Warrensburg, and 10 in Sedalia) and 20 temporary facilities would be required. The peak demand for temporary facilities would occur in 1991. The short-duration demand would be for 30 facilities in that year and would be virtually nonexistent during the operations phase. The peak demand for permanent units would be experienced in 1992. The short-duration demand would be for 140 units (60 in Knob Noster, 50 in Warrensburg, and 30 in Sedalia) and would decline to the long-duration demand of 110 units (50 in Knob Noster, 40 in Warrensburg, and 20 in Sedalia) by the following year (1993). If all Air Force personnel were required to seek suitable and affordable housing in the community in the absence of any Air Force housing program, some serious consequences would result. With a majority of military personnel in the lower enlisted grades having an average monthly housing allowance of about $350, and with the available supply of low- and moderate-priced housing occupied, a shortage of over 200 units would result. Since monthly housing expenditures at this modest level are not sufficient for the development, financing, and construction of new two-, three-, and four-bedroom housing units, the housing shortfall would be offset through the use of unsuitable and potentially substandard housing. The competition for low- and moderate-income housing between military and civilian residents in the area would cause hardship for both groups because of increased housing costs and substandard housing conditions. In some cases, Air Force families may displace existing existing residents, placing an even grater burden on low-income households. The combined effects of insufficient affordable housing, higher housing costs, and potential displacement of low-income families would result in a critical housing shortage. In order to avoid these significant impacts, the Air Force will provide adequate housing for its personnel to offset potential shortages. The reduction of vacancies will provide benefits to residential property owners.

The short-duration demand for temporary facilities in both cities would not cause a shortage even during periods of peak baseline occupancy. Therefore, these demands would have beneficial effects by reducing vacancies.

Education. Approximately 130 additional students are expected to enroll in school districts in Johnson and Pettis Counties as a result of the Proposed Action. Knob Noster School District R-VIII would receive an additional 100 students, Warrensburg School District R-VI is projected to receive an additional 20 students, and 10 students are expected to enroll in the Sedalia No. 200 school district. Because of the construction of onbase family housing, approximately 75 students would live onbase. This would result in appreciable increases in classroom size for the onbase elementary school. For the Knob Noster school district, overall pupil-to-teacher ratios at the elementary level would rise from 15.7-to-1 to 16.3-to-1. Pupil-to-teacher ratios at districts in Warrensburg and

Sedalia would not appreciably change. Under the offbase family housing option, Knob Noster would receive 30 students, Warrensburg 50, and Sedalia 50. This would cause pupil-to-teacher ratios at the elementary level to increase from 15.7-to-1 to 15.9-to-1 in Knob Noster, from 18.9-to-1 to 19.3-to-1 in Warrensburg, and from 30.1-to-1 to 30.5-to-1 at Sedalia.

The impact of these enrollment increases will largely depend on the outcome of current plans to expand facilities in these three school districts. Increases from the B-2 bomber mission alone would begin to put a strain on school facilities in Sedalia and Warrensburg. With offbase housing, additional student in these two districts could aggravate the problem if additional facilities are not forthcoming.

Public Services. Program-related increases in population would lead to increases in demands for public services provided by the City of Knob Noster of 3.8 percent over baseline levels in 1993. The increased service demands would be experienced by a majority of the departments now providing service to area residents. There would be an inappreciable difference in jurisdictional staffing and service levels between the onbase and offbase housing options. To maintain current service levels as measured by the city's rate of 2.8 personnel per 1,000 population, the city would need two additional employees by 1993. If no additional personnel were hired the number of personnel per 1,000 population would drop from 2.8 to 2.6. This reduction in the number of personnel per 1,000 population rate would not result in an appreciable deterioration from the community's current level of public service provision.

Program-related increases in population in Warrensburg would lead to increases in demands for public services of 0.8 percent in 1993. This minor increase would call for one additional employee in 1993, but would have no discernible effect on the community's ability to provide public services.

Program-related increases in population would lead to increases in demands for public services provided by Johnson County of 1.8 percent over baseline levels in 1993. To maintain existing service levels, the county would need to hire one additional employee by 1993. Even without additional staffing, however, the number of the county personnel per 1,000 population would remain at 2.6. This level of population increase would not affect the county's ability to deliver public services at current levels to area residents.

The population inmigration into Sedalia and Pettis County would lead to minor increases in the demand for public services in these jurisdictions. Additional staffing requirements would be limited to the City of Sedalia which would need additional employees by 1993.

Public Finance. Program-related increases in expenditures in the county and cities would be limited to outlays for additional personnel. Because of the relatively low personnel requirements, program-related expenditure increases would be minor (less than $40,000 in Knob Noster, Warrensburg, and Johnson County). In Knob Noster, because of the relatively low baseline expenditure levels, the expenditure increase would represent about a 10-percent increase over projected baseline levels. In Warrensburg, this would be an increase of less than one percent over projected baseline levels. In Johnson County, the increase would be approximately 1.9 percent over projected baseline expenditure levels during the operations phase.

Based on an average per pupil cost of $2,800 in the Knob Noster School District, program-induced expenditure increases would be approximately $280,000 in 1993. This increase would represent about a 5-percent increase over projected baseline expenditure levels. Payments under P.L. 81-874 programs would amount to approximately $70,000 during the operations phase. In the Warrensburg School District, based on an average per pupil cost of $3,200, program-induced expenditure increases would be approximately $60,000 in 1993. This would be an increase of less than one percent over projected baseline expenditure levels. Temporary revenue shortfalls would occur as revenues from

state foundation programs lag behind the additional enrollment (approximately $70,000 in 1992 in the Knob Noster School District and $10,000 in the Warrensburg District). Reserve fund balances of approximately $3.6 million in Knob Noster and $300,000 in Warrensburg would be adequate to meet these potential shortfalls.

Summary of Impacts. For the Proposed Action at Whiteman AFB, short- and long-duration socioeconomic impacts would be moderate since inmigration would cause population in the City of Knob Noster to increase by 7.3 percent in 1992 and 5.8 percent in 1993. This level of program-induced population growth would result in moderate impacts on housing, education, public services, and public finance within the Knob Noster area for both the peak and succeeding years. Impacts would not be significant because the increase in demand for housing would be met by available vacancies, existing and planned educational facilities would absorb program-related enrollment increases, no new public service facilities would need to be constructed and existing revenue sources of the jurisdiction would be adequate to meet program-related expenditures.

However, if current plans for the financing and construction of new school facilities in Knob Noster, Warrensburg, and Sedalia are not implemented, education impacts in these communities may become significant.

Both short- and long-duration beneficial socioeconomic effects generated by the Proposed Action would include increases in employment income and demand for permanent and temporary housing facilities in the ROI.

Mitigation Measures. Mitigation measures that could be undertaken to reduce or eliminate potential significant impacts of the Peacekeeper Rail Garrison program at Whiteman AFB are listed below. All or some of these measures may be implemented. For each measure, the agencies that may be involved in implementation are identified.

- As appropriate, award multiple small contracts to enable local firms with limited bonding capacities the opportunity to bid. Contract awards to local firms would reduce population inmigration during the construction phase and subsequently lower demand for temporary housing units (U.S. Army Corps of Engineers [COE]).

- Provide information to local job service agencies about the availability of jobs (by type) and the skills needed for them. This information could help reduce the number of job seekers inmigrating into the area and reduce demand for local housing (U.S. Air Force contractors).

- Consult with local school district officials, state educators, and other federal officials who would recommend appropriate responses to potential overcrowding at local schools which serve the onbase personnel (U.S. Air Force).

- Maximize participation in P.L. 81-874 entitlement programs by encouraging parents who live or work on federal facilities to respond to school district requests for information. This federal program provides aid to local school districts which have had substantial increases in school enrollments as a result of new or expanded federal activities (U.S. Air Force).

4.11.1.4 Impacts of the Alternative Action

For the Alternative Action, a brief summary of the program-related effects on key socioeconomic indicators is presented in Table 4.11.1-2.

Table 4.11.1-2

Selected Socioeconomic Indicators, Peacekeeper Rail Garrison Program
Whiteman AFB, Missouri, 1990-1993
Alternative Action

	1990	1991	1992	1993[1]
Region of Influence				
Employment (Jobs)				
Total Program-Related Jobs	537	954	758	544
Direct Jobs	248	474	472	373
Civilian	242	377	161	64
Military	6	97	311	309
Secondary Jobs	289	480	286	171
Local Hires	452	719	367	189
Program-Related Spending (000s 86$)	$11,071	$18,884	$11,986	$7,473
Personal Income (000s 86$)				
Direct	$ 6,710	$11,936	$ 9,587	$ 6,912
Secondary	5,928	9,741	5,668	3,317
Total Personal Income	$12,638	$21,677	$15,255	$10,229
Knob Noster[2]				
Population				
Baseline Population	2,123	2,363	2,447	2,594
Program-Related Change	71	158	197	166
Change as % of Baseline	3.3	6.7	8.1	6.4
Housing Demand				
Temporary Units	8	11	4	1
Permanent Units	20	48	63	54
Total Units	28	59	67	55
School District Enrollment				
Elementary	5	25	63	61
Secondary	4	21	51	49
Total Enrollment	9	46	114	110
Warrenburg				
Population				
Baseline Population	14,241	15,192	15,553	16,150
Program-Related Change	59	132	164	138
Change as % of Baseline	0.4	0.9	1.1	0.9
Housing Demand				
Temporary Units	6	9	4	1
Permanent Units	16	40	52	45
Total Units	22	49	56	46
School District Enrollment				
Elementary	4	11	15	13
Secondary	4	9	13	11
Total Enrollment	8	20	28	24
Sedalia				
Population				
Baseline Population	22,079	23,722	24,335	25,399
Program-Related Change	18	40	94	69
Change as % of Baseline	0.0	0.2	0.4	0.3
Housing Demand				
Temporary Units	7	10	5	3
Permanent Units	15	33	30	23
Total Units	22	43	35	26
School District Enrollment				
Elementary	1	3	4	4
Secondary	1	3	4	3
Total Enrollment	2	6	8	7

Notes: [1]Program-related effects would continue at these levels throughout the life of the program.
[2]Includes Whiteman AFB for school enrollment.

Employment and Income. Impacts of the Alternative Action on employment and income in the ROI would be higher than those of the Proposed Action. During the construction phase, the Alternative Action would create new jobs ranging in number from 537 in 1990 to 954 in 1991, which is 34 to 54 more jobs than those created by the Proposed Action. Of the 954 new jobs during the peak construction year (1991), 474 would be direct jobs (377 civilian and 97 military) and 480 would be secondary jobs. There would be 719 local hires, 35 more than with the Proposed Action. During the operations phase, total new jobs created by the Alternative Action would number 544, which is 50 more than those created by the Proposed Action. Of these 544 new jobs, 373 would be direct jobs (64 civilian and 309 military) and 171 would be secondary jobs. Local hires would number 189 or 17 more than local hires with the Proposed Action.

During the construction phase, the Alternative Action would generate personal income ranging from $12.7 million in 1990 to $21.7 million in 1991 in the ROI. This is $0.9 million to $1.3 million more than generated by the Proposed Action. Johnson County's share of that personal income would range from $4.7 million in 1990 to $9.6 million in 1991. Pettis County's share of the personal income would range from $2.5 million in 1990 to $3.9 million in 1991. During the operations phase, the Alternative Action would generate $10.2 million in personal income for the ROI and $7.2 million of that personal income would go to Johnson County, and $832,000 would go to Pettis County. In the ROI, the program-related spending would range from $11.1 million in 1990 to $18.9 million in 1991, and then stabilize at $7.5 million during the operations phase.

Population and Demographics. The population increase associated with the Alternative Action would range from 207 in 1990 to 1,015 in 1992 in the ROI, 15 to 87 more persons than that associated with the Proposed Action. During the operations phase, total inmigrants to the ROI would number 925, which is 85 more than the Proposed Action. During the construction phase, Johnson County's share of the inmigration would range from 130 in 1990 to 900 in 1992. Of the 925 total inmigrants during operations, 842 would move to Johnson County. During the operation phase, the majority of inmigrants would be military personnel and their dependents. As a result of the total inmigration, the county's population would increase ranging from 0.3 percent in 1990 to 2.1 percent in 1992 and then to 1.9 percent during operations.

Of the 842 inmigrants generated by the Alternative Action during the operations phase, 538 would live onbase, 166 in Knob Noster, and 138 in Warrensburg. In addition, 69 persons would live in Sedalia, which is in Pettis County.

The inmigration would increase the baseline population of the Whiteman AFB area (Knob Noster, Warrensburg, Sedalia, and the base) by 2.2 percent in 1992 and 1.9 percent in 1993 and thereafter. Inmigrants living offbase in Knob Noster would change the baseline population by 8.1 percent in 1992 and 6.4 percent in 1993 and thereafter. The corresponding numbers for Warrensburg would be 1.1 and 0.9 percent, respectively and for Sedalia would be 0.4 and 0.3 percent, respectively. Military personnel and their dependents would account for 34 percent of the population in the Whiteman AFB area in 1993.

Housing. The Alternative Action would not change the expected program-related housing demand patterns within Knob Noster, Warrensburg, and the surrounding communities and rural areas. However, an additional 8 unaccompanied and 12 accompanied military personnel would live onbase in newly constructed family housing units and unaccompanied enlisted personnel housing facilities. For the Alternative Action, the Air Force has programmed for up to 132 family housing units to be constructed either on Whiteman AFB or in the proximity of the base. However, current projections of housing vacancies and potential new construction in the area suggest that about 267 would have to be provided by the Air Force through one of its housing programs. However, the Air Force will not build family housing to offset a short-duration shortage. Therefore, housing

impacts will be short-duration and significant. Since these conditions may change, the Air Force will continue to monitor the housing market in the area and will increase or decrease the extent of its participation as necessary to prevent adverse long-duration housing impacts in the community.

The additional workers would not change demand for temporary facilities appreciably, but would require an additional five permanent units in each of the three cities in 1992 and ten permanent units (5 each in Knob Noster and Sedalia) during the operations phase (1993 and thereafter). If all Air Force personnel were required to seek suitable and affordable housing in the community in the absence of any Air Force housing program, some serious consequences would result. With a majority of military personnel in the lower enlisted grades having an average monthly housing allowance of about $350, and with the available supply of low- and moderate-priced housing occupied, a shortage of over 200 units would result. Since monthly housing expenditures at this modest level are not sufficient for the development, financing, and construction of new two-, three-, and four-bedroom housing units, the housing shortfall would be offset through the use of unsuitable and potentially substandard housing. The competition for low- and moderate-income housing between military and civilian residents in the area would cause hardship for both groups because of increased housing costs and substandard housing conditions. In some cases, Air Force families may displace existing existing residents, placing an even grater burden on low-income households. The combined effects of insufficient affordable housing, higher housing costs, and potential displacement of low-income families would result in a high and significant housing impact. In order to avoid these significant impacts, the Air Force will provide adequate housing for its personnel to offset potential shortages.

The additional demand for permanent units would increase the beneficial effects which would be experienced by landlords and property owners. It would also increase the adverse impacts on both program-related and local households.

Education. During the operations phase, the Alternative Action would bring in an additional 10 students above those levels reported for the Proposed Action. Knob Noster School District R-VIII is projected to receive 110 students, Warrensburg School District R-VI is expected to receive 25 students, and the remainder would attend Sedalia No. 200 school district. Because of the construction of onbase family housing, 80 students would reside onbase. The elementary school located onbase would receive a sizable share of these students. Additional staffing may be needed to accommodate this influx. Student-to-teacher ratios would remain essentially the same as those identified for the Proposed Action.

Public Services. The additional population inmigration associated with this alternative would not result in a measurable increase in city or county personnel needs over what is projected for the Proposed Action. Personnel per 1,000 population rates for Knob Noster, Warrensburg, Sedalia, as well as Johnson and Pettis Counties would not differ from the levels identified for the Proposed Action.

Public Finance. Because no additional service personnel would be required for this alternative, expenditure impacts in the cities, county, and school district would not vary from levels estimated for the Proposed Action.

Summary of Impacts. For the Alternative Action at Whiteman AFB, short- and long-duration socioeconomic impacts would be moderate because population in the City of Knob Noster is projected to increase by 8 percent in 1992 and 6.4 percent in 1993. This level of program-induced population growth would result in moderate impacts on housing, education, public services, and public finance within the Knob Noster area for both the peak and succeeding years. Impacts would not be significant because program-related demand for housing could be met by available vacancies or the timely development of suitable housing, and existing and planned educational facilities could absorb program-

related enrollment increases. No new public service facilities would need to be constructed and existing revenue sources would be adequate to meet program-related expenditures. However, if current plans for the financing and construction of new school facilities in Knob Noster, Warrensburg, and Sedalia are not implemented, education impacts in these communities may be significant.

Both short- and long-duration beneficial socioeconomic effects generated by the Alternative Action would include increases in employment income and demand for permanent and temporary housing facilities in the ROI.

Mitigation Measures. The significant housing and education impacts would be mitigated through options previously discussed for the Proposed Action.

4.11.2 UTILITIES

4.11.2.1 Region of Influence

The utilities ROI for Whiteman AFB includes the host communities of Warrensburg, Knob Noster, and Sedalia and the base.

4.11.2.2 Existing and Future Baseline Conditions

Potable Water Treatment and Distribution. The cities of Warrensburg and Knob Noster provide their residents with well water. The average daily potable water demand for the City of Warrensburg for 1987 was 1.9 million gallons per day (MGD) or 94 percent of the 2.02-MGD treatment capacity. Storage is adequate to handle peak summer demands. The average daily demand for 1990 and 1994 is estimated to be 1.9 MGD and 2.3 MGD, respectively, and the city has plans to expand its capacity to 3.36 MGD. The City of Knob Noster had an average daily potable water demand in 1987 of 0.26 MGD or 100 percent of the system capacity. Storage for the city is 0.45 million gallons (MG) and occasional water shortages are experienced. A new well, operational in June 1988, will increase the city's capacity to 0.38 MGD and should resolve the current shortage problem. Estimated average daily demand for 1990 is 0.27 MGD and it would increase to 0.34 MGD in 1994 as a result of the inmigration associated with the B-2 bomber mission.

The City of Sedalia provides its residents potable water from both surface and groundwater supplies. The average daily potable water demand during the years 1985 to 1987 was 3.0 MGD. Existing treatment capacity is 6.0 MGD and the city has a total storage capacity of 4.0 MG. The city's water system has not experienced any water shortages and is capable of meeting peak demands. Average daily demands are estimated to increase to 3.3 MGD in 1990 and 3.9 MGD in 1994. Adequate capacity will be available to meet these demands.

Whiteman AFB derives its water from a groundwater source. The base's average daily potable water demand for 1986 was 0.7 MGD or 52 percent of the 1.35-MGD treatment capacity. Storage capacity of 1.5 MG is sufficient to handle increased summer demands. The demands for the base are expected to increase as a result of the B-2 bomber mission. Three additional wells will be constructed providing a supply of 3.0 MGD by 1990.

Wastewater. The City of Warrensburg has three wastewater treatment facilities, consisting of two oxidation ponds and a lagoon that are operating at 107, 57, and 74 percent of capacity, respectively. The city is presently looking at how to resolve the overloaded oxidation pond and expansion of the lagoon system. The 1987 collective wastewater flow was 2.86 MGD and the anticipated 1990 and 1994 flows are 3.02 MGD and 3.14 MGD, respectively. The City of Knob Noster provides wastewater treatment for its residents through a lagoon and overland flow system. The average wastewater flow for 1987 was estimated to be 0.2 MGD or 42 percent of the 0.48-MGD treatment

capacity. The anticipated 1990 and 1994 wastewater flows are 0.27 MGD and 0.43 MGD, respectively. The City of Sedalia provides wastewater treatment to its residents through three facilities with a total capacity of 7.6 MGD. The average daily wastewater flows from all three plants was 4.0 MGD in 1987. The city and the state are examining financing options for improvements to the central plant, which is currently under administrative order. Average daily flows are estimated to increase 4.4 MGD in 1990 and 5.1 MGD in 1994. Whiteman AFB provides wastewater treatment for its residents with an 0.8-MGD trickling filter plant that had an average daily flow of 0.53 MGD in 1987. The wastewater flow at the base is expected to increase up to 0.90 MGD as a result of the B-2 bomber mission. The capacity of the onbase wastewater system will be increased to 1.4 MGD to process the increased flow.

Solid and Hazardous Waste. Solid waste from Warrensburg, Knob Noster, Sedalia, and Whiteman AFB is collected and disposed of by municipal and private haulers. Two landfills, whose lifespans are through 1993, receive all wastes, estimated at 83 tons per day (T/day). Additional landfill space will be required after 1993 to dispose of baseline solid waste.

Onbase hazardous wastes are managed by Whiteman AFB and the Defense Reutilization and Marketing Office (DRMO) is responsible for providing for the proper handling of the wastes and arranging for transport to treatment and disposal facilities. The DRMO has plans to construct a new conforming storage facility in FY 1989. The wastes include sodium chromate, batteries and battery acid, oils, paints, thinners, solvents, and other regulated materials.

Energy Utilities. Missouri Public Service Company (MoPub) services 141,000 electricity customers, including Warrensburg, Knob Noster, Sedalia, and Whiteman AFB. Peak demand in 1987 equaled 850 megawatts (MW). MoPub projects peak demand to increase to 886 MW in 1990 and 953 MW in 1994. The system has an adequate supply, including surplus, and foresees no problem in meeting demand. Electric power is supplied to Whiteman AFB via a single 69-kilovolt (kV) transmission line to a company-owned transformer substation. The transmission line has an unused capacity of 15 kV. Currently, the existing distribution system is being replaced and new substation facilities are being installed which will have adequate capacity for existing and future missions.

Natural gas is provided to Warrensburg and Knob Noster by MoPub. MoPub purchases its gas supplies from Northwest Central Pipeline Corporation and Panhandle Eastern Pipeline Company. MoPub projects gas consumption to remain stable, with a small decline in demand because of conservation. The company maintains an adequate supply with surplus available to accommodate increases in consumption. Kansas Power and Light provides natural gas service to Whiteman AFB. Peak demand is approximately 56,000 thousand cubic feet (Mcf) per month, and average usage is approximately 30,600 Mcf per month. The natural gas distribution system at Whiteman AFB is adequate for current demand, but may require expansion to accommodate additional demand.

The central heating system consists of a steam plant and distribution system supplying heat to the cantonment and operational areas. The plant is a modified combustion gas- and oil-fired complex, with four boiler units producing steam. One boiler is new, and two have been retrofitted. Only three boilers can be fired at one time, the fourth is a standby. Peak demand requires approximately 88 percent of the capacity of the three boilers. Average natural gas use in the boiler plant is 20,000 Mcf per month. Military family housing is heated by natural gas-fired furnaces with firm supply. Average use is 12,700 Mcf per month. In FY 1987, total natural gas consumption was 343,820 Mcf.

Aviation fuel (JP-4), unleaded gas, leaded gas, diesel fuel, No. 6 heating oil, and deicer are available at Whiteman AFB. Liquid fuel is supplied by tanker truck and rail. The fuel system consists of tanker unloading connections for pumping liquid fuel from tank cars and tanker trucks to bulk storage areas.

4.11.2.3 Impacts of the Proposed Action

Potable Water Treatment and Distribution. With military housing constructed onbase, average daily requirements for the City of Warrensburg would increase from a baseline level of 2.18 MGD to a peak of 2.20 MGD in 1992 because of a 0.02-MGD or 1-percent program-related increase. Program-related increases would equal 0.02 MGD or one percent above baseline. If housing for military personnel is constructed offbase, average daily requirements in the City of Warrensburg would increase from 2.18 MGD to 2.22 MGD. Program-related increases would equal 0.04 MGD or 1.9 percent. For either option, the city's treatment facilities, with a 3.36-MGD capacity would have adequate capacity and storage would be adequate to meet summer demands. With military housing constructed onbase, average daily requirements for the City of Knob Noster would increase from a baseline level of 0.32 MGD to a peak of 0.34 MGD in 1992. Program-related increases would equal 0.02-MGD or 7.5 percent. If housing for military personnel is constructed offbase, average daily requirements in the City of Knob Noster would be about the same.

In 1992, average daily requirements for the City of Sedalia would increase from a baseline level of 3.65 MGD to 3.69 MGD if military housing is constructed offbase. The city's treatment capacity of 6.0 MGD would be adequate to process the 1.1-percent program-related increase. The city's treatment and distribution system, with a projected capacity of 0.38 MGD, would be adequate. Daily requirements at Whiteman AFB with military housing onbase would increase from baseline levels of 0.86 MGD by 0.10 MGD, or 11.6 percent, in the same year. If housing for military personnel is built offbase, program-related demands would equal 0.03 MGD in 1992, an increase in the total demand from 0.86 MGD to 0.89 MGD. The capacity of the base water supply would be expanded to 3 MGD and would be adequate to meet the projected demands.

Wastewater. With military housing constructed onbase, average daily flows for the City of Warrensburg would increase from baseline levels of 3.06 MGD to a peak of 3.07 MGD in 1992. Program-related increases would equal 0.01-MGD or less than 1 percent above baseline. If military housing is constructed offbase, average daily flows for the City of Warrensburg would increase from 3.06 MGD to 3.09 MGD. Program-related increases would equal 0.03 MGD or one percent. While the total capacity equals 3.47 MGD, two of the existing facilities are unable to adequately treat the flows and one of these facilities is operating above its rated capacity. The city is considering actions to improve the facilities. With military housing constructed onbase, average daily flows for the City of Knob Noster would increase from a baseline level of 0.24 MGD to a peak of 0.26 MGD in 1992. Program-related increases would equal 0.02 MGD or a 7.4-percent increase above baseline. If military housing is constructed offbase, the flows would remain the same. The treatment facility, with 0.48-MGD capacity, would be operating at 54 percent and would be able to adequately treat the increased flows. Average daily flows at Whiteman AFB, with military housing onbase, would increase from a baseline level of 0.62 MGD to 0.69 MGD. Program-related flows would equal 0.07 MGD or 10.9 percent in 1992. The expanded base treatment facility will have a capacity of 1.4 MGD and would be adequate to treat the increased flow. If military housing is constructed offbase then the flows at the base would increase from 0.62 MGD to 0.63 MGD and adequate capacity would be available.

Solid and Hazardous Waste. With military housing onbase, solid waste generation would increase by a total of 4.6 T/day or 9.4 percent for the cities of Knob Noster, Warrensburg, Sedalia, and Whiteman AFB in 1992. Solid waste generation at Whiteman AFB would contribute approximately 1.7 T/day to that amount. With the cities and private haulers already adequately disposing of 83 T/day, the program-related increase would require no additional equipment or personnel. If military housing is constructed offbase, the solid waste generated at the base would increase by 0.3 T/day less, while solid waste generation in the communities would increase by 3.1 T/day. Solid waste in the area is disposed of at two private landfills with expected lifespans through 1993. A

facility would be required after that date to dispose of baseline and program-related wastes. Program-related hazardous waste generation at Whiteman AFB would be incorporated into the existing management system, stored onbase, and then transported to treatment and disposal facilities.

Energy Utilities. Program-related electricity demands would peak in 1993 with an increase of 5.06 MW. This demand would increase the projected peak demand of 939 MW for the MoPub system by less than one percent. The MoPub system has adequate power supplies to meet this increase. Electrical requirements, with onbase military housing, would be an increase of 4.86 MW. Adequate capacity will be available from the new substations to meet these demands. If military housing is constructed offbase, the demands for electricity at the base would be less while overall consumption would be similar. Program-related natural gas consumption in the region would increase demand by 15 million cubic feet (MMcf). MoPub has adequate infrastructure and reserves to meet the new demand. Natural gas use at the base, with onbase military housing, would increase demand 20 MMcf. Natural gas is supplied to the base by Kansas Power and Light and their reserves and infrastructure are adequate to absorb the increase. If military housing is constructed offbase, then the demands for natural gas at the base would be less while overall consumption would be similar. As a result of the program, diesel fuel consumption at Whiteman AFB would increase. Supplies would continue to be filled by the Defense Fuels Supply Center through contracts with local and regional suppliers.

Summary of Impacts. Utility requirements associated with the Peacekeeper Rail Garrison program would increase demands on the City of Knob Noster by 7.4 percent, on the City of Sedalia by 1.1 percent, and on the City of Warrensburg by 1.9 percent in 1992 (peak year). During the operations phase, the increases would be slightly less but would remain above five percent in Knob Noster. Both peak year and operations requirements on energy utilities would be less than one percent. Because the peak year requirements would not be substantially greater than the impacts associated with the operations requirements, all utility impacts are considered to be of long duration. These impacts would be moderate since program-related increases are greater than five percent but less than ten percent. Impacts would not be significant because each utility system has adequate capacity to meet the new demands without increasing personnel or expanding existing facilities.

4.11.2.4 Impacts of the Alternative Action

Potable Water Treatment and Distribution. With the additional construction associated with six Train Alert Shelters (TASs) and the operations personnel to support the program, potable water requirements for the Alternative Action would be slightly greater than the Proposed Action. With military housing constructed onbase, program-related potable water demands would increase by less than 0.01 MGD in the cities of Warrensburg and Knob Noster. Program-related demands would increase overall consumption by eight percent in Knob Noster and by one percent in Warrensburg. The Alternative Action would increase the demand at Whiteman AFB by 0.01 MGD to 0.11 MGD or a 12-percent increase over the baseline demand in the same year. With military housing constructed offbase, program-related potable water demands would increase by less than 0.01 MGD in the cities of Warrensburg, Knob Noster, and Sedalia. Program-related demand would increase overall consumption by 9.4 percent in Knob Noster, by 2.2 percent in Warrensburg, and 1.4 percent in Sedalia. In all of these cases, the slight increase associated with the Alternative Action would not create any additional problems or add to any existing problems that may be associated with the Proposed Action.

Wastewater. With military housing constructed onbase, average daily flows to the City of Warrensburg's treatment plants would peak in 1992 and would be slightly larger then the flows identified for the Proposed Action, but still remain less then a 1-percent increase over the baseline flow. The Alternative Action would slightly increase the

demand on the City of Knob Noster's system to 8.1 percent of the baseline demand. With military housing constructed offbase, program-related flows would increase by less than 0.01 MGD in the cities of Warrensburg, Knob Noster, and Sedalia. Program-related demands would increase overall processing by 8.7 percent in Knob Noster, by 1.1 percent in Warrensburg, and by less than 1.0 percent in Sedalia. The demand at the base would increase by less than 0.1 MGD over the Proposed Action or a 12.7-percent increase over the baseline demand. In all of the previously mentioned cases, the slight increase associated with the Alternative Action would not create any additional problems or add to any existing problems that may be realized due to the Proposed Action.

Solid and Hazardous Waste. Solid waste generation from the increased construction and operations activities from the Alternative Action would be slightly greater than the Proposed Action. Solid waste generation for both the cities and the base would be 0.5 T/day greater during the construction and operations phases. These increases would not adversely affect the city and private haulers or the life of the landfills involved. Hazardous waste generation would be slightly greater than the Proposed Action as a result of the maintenance activities associated with the additional trains. These wastes would be incorporated into the existing management system and transported to treatment and disposal facilities.

Energy Utilities. Demands for electricity would be 0.6 MW greater for the Alternative Action than for the Proposed Action. The additional demand associated with this alternative would not create any problems or add to any problems that may be realized due to the Proposed Action on the MoPub or the base's system. Demands for natural gas are 2.8 MMcf greater for the Alternative Action than for the Proposed Action. Both MoPub and Kansas Power and Light have adequate infrastructure and reserves to meet these increased demands. Liquid fuel consumption would be greater than the Proposed Action. Supplies would continue to be filled by the Defense Fuels Supply Center through contracts with local and regional suppliers.

Summary of Impacts. Utility requirements associated with the Alternative Action would be slightly greater than those identified for the Proposed Action. Because the peak year requirements would not be substantially greater than the impacts associated with the operations requirements, all utility impacts are considered to be of long duration. These impacts would be moderate since program-related demands on potable water and wastewater systems exceed five percent in the City of Knob Noster. Impacts would not be significant because each utility system has adequate capacity to meet the new demands without increasing personnel or expanding existing facilities.

4.11.3 TRANSPORTATION

4.11.3.1 Region of Influence

The ROI for transportation includes the principal city streets in Knob Noster, Warrensburg, and Sedalia, Missouri, and the primary highways leading to Whiteman AFB.

4.11.3.2 Existing and Future Baseline Conditions

The principal city streets in Knob Noster consist of McPherson Road, also referred to as Business Route U.S. 50, and State Street, also referred to as J Road. J Road, which leads to Whiteman AFB, had an average annual daily traffic (AADT) of 5,000 in 1986. Business Route U.S. 50, which provides access to Knob Noster from Kansas City and Jefferson City, handled between 4,300 to 4,600 vehicles per day in 1986. The principal city streets in Warrensburg, located about nine miles west of Knob Noster, include Young Avenue, Gay Street, Maguire Street, and Holden Street. Young Avenue, which is Business Route U.S. 50 in Warrensburg, had segments with an AADT ranging between 3,260 and 12,180 in 1986. Maguire Street, which is part of Missouri State Highway 13, had an AADT of 9,530 to 16,400 within the city. Gay Street and Holden Street had an AADT of 3,450 to 8,210,

respectively, in 1986. The principal streets in Sedalia, located 19 miles east of Knob Noster, include Broadway Boulevard, which is a segment of U.S. 50, and Limit Avenue, which is a segment of U.S. 65. Segments of Broadway Boulevard, within the downtown area, had an AADT of 18,150 to 23,870 in 1986. Limit Avenue had AADTs of 14,420 to 19,900 in 1986.

Current level of service (LOS) ratings of these principal city streets are mostly free-flowing. McPherson Road and State Street in Knob Noster were providing service at LOS A during the peak hours in 1986. (Refer to Section 3.4.4 and Table 3.4.4-1 for descriptions of LOS letter scores.) Segments of Young Avenue and Maguire Street in Warrensburg provided service at LOS A and B during the peak hours in 1986. Traffic flow along Gay Street and Holden Street was also free-flowing at LOS A. Broadway Boulevard in Sedalia provided service at LOS B and C during the peak hour in 1986. Traffic flow along Limit Avenue was rated at LOS B. With normal growth in traffic and with the B-2 bomber mission at Whiteman AFB, traffic flow along these principal roads would increase substantially. Sections of J Road would be providing service at LOS B by 1990. Sections of U.S. 50, near Knob Noster, would drop to LOS C by 1994. Segments of the principal roads in Sedalia, where most of the program-related personnel are expected to reside, would be providing service at LOSs B and C by 1990, and at LOS C by 1994.

The primary access to the base is provided by U.S. 50, which proceeds east-west just north of the base connecting Kansas City with Jefferson City. U.S. 50 passes through Warrensburg, Knob Noster, and Sedalia, the communities closest to the base. The base has three gates: the Warrensburg (main) gate on arterial road Mitchell Avenue, which connects with Missouri State Secondary Highway 132; the Knob Noster gate on Arnold Avenue, which is the principal arterial to the flightline and community center; and Windsor gate on Windsor Drive on the south side of the base.

Morning peak-hour machine counts taken in 1986 recorded a total of 1,033 vehicles entering the base: 543 vehicles at the Knob Noster gate, 430 vehicles at the Warrensburg gate, and 60 vehicles at the Windsor gate. Morning traffic at the base is widely dispersed with no particular route experiencing a high concentration of traffic. Similarly, afternoon peak-hour (between 4:00 P.M. and 5:00 P.M.) volumes are quite low, usually less than 150 vehicles per hour in one direction. The LOS ratings at these gates were estimated at level A. Overall, traffic volumes at the installation are fairly low. Momentary traffic congestion occurs onbase during the morning and afternoon peak hours, but this is only of short duration and does not substantially affect the flow of traffic at any particular location. However, traffic volumes are expected to increase dramatically in some areas of the base and truck traffic will be especially heavy the next few years as construction for the B-2 bomber mission progresses. A proposed road improvement program in the Knob Noster area includes widening and realignment of Missouri State Secondary Highway 132 from the Warrensburg gate of Whiteman AFB to U.S. 50. The plan also includes construction of a cloverleaf interchange at the junction of U.S. 50.

4.11.3.3 Impacts of the Proposed Action

During the construction phase, an increase in incoming vehicular traffic would occur as a result of the movement of construction workers, materials, and equipment. Construction activities would require an estimated 441 program-related personnel during the peak construction year (1991). Of these, 104 program-related employees would reside in Knob Noster, 168 in Warrensburg, and 100 in Sedalia, and would commute daily to the base. They would add a total of 345 passenger vehicle trips to the base during the peak hours in 1991. The increase in traffic would add to the delays and queues at the main gate to Whiteman AFB. Additional heavy vehicle trips to the base would also increase traffic volume at the gate. However, these movements could occur during off-peak hours and would not cause additional delays at the main gate during the rush hours. Program-related commuters would cause an increase in traffic flow along principal streets in Knob

Noster, Warrensburg, and Sedalia, but would not reduce the LOS rating. Traffic would increase along Missouri State Highway J, which leads to the base, causing increased vehicular traffic and reducing its LOS from B to C.

During the operations phase, an estimated 55 out of the 339 program-related employees would reside in Knob Noster, 89 in Warrensburg, and 95 in Sedalia. They are expected to add a total of 224 passenger vehicle trips to the base and would slightly increase congestion and delays along Missouri State Highway J, and would reduce its LOS rating from B to C. Operations personnel commuting from Sedalia and Warrensburg would not cause a reduction in LOS rating along the principal city streets. Traffic flow would remain at LOSs B and C. Increased queues and waiting time would also occur at the entrance gate. In addition, occasional program-related deliveries of supplies and equipment could also increase traffic volume at the gates. However, they are expected to occur during off-peak hours and could use other access routes to the base. If military housing is provided onbase, only 80 program-related personnel would reside in the communities. No changes in LOS ratings would occur.

Interruptions to vehicular flow along public roads where the rail spur crosses would also occur. The trains would only move out of the garrison when either major maintenance or repair necessitates that they be transported to the Main Operating Base or depot facilities, or when directed to disperse during times of national need. In addition, a training train would travel periodically to the garrison installation to accomplish operations, security, and maintenance training. These train interruptions at railroad/road crossings would not cause substantial delays to vehicular traffic. Moreover, these train interruptions would only occur occasionally.

Both short- and long-duration impacts on transportation would be low because the LOS rating along Missouri State Highway J would drop from B to C. A slight increase in queues and waiting time at the main gate could occur but this would not continue indefinitely. Impacts would not be significant.

If military housing is provided onbase, long-duration impacts would be negligible because no changes in LOS ratings would occur.

4.11.3.4 Impacts of the Alternative Action

Compared to the Proposed Action (4 TASs), the Alternative Action (6 TASs) would require slightly more program-related personnel. During the construction phase, an estimated 474 program-related personnel would be needed by 1991 (the peak construction year). Of these employees, 113 are expected to reside in Knob Noster, 182 in Warrensburg, and 105 in Sedalia. They are estimated to add a total of 371 passenger vehicle trips to the base during the peak hours in 1991. They would also increase vehicular flow at the entrance gate as with the Proposed Action. The LOS rating along Missouri State Highway J would be reduced from B to C. Program-related personnel commuting from Sedalia and Warrensburg would not cause a reduction in LOS rating along the principal city streets.

During the operations phase, an estimated 61 out of 373 program-related personnel may reside in Knob Noster, 98 in Warrensburg, and 105 in Sedalia. They are expected to add a total of 246 passenger vehicle trips (22 more than for the Proposed Action) to the base during the peak hours and would cause additional vehicular traffic along Missouri State Highway J and at the main gate. These increases in vehicular flow along Missouri State Highway J would reduce the LOS from B to C. Peacekeeper and training train impacts on vehicular traffic at road crossings would be about the same as the Proposed Action. If military housing is provided onbase, only 88 program-related personnel would reside in the communities. No changes in LOS ratings would occur.

Commuting associated with the Alternative Action would be slightly greater than with the Proposed Action. Both short- and long-duration impacts on transportation would still be low because the LOS rating along Missouri State Highway J and the main gate would be reduced from B to C. The LOS ratings along the principal city streets in Knob Noster, Warrensburg, and Sedalia would not change. Impacts would not be significant. If military housing is provided onbase, long-duration impacts would be negligible because no changes in LOS ratings would occur.

4.11.4 LAND USE

4.11.4.1 Region of Influence

The land use ROI includes Whiteman AFB, adjacent private lands located around the affected areas of the base, and a connector rail spur corridor approximately 3.2 miles long (offbase), including both existing and proposed rail mileage. The connector spur corridor would be located on private land that extends generally north from the garrison, then turns west, southwest, and west offbase to a new rail wye which would connect to the existing connector spur. The existing connector spur is generally aligned north-south in the vicinity of the proposed wye. The existing spur proceeds north to connect with the main line of the Union Pacific Railroad.

4.11.4.2 Existing and Future Baseline Conditions

The City of Knob Noster, just north of the base, has adopted a zoning ordinance but not a comprehensive plan. All of the area immediately surrounding the base is in the unincorporated part of Johnson County. Johnson County has adopted neither a zoning ordinance nor a comprehensive plan.

Figure 4.11.4-1 presents a generalized overview of land use onbase and surrounding areas. The primary land uses are military (associated with Whiteman AFB), agricultural and mixed open space, or private and public land. The cultivation of soybeans, milo, corn, and hay on nonirrigated croplands is the primary agricultural land use. Some croplands have been developed with extensive terrace systems associated with contour plowing. Mixed open space generally consists of unimproved pasture devoted to cattle or horse grazing and noncommercial forest. The largest amount of forested area is within Knob Noster State Forest, located west and northwest of the base, with the existing connector spur track located within a portion of the park. Prime farmland soils exist in the vicinity of the base, but no unique farmlands.

Inhabited buildings surround the affected portions of the base and connector spur corridor. Near the southwestern portion of the base, there are two inhabited farmhouses and associated farm structures. Near the southeastern portion of the base there are three scattered inhabited buildings (residences), one vacant farmhouse, and a private grass airstrip. Adjacent to the northwestern portion of the base are five inhabited buildings (residences) and one abandoned residence. Eighteen inhabited buildings (residences) are also present in a subdivision approximately 0.5 mile northeast of the base boundary.

The proposed connector spur and wye would be adjacent to a mobile home park with about 130 mobile homes and 4 commercial buildings. Other inhabited buildings located in the vicinity of the proposed connector spur include three residences, two commercial buildings with a total of four businesses, one church, and one industrial building. The existing connector spur corridor north of the proposed wye has about 60 residences and 2 commercial buildings.

Offbase, the ROI also contains low-voltage electrical distribution lines, one sewer line, one high-pressure gas transmission line, one aboveground telephone line, four state highways in the supplemental state highway system, and four county roads.

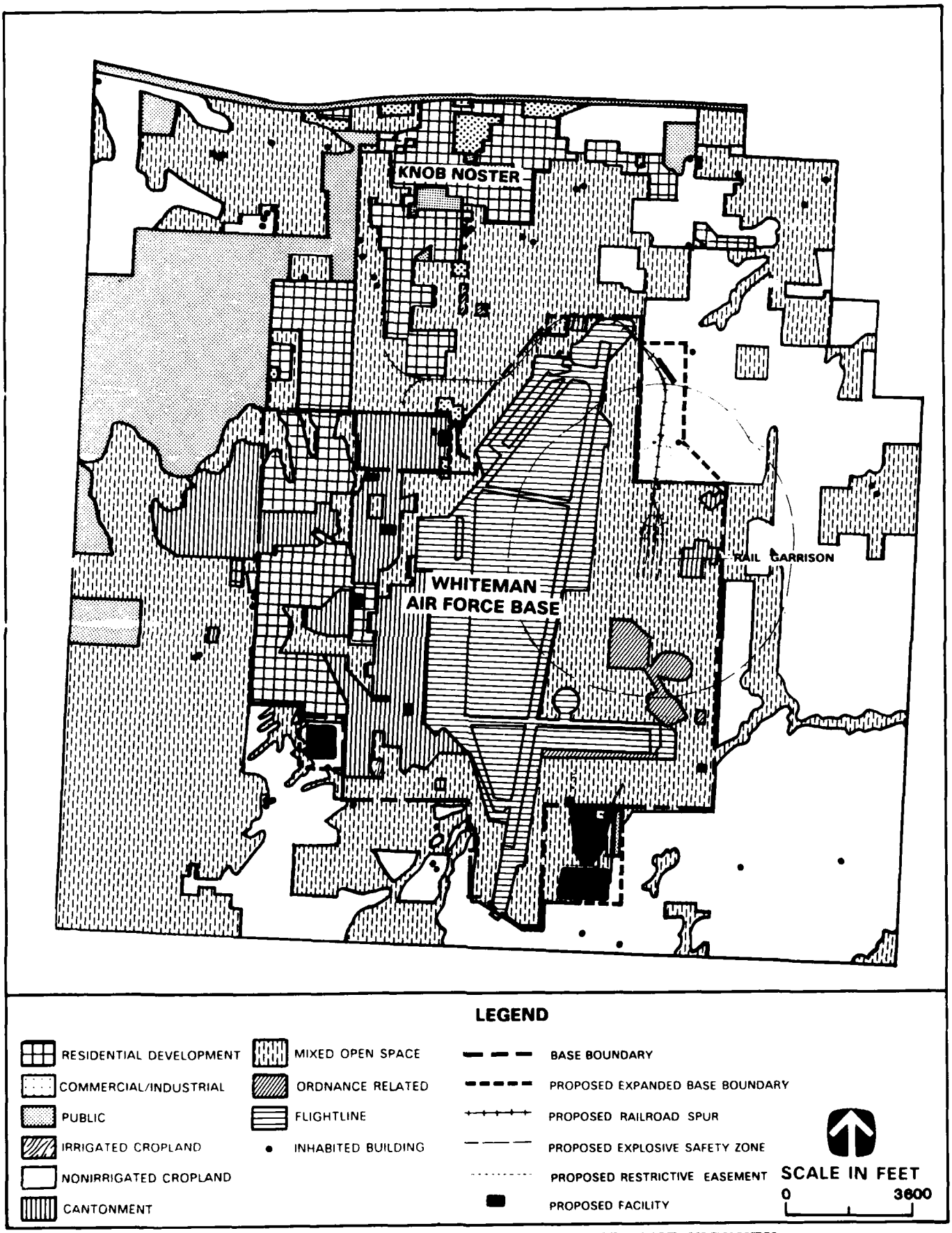


FIGURE 4.11.4-1 LAND USE AT WHITEMAN AFB, MISSOURI AND VICINITY

The visual attributes of the ROI are typical of the Central Lowlands Physiographic Province where most of the topography is gently rolling. The area was originally vegetated with prairie grasses and deciduous forests, but most of the area around the base is now in noncommercial forest or cropland. Knob Noster State Park, located on the western base boundary, contains many deciduous trees and shrubs, which are also found in nearby riparian strips. Landscape features forms are flat to rounded and lines are straight to curving. Colors are light greens and gold, with dark brown in winter. Textures are smooth to moderately rough and fairly well ordered. Onbase structures can be seen (but are not obtrusive) from base periphery roads, but cannot be seen from U.S. 50 (AADT 8,700), the key observation point for the base, because they are located about two miles from that highway and because of intervening topography, vegetation, and structures.

4.11.4.3 Impacts of the Proposed Action

The proposed garrison site at Whiteman AFB would be near the eastern base boundary. Fee acquisition for base expansion in that area would require about 128 acres for the garrison and Training Train Shelter (TTS), 10 acres for onbase spur curvature requirements at the northeast corner of the base, 12 acres for the connector spur, 120 acres for the relocated grenade range facility on the south side of the base, and 30 acres for onbase housing (optional) at the southwest corner of the base. Of the total 300 acres required in fee simple, 200 acres are nonirrigated cropland and 100 acres are mixed open space (including a reservoir of about 4 acres). About 225 acres of this area have prime farmland soils. The 128-acre eastside base expansion would contain one inhabited building (a residence) and a number of farm structures. The 120-acre site for the relocated grenade range would also contain one inhabited building (a residence), a grass airstrip, and a small reservoir. These would require relocation. The proposed base expansion would be compatible with local plans and policies, because none exist. The Rail Garrison program at Whiteman AFB would require relocation of six existing onbase uses, including the explosive ordnance range and the grenade range.

The proposed restrictive easement would cover about 330 acres of mostly agricultural land east of the base but would include no inhabited buildings. Agriculture would remain unaffected by the easement but no new inhabited buildings could be built in the easement area for the duration of the program. The connector spur right-of-way (ROW) would require 12 acres of nonirrigated cropland and mixed open space for ROW north of the base main gate.

State Supplemental Highway D, one unnamed county road, one high-pressure natural gasline with an aboveground substation (two small, uninhabited structures), and two low-voltage electrical distribution lines would be located within the public transportation route explosive safety zone. The roads and electrical lines may require relocation outside that zone.

The TASs would be located about 10,300 feet from U.S. 50, the key observation point, with the view obstructed by topography, vegetation, and structures. The TTS would be located only about 300 feet west of Road D adjoining the new eastern base boundary, and the TASs would be located approximately 1,700 feet from that road in the same general area. The TTSs would be 800 feet long and 30 feet high, and would be a major intrusion on the landscape as viewed from Road D. However, because only about 680 cars per day use Road D and the closest existing residences are at least one mile away, visual impacts are considered to be low.

Summary of Impacts. Proposed base expansion for the garrison, relocated grenade range, onbase spur curvature, connector spur, and onbase housing would result in a total loss of about 210 acres of nonirrigated cropland. This is about 0.07 percent of that type of agriculture in Johnson County. The approximately 90 acres of mixed open space required in fee is only 0.07 percent of that use in the county. The 225 acres of prime farmland acquired by the program would be equal to about 0.2 percent of that in Johnson County.

Two inhabited buildings (residences) are located on land that would be acquired in fee by the program. The TASs and TTS would only create visual impacts when viewed from Road D, which has less than 1,000 AADT, and therefore, noticeable but not objectionable. With these considerations, the short- and long-duration impacts of the program on land use would be low. Impacts would be significant because two inhabited buildings would have to be relocated.

4.11.4.4 Impacts of the Alternative Action

Impacts of the Alternative Action at Whiteman AFB would be about the same as for the Proposed Action with one exception: the restrictive safety easement would be about 405 acres. Two inhabited buildings would require relocation and visual impacts would be low. With these conditions, the short- and long-duration impacts of the Alternative Action on the land use resource would be low. Impacts would be significant because two inhabited buildings would have to be relocated.

4.11.5 CULTURAL RESOURCES

4.11.5.1 Region of Influence

The ROI for cultural resources at Whiteman AFB is the prairie zone between the Ozark Highlands on the south and the Missouri River on the north. The ROI consists of the Lamine and Blackwater River drainage basins, corresponding to the Blackwater and Lamine Study Units from the Master Plan for Archaeological Resource Protection in Missouri. The ROI encompasses a physiographic and biotic region characterized by incised dendritic drainages which support deciduous forest separated by upland prairie.

4.11.5.2 Existing and Future Baseline Conditions

Prehistoric Resources. Isolated *Paleoindian projectile points* dating as early as 12,000 B.C. have been reported in the ROI, but they are scarce. The Sedalia Complex of the Late Archaic, which dates from 3000 to 1000 B.C., is particularly well represented in the ROI by a concentration of campsites left by foraging groups. Sites dating to this period are mostly lithic scatters.

Woodland sites in the ROI date from 1000 B.C. to A.D. 900. Most Woodland sites are small, temporary camps similar to Archaic sites except for the addition of small amounts of ceramic sherds. Woodland people were horticulturalists living in villages along major drainages. Substantial Woodland sites occur along the Missouri River approximately 40 miles north of the ROI, but major villages are not expected in the ROI. Archaeological survey has been initiated in proposed impact and fee acquisition areas, but no prehistoric sites have been reported.

Historic Resources. Homesteaders began moving into the area in the late 1820s. Knob Noster was settled in 1854 and the Missouri Pacific Railroad came in 1864. Coal mining and brick making were important activities, but the primary economy of the region was farming and ranching. The Sedalia Army Air Field was established in 1942 and its name was changed to Whiteman AFB in 1955 when it came under Air Force control.

Few sites in the ROI have been determined eligible for the National Register of Historic Places (NRHP). No known or NRHP-eligible sites occur onbase or in the vicinity of the base. Two historic farmhouses occur within proposed acquisition areas, one dating to the 1920s and the other dating to about 1890 to 1910. Historical and architectural evaluation of these structures will be conducted as part of ongoing field investigations.

Native American Resources. The Great and Little Osage Indians occupied the ROI when French explorers and trappers arrived in the early 1700s. They had substantial villages along the Missouri River and practiced a hunting, gathering, trading, and minor

horticultural subsistence economy. Shortly after the arrival of Europeans, the Indians' way of life changed dramatically as they became increasingly involved in the trapping and trading of the 1700s. By the early 1800s, the Osage primarily occupied southwestern Missouri. Osage groups had been forced west to Oklahoma and Kansas in the early 1800s by the United States government and the Cherokee. In 1839, the Osage ceded their land claims in Missouri but some families refused to leave. Most tribal members currently reside in Osage County, Oklahoma.

Paleontological Resources. The surface and near-surface geology of the Whiteman AFB area consists of the Pennsylvanian Cherokee Group comprised of a variety of marine clays, silts, and limestones. Marine fossils found in the formation are mainly brachiopods, but algae and bryozoans may also be found. These fossils are usually not considered important to the paleontological community.

4.11.5.3 Impacts of the Proposed Action

The program impact areas total approximately 354 acres onbase for program-related and relocated facilities, including four miles of new rail spur. Approximately 300 acres of offbase land would be acquired to accommodate portions of these facilities.

Prehistoric Resources. Whiteman AFB is in an upland prairie region away from the drainages, forest, and prairie-forest transition near which most of the prehistoric sites in the area can be expected to occur. Therefore, no important prehistoric sites are likely to be affected by the Proposed Action.

Historic Resources. Two historic farmhouses in the proposed acquisition areas require evaluation for NRHP status. Regardless of their NRHP status, these structures are relatively common in the region. Mitigation of effects, such as detailed architectural documentation, may be necessary.

Native American Resources. Consultation has been initiated with the Osage, but no concerns have been identified. No sensitive areas are expected to occur onbase.

Paleontological Resources. No paleontological localities have been identified on or near the base. Potential paleontological localities would be marine fossils from Pennsylvanian deposits and these are usually not considered to have high research potential by paleontologists.

Summary of Impacts. Long-duration impacts on cultural resources as a result of the Proposed Action at Whiteman AFB are expected to be low. A few historic homesteads may be affected, but they make up a small percentage of such resources in the region. The significance of impacts has yet to be determined, pending the results of ongoing field investigations. Short-duration impacts would not occur.

Mitigation Measures. For NRHP-eligible structures, documentation or data recovery would be conducted if they cannot be avoided or moved. Documentation consists of historical research and recording the architectural or engineering characteristics following standards prescribed by the Historic American Building Survey or the Historic American Engineering Record. Adequate documentation may be used to support the conclusion that impacts are adverse but acceptable.

4.11.5.4 Impacts of the Alternative Action

Impacts on cultural resources as a result of the Alternative Action would be similar to the Proposed Action. Approximately 58 additional acres would be affected by garrison construction, but the disturbance would not occur in areas likely to contain additional resources. Long-duration impacts would be low and not significant. Short-duration impacts would not occur.

Mitigation Measures. Mitigation measures would be the same as those discussed for the Proposed Action.

4.11.6 BIOLOGICAL RESOURCES

4.11.6.1 Region of Influence

The ROI for biological resources for Whiteman AFB is defined as the areas where these resources would be directly affected by the construction of new facilities onbase and along 0.8 miles of rail spur offbase (Section 4.11, Figure 4.11-1). Areas where program-induced indirect impacts may occur are defined as those recreational areas within a 1-hour driving time of Knob Noster, Missouri, including recreational areas such as Harry S Truman Reservoir, Lake of the Ozarks, the Missouri River, and Knob Noster State Park.

4.11.6.2 Existing and Future Baseline Conditions

Biological Habitats. Prior to development, the region containing Whiteman AFB consisted primarily of tall-grass prairie and oak-hickory forest. Whiteman AFB has undergone extensive development and little native grassland or oak-hickory forest exists onbase today. Disturbed areas onbase have been seeded to nonnative grass species (e.g., rye and bermuda). Introduced tree species, such as spruce and Russian olive, have been planted throughout the base. The majority of the area surrounding the base out to approximately one mile has been converted to agriculture (Figure 4.11.6-1), with the exception of Knob Noster State Park, which supports native vegetation. The area within one mile of the base supports cropland, grassland, and woodland. Some of the wildlife species that occur onbase and in the region include the northern bobwhite, eastern cottontail, long-tailed weasel, plains pocket gopher, red fox, and white-tailed deer. Aquatic habitat onbase includes Long Branch Creek and several reservoirs and small ponds. Forested and nonforested wetlands occur in conjunction with these aquatic habitats. An intermittent tributary of the Long Branch Creek, which is located in the south portion of the proposed garrison site, will be diverted and channelized in preparation for the B-2 bomber program. The Long Branch Creek will also be channelized for the B-2 program. Two fishing ponds occur on Whiteman AFB and provide some aquatic recreation. Future baseline conditions are expected to be similar to existing conditions based on current base management plans.

Agricultural land is common in the remaining ROI. Native grasslands, oak-hickory forest, and riparian woodlands along streams and rivers are also abundant. Major water bodies in the region include the Missouri River, Harry S Truman Reservoir, and Lake of the Ozarks. These aquatic habitats support important wetlands and fisheries resources and are used extensively by fisherman. Montrose State Wildlife Area and Swan Lake National Wildlife Refuge provide recreation for hunters. Future baseline conditions would be similar to existing conditions based on projections of population increases and increased recreational use in the ROI.

Threatened and Endangered Species. No threatened or endangered or federal-candidate species are known to occur onbase. One state-protected species, the greater prairie chicken, occurs onbase and seven additional state-protected species occur or may occur onbase. To reduce bird air strike hazards, Whiteman AFB will remove all greater prairie chickens from the base according to procedures established by the Missouri Department of Conservation. Several threatened and endangered species occur in the ROI and include four federally listed and one state-protected species, which is not federally listed or a federal candidate (Table 4.11.6-1).

4.11.6.3 Impacts of the Proposed Action

Biological Habitats. Approximately 358 acres of land would be disturbed during construction of the proposed program including 150.9 acres permanently and 207.3 acres temporarily (Section 4.11, Table 4.11-3). Of the total area that would be disturbed, 38.9 acres are agricultural land, 163.6 acres are grassland 67.7 acres are forest, and

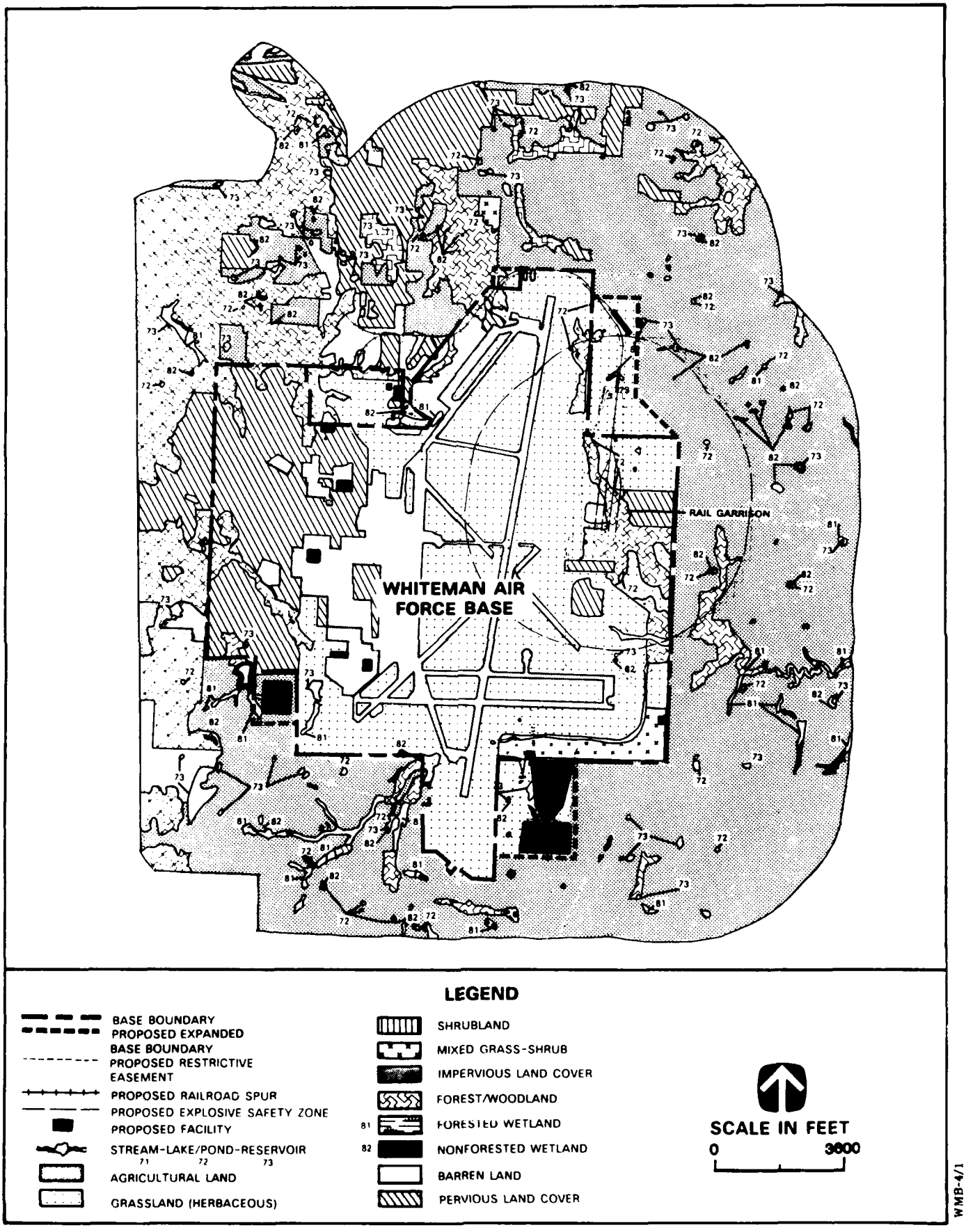


FIGURE 4.11.6-1 HABITAT AND LAND COVER TYPES AND POTENTIAL DISTURBANCE AREAS ON WHITEMAN AFB, MISSOURI AND IN THE VICINITY

Table 4.11.6-1

Federally Listed, Federal-Candidate, and State-Sensitive Species Whiteman AFB, Missouri and Vicinity

Common Name	Scientific Name	Federal Status	State Status	Distribution
American peregrine falcon	Falco peregrinus anatum	E	E	Occurs in region as migrant
Arctic peregrine falcon	Falco peregrinus tundrius	T	E	Occurs in region as migrant
Bald eagle	Haliaeetus leucocephalus	E	E	Occurs in region as migrant
Barn owl	Tyto alba	-	E	Occurs onbase as migrant
Black-tailed jackrabbit	Lepus californicus	-	R	Occurs onbase
Cooper's hawk	Accipiter cooperii	-	E	Occurs onbase
Greater prairie chicken	Tympanuchus cupido	-	R	Occurs onbase
Indiana bat	Myotis sodalis	E	E	May occur in region
Long-tailed weasel	Mustela frenata	-	R	May occur onbase
Meadow-jumping mouse	Zapus hudsonius	-	U	Occurs in region
Sharp-shinned hawk	Accipiter striatus	-	E	Occurs onbase
Upland sandpiper	Bartsamia longicauda	-	R	Occurs onbase
Western smooth green snake	Opheodrys vernalis blanchardi	-	E	May occur onbase

Notes: E = Endangered
T = Threatened
E = Endangered
R = Rare
U = Undetermined status

Sources: U.S. Air Force 1983f; Missouri Department of Conservation 1984.

60.1 acres were previously disturbed during development of other projects (Table 4.11.6-2). In addition, 9.2 acres of streams, lakes/ponds, and reservoirs, and 11.1 acres of wetland would be disturbed during construction. A 0.7 mile segment of an intermittent tributary of the Long Branch Creek, which is located in the northern portion of the garrison site, will be buried in a culvert. Divesting this creek will alter the existing habitats along the watercourse and will adversely affect the wildlife that are dependent upon these areas. Removal of grassland habitat would increase the mortality of those species which are less mobile (e.g., plains gopher), and displace mobile species (e.g., white-tailed deer) to adjacent habitats. Removal of woodland would have the greatest impact on wildlife because species diversity is highest in these onbase woodland habitats. For security purposes, most of the forest habitat disturbed would not be restored to forest, and instead, would be maintained as grassland or kept barren.

In compliance with Executive Order No. 11990 and according to requirements of Section 404 of the Clean Water Act, alternative sites were considered for location of project facilities. In order to collocate facilities of the proposed program with existing facilities, meet engineering and operational constraints, and keep most of the new facilities within existing base boundaries or close to the base, it was determined that there is no practicable alternative to the proposed construction of some facilities in wetlands. Furthermore, site-specific program design and construction techniques would include all practicable measures to minimize harm to wetlands.

Table 4.11.6-2

Habitat and Land Cover Types Potentially Disturbed
by the Peacekeeper Rail Garrison Program at Whiteman AFB, Missouri

Habitat Type	Garrison, Support, and Relocated Facilities (acres)	Rail Line (acres)	Total (acres)
Proposed Action			
Agriculture	35.9	3.0	38.9
Nonforested wetlands	4.2	0.1	4.3
Forested wetlands	6.8	0.0	6.8
Reservoir	5.3	0.0	5.3
Ponds	1.2	0.0	1.2
Barren	7.6	0.0	7.6
Grassland	157.0	6.6	163.6
Forest/woodland	66.4	1.3	67.7
Stream	2.7	0.0	2.7
Previously disturbed	44.6	15.5	60.1
TOTAL:	331.7	26.5	358.2
Alternative Action			
Agriculture	35.9	3.0	38.9
Nonforested wetland	4.2	0.1	4.3
Forested wetland	6.8	0.0	6.8
Reservoir	5.3	0.0	5.3
Ponds	1.3	0.0	1.3
Barren	7.6	0.0	7.6
Grassland	192.2	6.8	199.0
Forest/woodland	88.7	1.3	90.0
Stream	2.7	0.0	2.7
Previously disturbed	44.6	15.3	59.9
TOTAL:	389.3	26.5	415.8

Locating the Peacekeeper Rail Garrison program at Whiteman AFB would cause a slight increase in the population in Johnson County which may cause an increase in recreational activities. The Harry S Truman Reservoir, Lake of the Ozarks, and areas along the Missouri River would experience increased use by regional fisherman. The number of hunters using the Montrose State Wildlife Area and the Swan Lake National Wildlife Refuge may also increase. The state parks in the region (Knob Noster, Bothell, and Harry S Truman) may also experience a slight increase in use. The biological resources in all of these recreational areas are protected and managed by natural resource management agencies and would not be affected.

Threatened and Endangered Species. Construction of Peacekeeper Rail Garrison facilities would permanently disturb woodland, wetland, and grassland habitat (Table 4.11.6-2). There are eight state-protected species which may occur in these habitats (Table 4.11.6-2). Removal of woodlands, wetlands, and grasslands on Whiteman AFB would displace some species and could cause a slight increase in mortality for those species which are less mobile, but would not substantially affect the population structure

of threatened and endangered species onbase or in the ROI. No impacts are expected for the greater prairie chicken because Whiteman AFB has received permission from the Missouri Department of Conservation to remove all birds from the base to reduce bird air strike hazards. The greater prairie chicken would be removed from the base prior to the start of this program.

Summary of Impacts. The Peacekeeper Rail Garrison program would generate some impacts on biological resources at Whiteman AFB because of 358.2 acres of land that would be affected. Various species would experience some disruption during construction activities. The most disruption would occur in the forested and wetland areas, which provide forage and cover for many wildlife species. Program-induced recreation would not affect biological resources in the ROI because increases in recreational use would be low and dispersed throughout the region. Short-duration impact would be low and not significant. Because of the disturbance of forest and wetland habitats, long-duration impacts would be moderate. Long-duration impacts would be significant because of the ecological importance of habitats that would be disturbed.

Mitigation Measures. Implementation of mitigation measures would substantially reduce the impacts on biological resources at Whiteman AFB. Implementation of mitigation measures would, over the long term, help restore the value of habitat to predisturbance conditions. Mitigative measures which could be effective in substantially compensating for significant impacts on wetlands and other sensitive habitats and the agencies which would be responsible for their implementation include the following:

- Limit the areal extent of construction disturbance in wetlands and other sensitive habitats to the minimum possible. Operate construction equipment only on roads or within designated disturbance areas (U.S. Air Force and COE).

- Create new wetlands or enhance existing wetlands to substantially reduce impacts on wetlands onbase. A mitigation plan will be developed which will discuss the methods (e.g., grading and revegetation) to be used in creating new wetlands or enhancing existing wetlands. Development of the mitigation plan will be coordinated with the COE and the U.S. Environmental Protection Agency.

- Implement offsite habitat (other than wetlands) restoration or increasing protection of sensitive species or important habitats if offsite mitigation is considered the only feasible means to compensate for impacts on important habitats or wetlands (U.S. Air Force and COE).

- Build sediment traps where appropriate on drainages flowing away from construction sites to control impacts from increased erosion in the area. Until new revegetation becomes established, temporary sediment retention basins should be constructed and maintained downstream of the construction sites. (U.S. Air Force).

4.11.6.4 Impacts of the Alternative Action

The Alternative Action would result in the loss of 199.0 acres of grassland, and 90.0 acres of forest, and 11.1 acres of wetlands. The additional amounts of these habitats that would be lost for the Alternative Action are not substantially greater than the Proposed Action, and disturbances of biological resources are expected to be very similar to those described for the Proposed Action. Short-duration impacts would be low and not significant. Long-duration impacts would be moderate and significant.

4.11.7 WATER RESOURCES

4.11.7.1 Region of Influence

The ROI for Whiteman AFB is located in the Blackwater-Lamine River watershed of the Lower Missouri River Basin. The approximate boundaries of the ROI are the Blackwater River on the north, Missouri State Highway 13 on the west, U.S. Highway 65 on the east, and a line passing just south of the base (Figure 4.11.7-1). The ROI has an areal extent of approximately 200 square miles and encompasses the support communities of Knob Noster, Warrensburg, and Sedalia.

4.11.7.2 Existing and Future Baseline Conditions

Major Water Users. Total water use in Johnson and Pettis counties amounted to approximately 10,350 acre-feet (acre-ft) in 1985. Municipal water use accounted for about 69 percent of the total, most of which was supplied by the cities of Warrensburg and Sedalia. Agricultural use accounted for 17 percent and military use was 7 percent. Current and projected water use for Whiteman AFB, Knob Noster, Warrensburg, and Sedalia is presented in Figure 4.11.7-1. These entities obtain their water from deep wells. Sedalia also obtains about half of its water from Spring Fork Lake (storage capacity 550 acre-ft), located about ten miles south of the city. The water supply systems of Whiteman AFB, Knob Noster, and Warrensburg will be upgraded in the near future to accommodate the new B-2 bomber mission at Whiteman AFB. All of the affected entities will have adequate water supplies to meet all anticipated needs throughout the projected period.

Surface Water Hydrology and Quality. The ROI is traversed by several small perennial streams that flow to either the Blackwater or Lamine rivers. These two rivers eventually join outside of the ROI and discharge to the Missouri River. Many of the ROI streams tend to be turbid and to carry substantial amounts of sediments. This relatively high degree of sedimentation can be partially attributed to stream channelization which is a widespread practice in Missouri. Other water quality problems in the ROI include low levels of dissolved oxygen and elevated concentrations of ammonia, which are mainly associated with agricultural practices. The Clear Fork is the principal hydrologic feature in the vicinity of Whiteman AFB. It flows north for about ten miles to its confluence with the Blackwater River. The western part of the base drains to the Clear Fork via Brewer Branch and several unnamed, intermittent tributaries. The eastern part of the base drains to Long Branch Creek, which flows about 5 miles to Muddy Creek and, in turn, discharges to the Lamine River 30 miles downstream. Whiteman AFB, Knob Noster, and Warrensburg discharge a total of about 4,150 acre-feet per year (acre-ft/yr) of treated wastewater effluent to the Blackwater River system at five separate locations. Sedalia discharges about 4,490 acre-ft/yr (4 million gallons per day) to the Lamine River system at three separate locations. Stormwater drainage from the base is hampered by soils with poor infiltration capacity and a level topography. Localized flooding and ponding in several parts of the base occur frequently. The southeastern corner of the base occupies the 100-year floodplain of Long Branch Creek (Figure 4.11.7-2).

Groundwater Hydrology and Quality. The majority of the water used in the ROI is supplied by deep bedrock aquifers. The principal aquifers in the ROI are Ordovican and Cambrian formations such as the Eminence, which supplies Whiteman AFB and Knob Noster; the Roubidoux, which supplies Warrensburg; and the Lanotte, which supplies about half of Sedalia's water requirements. No substantial declines in the potentiometric levels of these units have been reported. Groundwater obtained from the deep aquifers within the ROI is of good quality. However, the ROI is located near a transition zone from fresh to saline groundwater. Localized migration of saline groundwater from the north and west as a result of local pumpage resulted in the abandonment of a well field in Warrensburg in 1962. However, no further degradation of groundwater quality has been observed in the area since then.

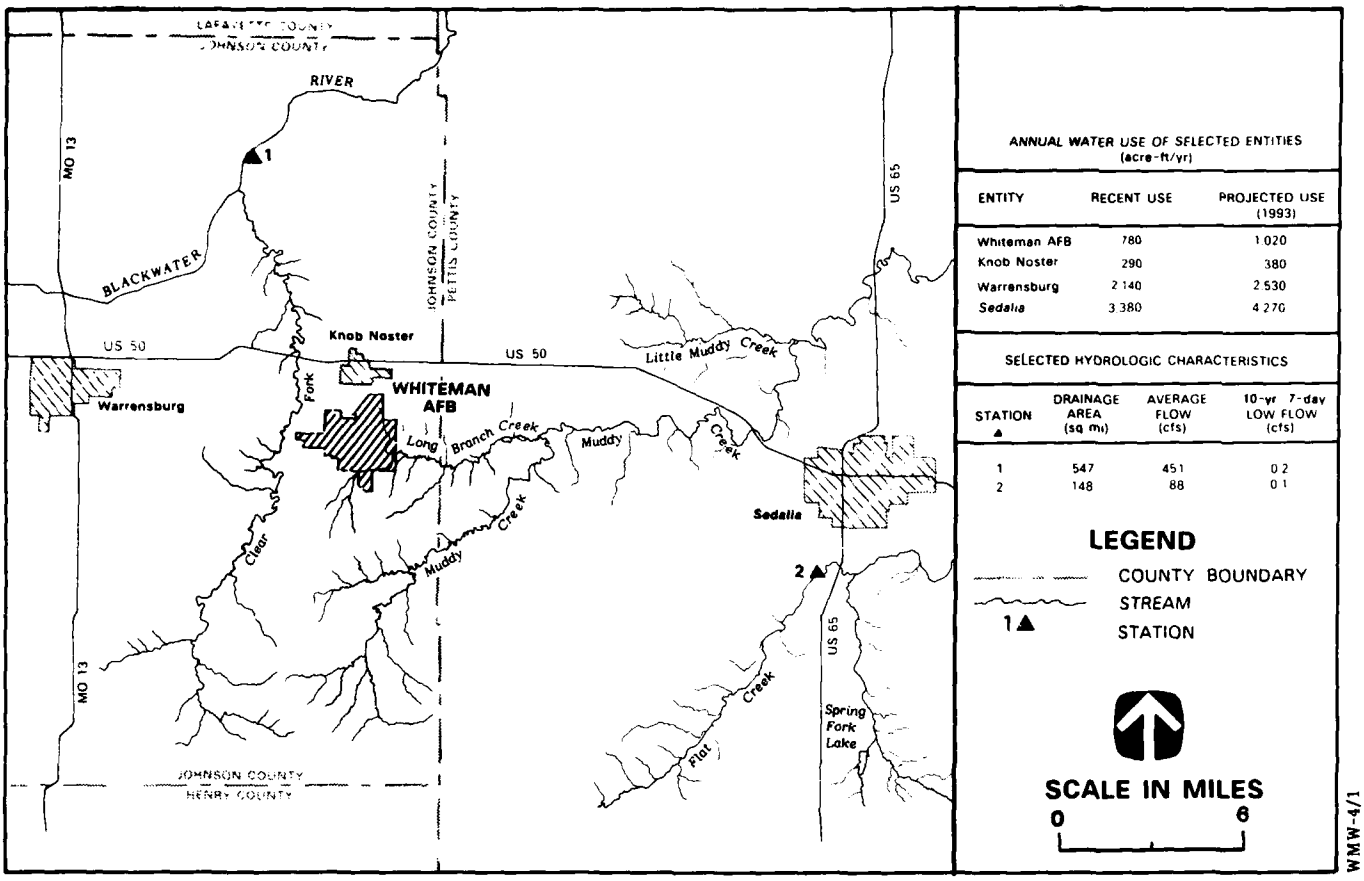


FIGURE 4.11.7-1 HYDROLOGIC FEATURES OF THE WHITEMAN AFB, MISSOURI REGION OF INFLUENCE

Table 4.11.7-1

Program-Related Water Use
Within the Whiteman AFB Region of Influence
Peacekeeper Rail Garrison Program (Proposed Action)
(values in acre-ft)

	1990		1991		1992		1993 Onwards	
Whiteman AFB Construction/Operations	58	(58)[1]	52	(52)	28	(28)	19	(19)
Domestic	0	(0)	25	(4)	87	(15)	87	(15)
Knob Noster Domestic	10	(7)	21	(18)	26	(27)	22	(24)
Warrensburg Domestic	9	(13)	19	(32)	24	(47)	20	(42)
Sedalia Domestic	2	(7)	5	(25)	4	(52)	3	(49)
TOTAL:	79	(85)	122	(131)	169	(169)	151	(149)

Note: [1]Numbers in parenthesis reflect the offbase military housing option.

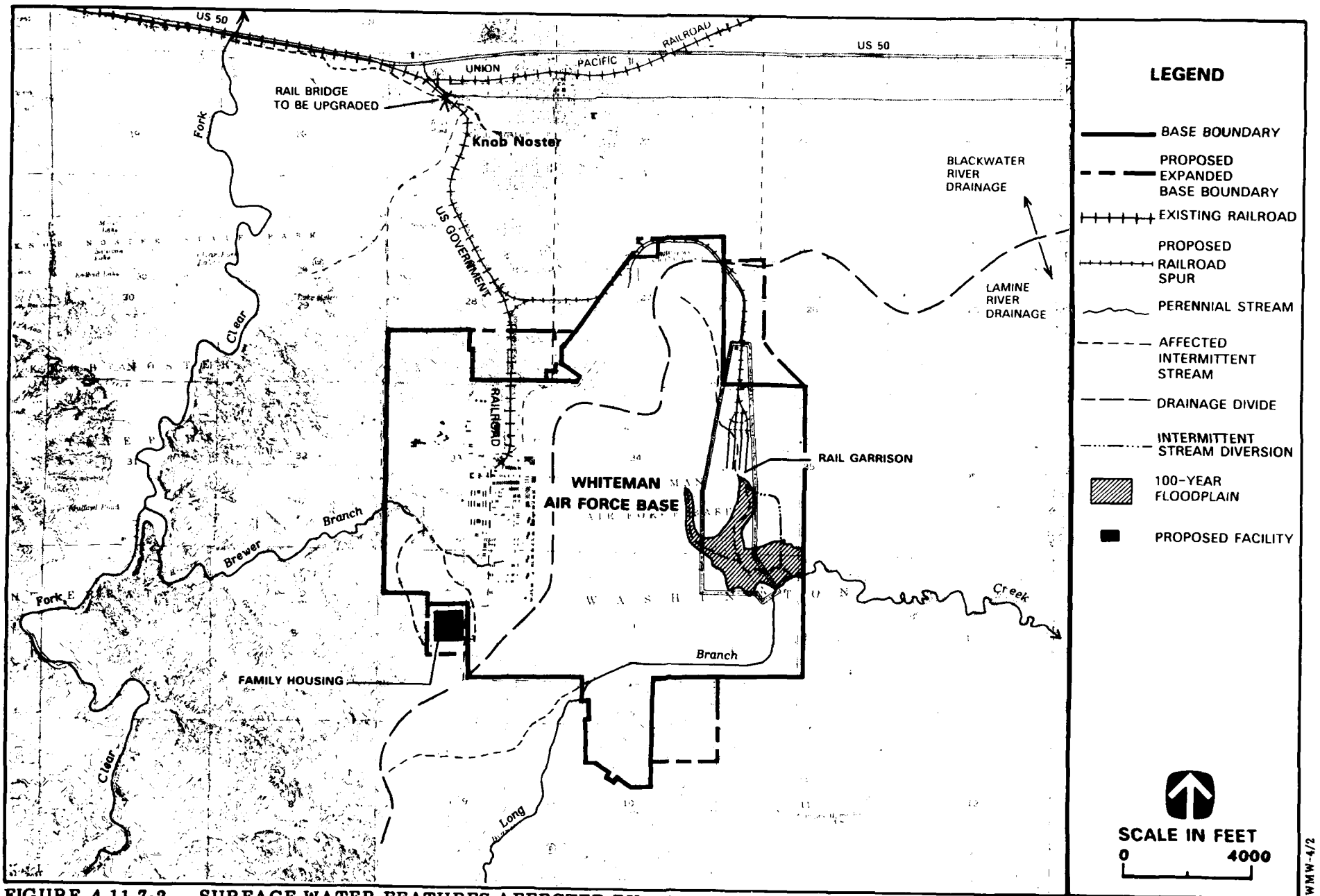


FIGURE 4.11.7-2 SURFACE WATER FEATURES AFFECTED BY THE PEACEKEEPER RAIL GARRISON PROGRAM AT WHITEMAN AFB, MISSOURI

4.11.7.3 Impacts of the Proposed Action

Major Water Users. Total program-related water use would peak at about 170 acre-ft/yr in 1992, and stabilize at about 150 acre-ft/yr during the operations phase (Table 4.11.7-1). With the onbase housing option, virtually all of the water would be obtained from deep aquifers. Program-related water use would represent peak annual increases of 12, 7, and 1 percent over the 1992 baseline water use of Whiteman AFB (960 acre-ft), Knob Noster (360 acre-ft), and Warrensburg (2,440 acre-ft), respectively. The increase in Sedalia would be negligible. With the offbase housing option, approximately 85 percent of the program water requirements would be pumped from deep aquifers and the remainder would be obtained from Spring Fork Lake. Program-related water use would represent peak annual increases of four, six, one, and one percent over the 1992 baseline water uses of Whiteman AFB, Knob Noster, Warrensburg, and Sedalia (4,090 acre-ft), respectively. Therefore, program-related water use at Whiteman AFB would be considerably less with the offbase housing option (Figure 4.11.7-1).

Missouri statutes do not address groundwater allocation, and no water allocation limits have been imposed on any of the affected entities. The affected entities have adequate water supplies to accommodate the Proposed Action with either housing option, and the small increases in ROI water use would not interfere with existing major water users.

Surface Water Hydrology and Quality. With the onbase housing option, program-induced increases in wastewater discharge would peak at about 120 acre-ft/yr in 1992. Nearly all of this increase would be discharged to the Blackwater River system, representing a 3-percent increase over the 1992 baseline discharges of the affected entities (4,730 acre-ft). Program-induced discharge to the Lamine River system would be negligible. With the offbase housing option, program-induced discharges to the Blackwater River system would peak at about 90 acre-ft in 1992, representing a 2-percent increase over baseline. Program-induced discharges to the Lamine River system would peak at about 40 acre-ft in 1992. This peak represents 1-percent increase over the baseline discharge of Sedalia (5,450 acre-ft). All of the affected entities would have adequate wastewater treatment capacity to accommodate the proposed program with either housing option (Section 4.11.2.3). Therefore, the small additional discharge would not materially affect baseline water quality in the Blackwater or the Lamine river basins.

The proposed garrison site is traversed by an intermittent tributary of Long Branch Creek. Poor drainage and seasonal ponding occurs in the lower portion of this tributary near the existing weapons storage area. The lower portion of this tributary is scheduled to be diverted and channelized in preparation for the arrival of the B-2 bomber mission (Figure 4.11.7-2). Long Branch Creek would also be channelized through the base. These baseline actions should eliminate the seasonal flooding problems caused by the tributary. Under the Proposed Action, a segment (approximately 0.7 mile) of the tributary that crosses the garrison site would be buried in a culvert. The unnamed stream has a small drainage area (1 sq mi), and the elimination of its natural channel should have minor, permanent effects on the local hydrology. Construction of the garrison site would result in land disturbance and associated erosion on approximately 181 acres in the Long Branch Creek drainage. Long Branch Creek is a perennial stream classified for stock watering and aquatic life maintenance. The garrison site is located on relatively flat area. However, the site is vegetated and would be completely cleared during the construction phase. In addition, the base is located in a humid region that receives substantial precipitation. All this suggests that the program could result in considerable short-term sedimentation to Long Branch Creek. Following construction, erosion control measures would reduce sedimentation to the creek.

Several ground-disturbing activities could temporarily increase the turbidity of the Clear Fork, which is classified for stock watering and aquatic life maintenance. If onbase housing is constructed, approximately 30 acres would be disturbed in this drainage. The

proposed housing site lies in a flat area fairly distant from the Clear Fork. The site is drained by an intermittent stream that flows for about 0.5 mile to the Brewer Branch which, in turn, flows for about 2 miles to the Clear Fork (Figure 4.11.7-2). Consequently, sediments eroded from the proposed housing site are not expected to reach the Clear Fork in substantial amounts. Approximately 2.4 miles of new rail spur would also be constructed in this drainage. The closest point of the spur is also fairly distant from the Clear Fork (about 2 miles). Therefore, the construction of the spur would have minor effects on the quality of the Clear Fork. An existing railroad bridge over an intermittent, unnamed tributary to the Clear Fork would be upgraded (Figure 4.11.7-2). Bridge construction activities could result in a large increase in turbidity immediately downstream. This increase in turbidity would be of very short duration and could be avoided if bridge construction occurs during periods of little or no flow. In summary, the water quality of the Clear Fork is not expected to be appreciably degraded as a result of the Proposed Action.

Groundwater Hydrology and Quality. The Eminence Formation would supply the majority of the program-related water requirements (i.e., program-related water use at Whiteman AFB and Knob Noster). The Roubidoux Formation would supply the program-related water needs of Warrensburg. The Lanotte Formation would supply about half of the program-related water use at Sedalia. The safe yields of these aquifers are not known. However, all units are recognized as very prolific regional aquifers, and have not exhibited any substantial declines in groundwater levels within the ROI. Program-induced pumpage is relatively small and would not substantially affect local hydrogeologic conditions.

Summary of Impacts. The water resource base of the ROI is adequate to meet program-related water requirements for either housing option, and no appreciable declines in groundwater levels or groundwater quality would result. Substantial temporary sedimentation and associated degradation of water quality in Long Branch Creek would result in short-duration, moderate impacts. Hydrologic modifications in an intermittent tributary to Long Branch Creek would result in long-duration, low impacts. None of these impacts would be significant.

4.11.7.4 Impacts of the Alternative Action

Major Water Users. Total program water use during the operations phase would be about 180 acre-ft/yr, a 19-percent increase over the Proposed Action. For either housing option, baseline-plus-program water use at Whiteman AFB would increase by less than 1 percent compared to the Proposed Action. The comparable increases in water use in Warrensburg and Sedalia would also be minor. The available water supplies are adequate to meet the water needs of this alternative for either housing option without interfering with existing major water users.

Surface Water Hydrology and Quality. With six TASs, the disturbed area at the garrison would increase by 32 percent to about 239 acres. Short-term sediment yield to Long Branch Creek could be expected to increase by a similar percentage. The overall effects of this alternative on local water quality and hydrology are not expected to be substantially different from those of the Proposed Action.

Groundwater Hydrology and Quality. Nearly all program-related water use would be supplied by groundwater resources. Program-induced groundwater pumpage would be relatively low and should not materially affect groundwater levels or the large groundwater reserves of the Eminence, Roubidoux, and Lanotte formations.

Summary of Impacts. Impacts on water resources are expected to remain essentially the same as for the Proposed Action. With either housing option, short-duration impacts would be moderate and long-duration impacts would be low. These impacts would not be significant.

4.11.8 GEOLOGY AND SOILS

4.11.8.1 Region of Influence

The ROI at Whiteman AFB for geology and soils includes the installation and associated program-related areas in the immediate vicinity. The land within a 1-mile radius of the installation and a 1,000-foot-wide corridor along the connecting rail spur were characterized for purposes of establishing the local baseline context. In addition, a regional ROI was established for geologic hazards for the purpose of developing a regional framework for seismicity at the installation.

4.11.8.2 Existing and Future Baseline Conditions

Whiteman AFB is located in the Osage Plains Physiographic Province which is characterized by maturely dissected uplands, low rolling hills, and broadly eroded valleys. Quaternary alluvium overlies older Pennsylvanian rocks which are composed of limestone, shale, siltstone, sandstone, coal, and clay. The installation lies in seismic zone 1 (Uniform Building Code 1985) in which a maximum credible earthquake with a magnitude of 6.1 is the largest predicted for the area. Maximum horizontal acceleration in rock is expected to be less than 0.04 g, with a 90-percent probability of not being exceeded in 50 years (Algermissen et al. 1982). Active faults have not been identified in the local ROI and the area is not susceptible to liquefaction. Areas susceptible to landslides or terrain failure were not discovered in the ROI.

Energy and Mineral Resources. No oil or gas leases/fields have been identified in the ROI. No uranium mines/leases, Known Geothermal Resource Areas, or metallic/nonmetallic mineral resource mining operations or leasing activities exist in the ROI. However, coal resources have been identified in the vicinity of the installation.

Soil Resources. The U.S. Soil Conservation Service (SCS) has mapped 24 soil types in the ROI. Eleven of these soil types occur in areas where program-related facilities may be located. They occur on level to moderately sloping surfaces, have a loamy texture, and range from poorly to well drained. Soil erosion susceptibility was evaluated for wind and sheet erosion. Wind erosion of unvegetated/disturbed ground in the ROI is not a major concern of the SCS in Missouri. However, the prevailing southerly wind direction would make north-south elongated tracts of land susceptible to wind erosion. The proposed garrison, rail spur, and other facilities would all be located on soils with a low to moderate susceptibility to wind erosion and a moderate susceptibility to sheet erosion.

4.11.8.3 Impacts of the Proposed Action

Energy and Mineral Resources. Coal resources have been identified in the ROI. However, these resources are not currently being explored because of their high sulfur content. No other energy or mineral resources have been identified, and, therefore, impacts are not expected.

Soil Resources. Program-related wind erosion at the proposed garrison, other facilities, and rail spur is primarily projected to occur at rates less than 0.1 ton per acre per year (T/ac/yr). This is because regional wind velocities are low and do not substantially influence rates of soil erosion. During garrison construction, soil would erode at a rate of 1.2 T/ac/yr for large exposed areas of a soil type. The application of one ton per acre (T/ac) of straw mulch would temporarily reduce this rate to less than 0.1 T/ac/yr. Program-induced sheet erosion at the proposed garrison site is projected to occur at rates of 6.9 T/ac/yr to 13.2 T/ac/yr. Soils along the rail spur and at other facility sites are projected to erode at rates of 7.9 T/ac/yr to 63.1 T/ac/yr. The application of one T/ac of straw mulch after construction would temporarily reduce the rates of erosion to 1.4 T/ac/yr to 12.6 T/ac/yr for all soils affected. The range of soil erosion rates identified for the proposed program (6.9 to 64.3 T/ac/yr) are comparable to those

determined for general urban development (16 to 156 T/ac/yr) as supplied by the U.S. Department of Housing and Urban Development (1981).

Soil erosion impacts are based on the combined effects of wind and sheet erosion values and how they compare to the maximum tolerable soil loss (2-5 T/ac/yr) of the affected soil types during construction. Program-induced soil erosion is therefore expected to cause short-duration impacts. Long-duration impacts are not expected because accelerated rates of erosion would occur for only a short period of time prior to mulching and reestablishing a vegetative cover in the disturbed areas.

Summary of Impacts. Overall short-duration impacts of the proposed program on the geology and soils resource are expected to be high because accelerated rates of erosion during program-related construction would exceed the maximum tolerable soil loss of the soils affected. Long-duration impacts are expected to be negligible because accelerated rates of erosion would not continue into the operations phase of the program. Short-duration impacts would not be significant because increased rates of erosion would not result in an appreciable net loss of topsoil over the short period of time under consideration.

4.11.8.4 Impacts of the Alternative Action

The Alternative Action would slightly increase the size of the garrison. Therefore, impacts on the geology and soils resource would be about the same as for the Proposed Action. Consequently, all levels of impact and significance would remain the same as for the Proposed Action. Short-duration impacts would be high and not significant and long-duration impacts would be negligible.

4.11.9 AIR QUALITY

4.11.9.1 Region of Influence

The ROI for the air quality resource includes Whiteman AFB; the communities of Sedalia, Warrensburg, and Knob Noster; and the interstate highways and principal arterials in Johnson County.

4.11.9.2 Existing and Future Baseline Conditions

The area that may be affected by air emissions from the proposed program includes Whiteman AFB and the City of Knob Noster. The area is included in the Southwest Missouri Air Quality Control Region (No. 139). There are no Prevention of Significant Deterioration Class I areas within 50 miles of the base.

Ambient air quality at Whiteman AFB in Johnson County has not been monitored because of the lack of either significant point or area sources. However, a representative total suspended particulate (TSP) monitoring station is located near the Kansas City International Airport approximately 73 air miles from the base. At this station in 1986, the highest TSP 24-hour average concentration was 109 micrograms per cubic meter ($\mu g/m^3$), while the annual geometric mean was 39.5 $\mu g/m^3$. Both of these concentrations are below the National Ambient Air Quality Standards (NAAQS). The area included within the ROI is in attainment status for all criteria pollutants.

Johnson County emissions, which constitute carbon monoxide (CO), volatile organic compounds (VOC, a measure of reactive hydrocarbons), nitrogen oxides (NO_x), particulate matter (PM_{10}), and sulfur oxides (SO_x), are presented in Table 4.11.9-1. Sources of pollutants include fixed sources (fossil fuel combustion and fuel or solvent evaporation), construction activities, and mobile sources (both ground and aircraft).

Table 4.11.9-1

Johnson County, Missouri Air Emissions Inventory, 1987
(tons per year)

Emission Source	TSP	SO_x	NO_x	VOC	CO
Fuel Combustion	346	127	182	743	2,124
Industrial Process	0	0	0	509	0
Solid Waste Disposal	26	1	7	35	110
Air/Water Transportation	108	7	54	127	276
Land Transportation	563	98	1,463	1,137	6,180
Miscellaneous	7,402	0	1	9	47
Whiteman AFB	36	28	151	153	827
TOTAL:	8,481	261	1,858	2,713	9,564

Source: U.S. Environmental Protection Agency 1988c.

Future air quality will not be degraded as a result of the proposed residential and commercial projects in Johnson County.

An additional boiler with 75 million British thermal units per hour heat input will be installed in the base heating plant in 1989. Gas will be used as primary fuel with No. 2 fuel oil used as emergency backup fuel. A low NO_x burner will be used to reduce NO_x emissions. Pollutant emissions will be below U.S. Environmental Protection Agency (EPA) "significance" levels. A "de minimus" construction permit will be required from the Missouri Department of Natural Resources. Since pollutant emissions from the boiler will be below EPA "significance" levels, they should have only minor effects on regional air quality.

4.11.9.3 Impacts of the Proposed Action

Direct air emissions would result from construction of the rail spur line and support facilities and operation of the proposed program at Whiteman AFB. Emission sources associated with construction include light-duty vehicle traffic, diesel trucks, offsite heavy-duty vehicles, diesel construction equipment, and fugitive dust from ground disturbance.

The highest monthly fugitive dust emissions from program-related construction activity is approximately 23 tons. Fugitive dust calculations assume a 50-percent reduction because of the watering of construction sites. All of the fugitive dust emissions at Whiteman AFB were conservatively assumed to be within the 10-micrometer particle Construction-related impacts were calculated for 24-hour and annual averaging periods. A program-related increase of 3.5 $\mu g/m^3$, which includes particulates from combustion products, would occur, increasing the 24-hour average background concentration to 112.5 $\mu g/m^3$. The predicted fugitive dust 24-hour average background concentration would not equal or exceed the 24-hour NAAQS of 150 $\mu g/m^3$ (PM_{10}). The annual background concentration would increase to 40.1 $\mu g/m^3$, which would not equal or exceed the PM_{10} standards of 50 $\mu g/m^3$. Fugitive dust generated at Whiteman AFB for the peak construction year would have negligible impacts on Johnson County air quality. The EPA-minimum threshold levels for fugitive dust in nonattainment areas would not be exceeded, and no violation of NAAQS would occur.

Overall short- and long-duration air quality impacts would be negligible.

4.11.9.4 Impacts of Alternative Action

The Alternative Action (6 TASs) would cause a 1.3-percent increase in fugitive dust emissions over the Proposed Action. This would result in a total increase of 4.9 $\mu g/m^3$, increasing the 24-hour average ambient concentration to 113.9 $\mu g/m^3$. The Alternative Action impacts would be negligible and would not cause any violation of the NAAQS. The increase in gaseous pollutant emissions would be negligible. Overall short- and long-duration air quality impacts would be negligible.

4.11.10 NOISE

4.11.10.1 Region of Influence

The ROI for the noise resource is broadly defined as the area where program-related noise level increases occur. Specifically the ROI includes Whiteman AFB; the communities of Sedalia, Warrensburg, and Knob Noster; and the interstate highways and principal arterials in Johnson County.

4.11.10.2 Existing and Future Baseline Conditions

There are three major noise sources in the City of Knob Noster and in the vicinity of Whiteman AFB: vehicular traffic, air traffic, and railroad noise. The principal vehicular noise source in the vicinity of the base and the City of Knob Noster is traffic utilizing County Road J. Traffic on Missouri State Highway 132, which provides access to the base main gate from Knob Noster, is a secondary source of vehicular noise. Sensitive receptors (residential areas within 200 ft of the highway) in Knob Noster along County Road J experience noise levels of about 55 decibels on the A-weighted scale (dBA) to 60 dBA expressed as day-night equivalent sound level (L_{dn}), while the onbase residences near Missouri State Highway 132 experience noise levels of 50 dBA to 60 dBA (L_{dn}).

Present ambient noise levels of this region resulting from aircraft operations, are about 55 dBA (L_{dn}). However, with the advent of the basing of B-2 bombers at Whiteman AFB, the noise levels are predicted to increase to 70 dBA to 75 dBA (L_{dn}). Flight activities at Whiteman AFB are routed to avoid nearby park and recreation areas, thereby minimizing noise impacts in these sensitive areas. Other than nearby parks, recreation areas, developed areas along County Road J between Knob Noster and Whiteman AFB, and the southern portion of Knob Noster, there are no particularly noise-sensitive areas or populations in the immediate vicinity of the installation.

The Union Pacific Railroad and U.S. Government Railroad spur lines passing near offbase residential areas (Knob Noster) are the only noise sources from railroad activity. The estimated noise levels are about 60 dBA (L_{dn}) at the residential receptors within 100 feet of the U.S. Government Railroad spur. The noise levels are about 65 dBA (L_{dn}) at the residential receptors within 100 feet of the Union Pacific rail line.

4.11.10.3 Impacts of the Proposed Action

Temporary impacts resulting from construction-related noise would occur within the immediate vicinity of construction sites. The various activities that would take place include construction of industrial structures, housing, rail spur and roadways (grading, compacting, and paving); landscaping; and cleanup at Whiteman AFB.

Construction-related noise at Whiteman AFB is anticipated to affect both onbase and offbase residential areas. Construction of new family housing adjacent to the current onbase residential area would increase background noise levels. The estimated construction noise in the existing residential area would be 65 dBA, causing an 8-dBA increase above background concentrations. In addition, the estimated construction noise levels in the offbase trailer park, about 200 feet from the proposed rail spur would be

74 dBA, a 5-dBA increase over background levels. The short-duration noise impacts on these sensitive receptors would be moderate. These impacts would not be significant because they would not exceed the 10-dBA criterion. Once the construction activity ceases, noise levels would return to near ambient conditions.

The TAS construction-related noise at Whiteman AFB is not anticipated to affect offbase or onbase residential areas because such noise levels from point sources attenuate quickly with distance. Potential construction-related noise levels of 80 dBA to 85 dBA at 100 feet from the source within the TAS construction site would be reduced to 46 dBA at the offbase residential areas which are located about 8,900 feet from the construction location. The noise levels at base residential areas which are located about 8,500 feet from the TAS construction site would be about 46 dBA. These noise levels would be masked by ambient noise levels of about 55 dBA to 65 dBA. Once the construction activity ceases, noise levels would return to near ambient conditions.

During the operations phase, noise would be generated from program-related increases in vehicular traffic and training train activities. Program traffic increases would cause an increase in noise levels of approximately 0.7 dBA (L_{dn}) and 0.5 dBA (L_{dn}) at sensitive receptors (residential areas) within 200 feet of County Road J and Missouri State Highway 132, respectively. This increase in vehicular noise levels would have a negligible impact on the sensitive receptors. Noise impacts from training train activities onbase would also be negligible because of the distance of the rail spur corridor (over 1 mi) from sensitive receptors.

Offbase training train activities would cause minor, temporary increases in average noise levels on sensitive receptors along the main railroad line.

Overall short-duration noise impacts would be moderate and not significant while long-duration impacts would be negligible.

4.11.10.4 Impacts of Alternative Action

The noise levels resulting from the construction of six TASs at the garrison site would be about the same as for the proposed program. The short-duration noise impacts at the onbase and offbase residential receptors would be moderate. However, these noise impacts would not be significant because they would not exceed the 10-dBA criterion. The long-duration impacts would be negligible.

4.11.11 Impacts of the No Action Alternative

With the No Action Alternative, the Peacekeeper Rail Garrison system would not be deployed. Activities at Whiteman AFB will continue to support other existing or proposed missions. For the host communities in the vicinity of the base, environmental changes would occur as a result of normal community growth. Future baseline conditions reflecting the No Action Alternative were described in earlier portions of this chapter.

4.11.12 Irreversible and Irretrievable Resource Commitments

Deployment of the Peacekeeper Rail Garrison program at Whiteman AFB would result in the irreversible and irretrievable commitments of some human and natural resources. The affected resources are the following:

- The proposed program requires the use of relatively small amounts of labor, materials, energy, and other economic resources during both the construction and operations phases. The local procurement of building materials (such as cement, sand, and gravel) may alter some resource characteristics in the deployment area. Although these economic factors, once used by the proposed program, generally cannot be recovered for other purposes, the extent of their use would be small in comparison to total resource availability.

- Lands utilized for the program facilities would be irreversibly committed for the duration of the program. Such use of land would not cause an irretrievable commitment because the land can be reclaimed through removal of program facilities and implementation of necessary soil rehabilitation.

- Both irreversible and irretrievable commitments would occur if historic sites and architectural resources eligible for the National Register of Historic Places are destroyed during construction and operations.

- Disturbed biological communities, given sufficient time, can recover to a state approximating predisturbance conditions once the disturbance ends. However, filling of wetlands represents an irreversible and irretrievable loss of valuable habitat. Creation of new wetlands would not fully compensate for the impacts because the newly created habitat would not be likely to have the same ecological value as the habitats lost.

- Water is by nature a renewable resource. Water demands of the proposed program can revert to other uses once the program is terminated; however, irreversible impacts could occur. At Whiteman AFB, a small, intermittent drainage would be diverted, irreversibly altering the local downstream flow characteristic in Long Branch Creek.

- Soils would be permanently disturbed at construction and related sites (e.g., borrow pits, roads, buildings, and rail spur) and may be irreparably damaged during the life of the program if disturbed areas are not mulched or revegetated, especially at the garrison location. Aggregate resources would be used for construction of buildings, roads, and rail spurs.

4.11.13 Relationship Between the Local Short-Term Use of Man's Environment and the Maintenance and Enhancement of Long-Term Productivity

Deployment of the Peacekeeper Rail Garrison program at Whiteman AFB would result in the short-term use of some human and natural resources that may affect the maintenance and enhancement of long-term productivity. The affected resources are the following:

- Short-term program-generated disruptions and delays of traffic would result in a decrease in the comfort, convenience, and safety afforded users of primary roads leading to the base. No effect on long-term productivity is expected.

- Additional information gained during program-related surveys of archaeological and historic resources may contribute to the data base and improve man's knowledge of the area's history. This would enhance the management of remaining cultural resources in the region.

- Acres temporarily disturbed by the construction activities would result in short-term losses of biological habitats. However, recovery rates are expected to be relatively fast and no effect on long-term productivity is expected.

- Soil erosion during construction would increase sedimentation to local streams resulting in a short-term deterioration of surface water quality. However, the additional loss of soil would not affect soil productivity or the long-term quality of streams.

- Reductions in air quality levels would result from fugitive dust during construction. However, no long-term reduction in air quality is expected.

4.11.14 Environmental Concerns Associated With a Possible Future Second Rail Connector

A second rail access to Whiteman AFB could be achieved by providing a southerly rail connector to the main line of the Missouri-Kansas-Texas Railway Company (Figure 4.11.14-1). This connector would require the acquisition of approximately 180 acres of land and the construction of 14.5 miles of new track. Additionally, five 50-foot bridges would be required for stream crossings.

Construction costs for this second rail connector would be approximately $17.4 million (1986 dollars) and would require approximately 140 direct construction workers and 180 secondary workers over a 1-year period. Most of these workers would be from the local area, including Cass, Henry, Jackson, Johnson, Lafayette, Pettis, and Saline counties in Missouri and Wyandotte County in Kansas. Since inmigration of labor for this construction would be minimal, there would be no major concerns for the socio-economics, utilities, and transportation resources.

The 14.8 miles of alternative connector spur right-of-way (ROW) would be located south of the base and pass through a rural area with mostly nonirrigated cropland, some mixed open space, and scattered farmhouses. The ROW would use approximately 180 acres of land and could probably be sited to avoid the existing scattered farmhouses. One Minuteman launch facility is located in the general vicinity of the alternative connector spur.

There is a high likelihood that numerous prehistoric sites are located in and near drainages along the proposed rail route. The rail connector would pass directly over or near at least three early homesteads dating prior to 1876.

The alternate connector for Whiteman AFB would require construction of five 50-foot bridges to cross stream drainages of the Long Branch and Muddy creeks. This construction would result in impacts on wildlife species utilizing the riparian habitats along those streams. In addition, small wetlands east of the base would be drained and filled, resulting in disturbance to the wildlife species in those habitats.

Bridge and culvert construction at Long Branch Creek, Muddy Creek, and unnamed tributary would cause temporary high increases in turbidity. Since the affected streams are fairly turbid, and Long Branch and Muddy creeks are channelized in the affected reaches, the resulting short-term water quality degradation would not represent a major concern for water resources.

Aggregate production (rail ballast) may be an issue due to substantial construction requirements. Soil erosion due to program-related construction may slightly increase rates of sedimentation to local drainages. Mineral resources will need to be investigated due to the presence of coal mines southwest of the rail line and the potential development of additional coal resources in the area.

Whiteman AFB and the surrounding area is included in the southwest Missouri Air Quality Control Region. The area is in attainment status for all criteria pollutants. Construction of the second rail connector would cause temporary local increases in fugitive dust and gaseous pollutant emissions. These emissions would not cause any violations of the National Ambient Air Quality Standards.

The existing noise levels along the alternative rail connector corridor vary from 65 dBA (L_{dn}) to 75 dBA (L_{dn}) near the base, and from 45 dBA (L_{dn}) to 50 dBA (L_{dn}) in rural areas. Temporary increases in noise levels in the vicinity of scattered farmhouses along the route would result from rail construction activities.

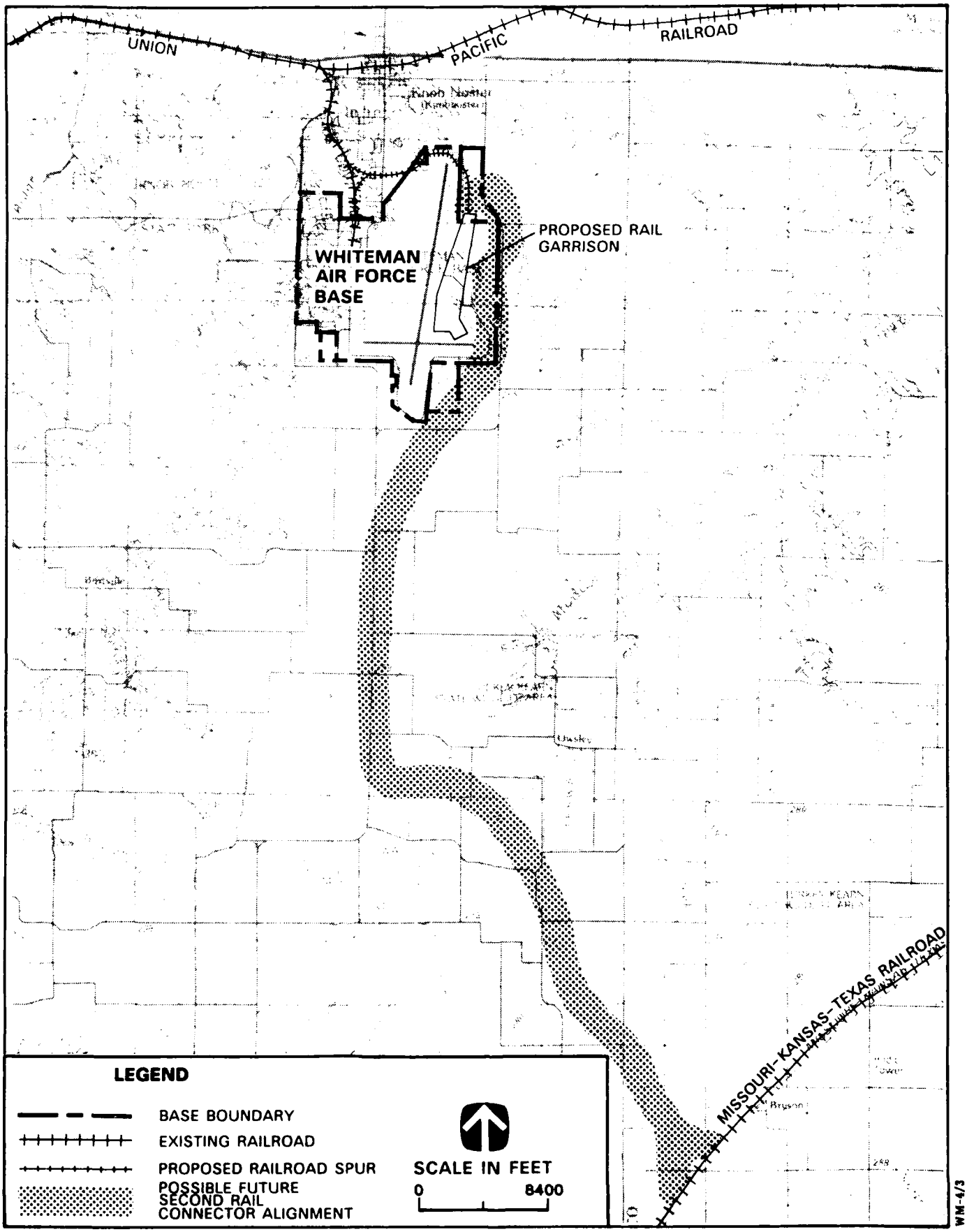


FIGURE 4.11.14-1 CONCEPTUAL ALIGNMENT OF A POSSIBLE FUTURE SECOND RAIL CONNECTOR FOR WHITEMAN AFB, MISSOURI

4.12 WURTSMITH AIR FORCE BASE, MICHIGAN

Wurtsmith AFB, with an area of 4,407 acres (1,943 acres are fee-owned and 2,464 acres are leased), is located in Iosco County in northeastern Michigan. The host organization of this Strategic Air Command Base is the 379th Bombardment Wing with B-52G bomber and KC-135A tanker aircraft. Wurtsmith AFB employed a total of 3,368 military personnel (455 officers and 2,913 enlisted), 423 appropriated fund civilian personnel, and 295 other civilian personnel at the end of fiscal year 1987. Approximately 58 percent of the personnel live on Wurtsmith AFB and 42 percent live in communities near the base.

Iosco County, located on the western shore of Lake Huron, is a popular resort and vacation area in Michigan. During some summer weekends, the county population is estimated to double. The 350,000-acre county is approximately 70 percent forestland, 96,600 acres of which are part of the Huron National Forest. Iosco County consists of 11 townships, each with local officials, and 3 incorporated cities. Wurtsmith AFB is located entirely within Oscoda Township (Figure 4.12-1). The main population area within the township is located two miles southeast of the base. A majority of the personnel living offbase reside in Oscoda Township, but some personnel live in Tawas City, East Tawas, and other townships in Iosco County. In addition, some personnel live north of the base in Alcona County, particularly the small communities of Greenbush and Harrisville.

The following sections provide a description of activities associated with the deployment of the Peacekeeper Rail Garrison program at Wurtsmith AFB for the Proposed Action (4 Train Alert Shelters [TASs]) and the Alternative Action (6 TASs).

Proposed Action. For the Proposed Action at Wurtsmith AFB, the Air Force would construct garrison facilities and provide personnel necessary for the deployment and operation of up to four Peacekeeper missile trains. Approximately $103.5 million (in 1986 dollars) of construction would occur at the base for the Proposed Action. Construction activities, for the purpose of analysis, are assumed to begin in 1990 and be completed in 1992, with full operations beginning in 1993. Direct employment requirements would be 173 in 1990, peak at 535 in 1991, and stabilize at 408 during the full operations phase. Peak construction employment of 373 would occur in 1991. Annual direct employment requirements for the Proposed Action are presented in Table 4.12-1 for site activation, construction, assembly and checkout, and operations activities.

The garrison would be located north of the runway in the western portion of the base and collocated with the existing weapons storage area (Figure 4.12-1). Seven buildings (including the 4 TASs), roads, utilities, parking, and approximately 1.5 miles of railroad track would be constructed within the garrison. The Proposed Action would require the acquisition of restrictive easements on 70 acres adjacent to the northern boundary of the base to accommodate the explosive safety zone (Table 4.12-2). Construction of the garrison would permanently disturb approximately 72 acres and temporarily disturb 147 acres (Table 4.12-3).

The rail spur connecting the garrison to the Detroit & Mackinac Railroad main line southeast of the base would use 0.8 mile of an existing spur (0.2 mi onbase and 0.6 mi offbase) and require the construction of 6.5 miles of track from the garrison to the existing spur (including a wye). The 0.8 mile of existing track would require upgrading. Approximately 36 acres would be disturbed permanently and 31 acres temporarily outside the garrison for the connector spur (Table 4.12-3).

The Proposed Action would require the construction of support facilities with a total floor space of approximately 98,200 square feet. To provide access to the Training Train Shelter, a 0.1-mile rail spur would be constructed from the connector spur (Figure 4.12-1). If additional military family housing is provided onbase, 160 family housing units (1,100 sq ft each) would be constructed. Construction of the support

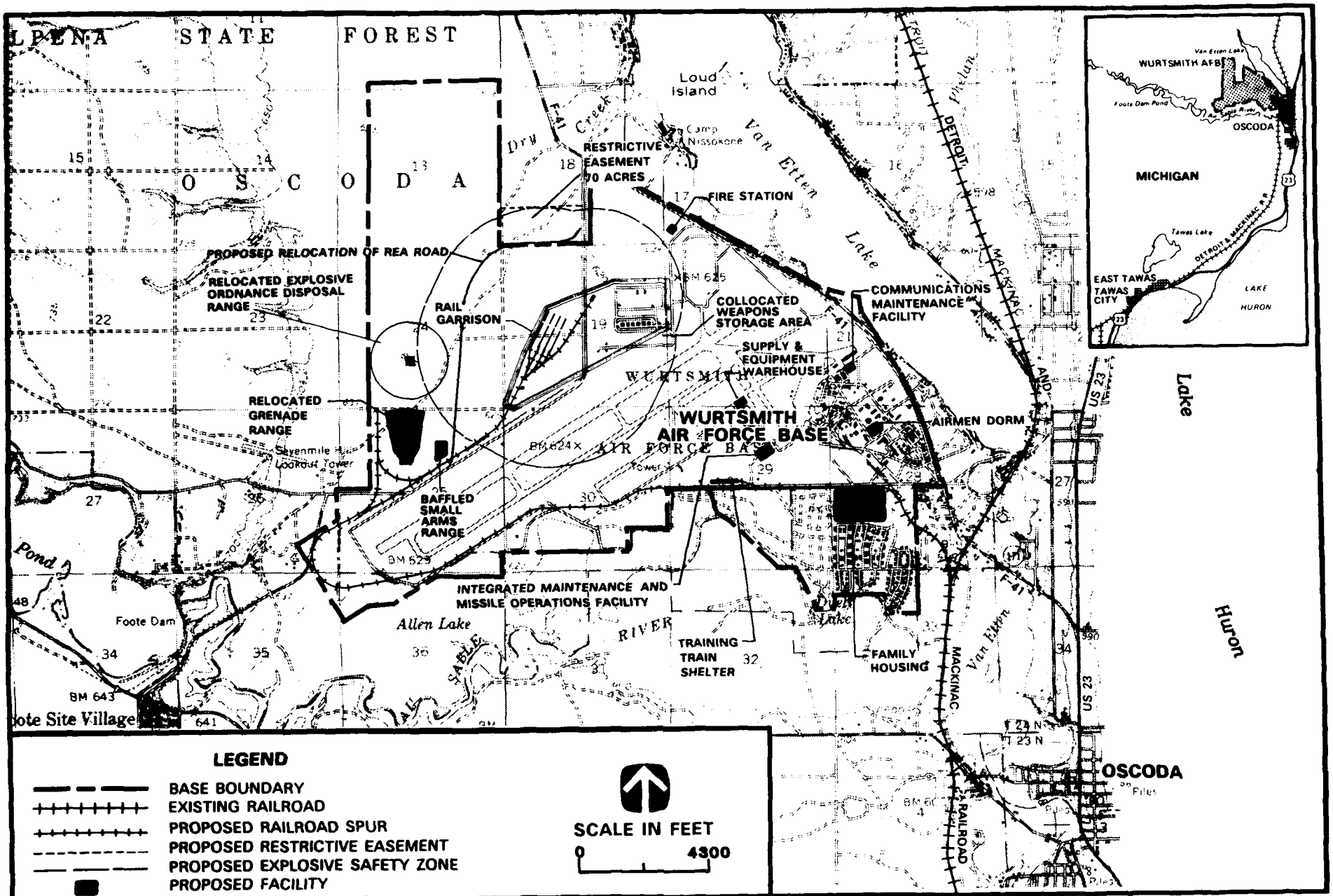


FIGURE 4.12-1 PROPOSED PEACEKEEPER RAIL GARRISON FACILITIES AT WURTSMITH AFB, MICHIGAN

Table 4.12-1

Annual Direct Employment (Military and Civilian) for the Peacekeeper Rail Garrison Program in the Wurtsmith AFB Area by Calendar Year (Full-Time Equivalent Jobs)

	1989	1990	1991	1992	1993[1]
Proposed Action					
Site Activation	1	15	24	11	0
Construction	0	157	373	100	0
Assembly & Checkout	0	1	18	1	0
Operations	0	0	120	408	408
TOTAL:	1	173	535	520	408
Alternative Action					
Site Activation	1	15	24	11	0
Construction	0	175	387	100	0
Assembly & Checkout	0	2	27	2	0
Operations	0	0	131	449	449
TOTAL:	1	192	569	562	449

Note: [1]Employment would continue at these levels for the life of the program.

Table 4.12-2

Offbase Land Acquisition and Easement Requirements Peacekeeper Rail Garrison Program Wurtsmith AFB, Michigan (acres)

	Proposed Action	Alternative Action
Land Acquisition		
Garrison Area	0	0
Rail Spur	0	0
Housing Area	0	0
Relocated Facilities	0	0
TOTAL:	0	0
Restrictive Easements	70	98

Table 4.12-3

Summary of Area Disturbed by the Peacekeeper Rail Garrison Program
Wurtsmith AFB, Michigan
(Proposed and Alternative Actions)

Facility Group	Area Disturbed (acres)		
	Permanent	Temporary	Total
Proposed Action			
Garrison Facilities	71.5	147.4	218.9
Rail Spur	35.5	30.9	66.4
Support Facilities	16.9	80.0	96.9
Relocated Facilities	15.3	39.0	54.3
TOTAL:	139.2	297.3	436.5
Alternative Action			
Garrison Facilities	80.5	189.8	270.3
Rail Spur	34.9	30.5	65.4
Support Facilities	16.9	80.0	96.9
Relocated Facilities	15.3	39.0	54.3
TOTAL:	147.6	339.3	486.9

facilities, utilities, roads, and parking would permanently disturb approximately 17 acres and temporarily disturb 80 acres (Table 4.12-3).

The Proposed Action would also require the relocation of the explosive ordnance disposal and grenade ranges to new locations. The existing small arms range would be baffled (Figure 4.12-1). In addition, a portion of a county road (Rea Road) would require relocation. Relocation of these facilities and the county road would permanently disturb approximately 15 acres and temporarily disturb 39 acres.

Alternative Action. For the Alternative Action, the Air Force would construct garrison facilities and provide personnel for the deployment and operation of up to six Peacekeeper missile trains. Approximately $117 million (in 1986 dollars) of construction would occur at Wurtsmith AFB for the Alternative Action. Construction and operations activities are assumed to occur in the same time frame as for the Proposed Action. Annual direct employment requirements for the Alternative Action are presented in Table 4.12-1.

The garrison would contain six TASs (instead of 4), and would be constructed in approximately the same location as the Proposed Action (Figure 4.12-2). Nine buildings (including the 6 TASs), roads, utilities, parking, and approximately 2.2 miles of track would be constructed within the garrison. The Alternative Action would require the acquisition of restrictive easements on an additional 25 acres (total of 98 acres) to accommodate the explosive safety zone (Table 4.12.2). Construction of the six-TAS garrison would disturb approximately 9 additional acres permanently (80.5 acres total) and 42 acres temporarily (189.8 acres total) (Table 4.12-3).

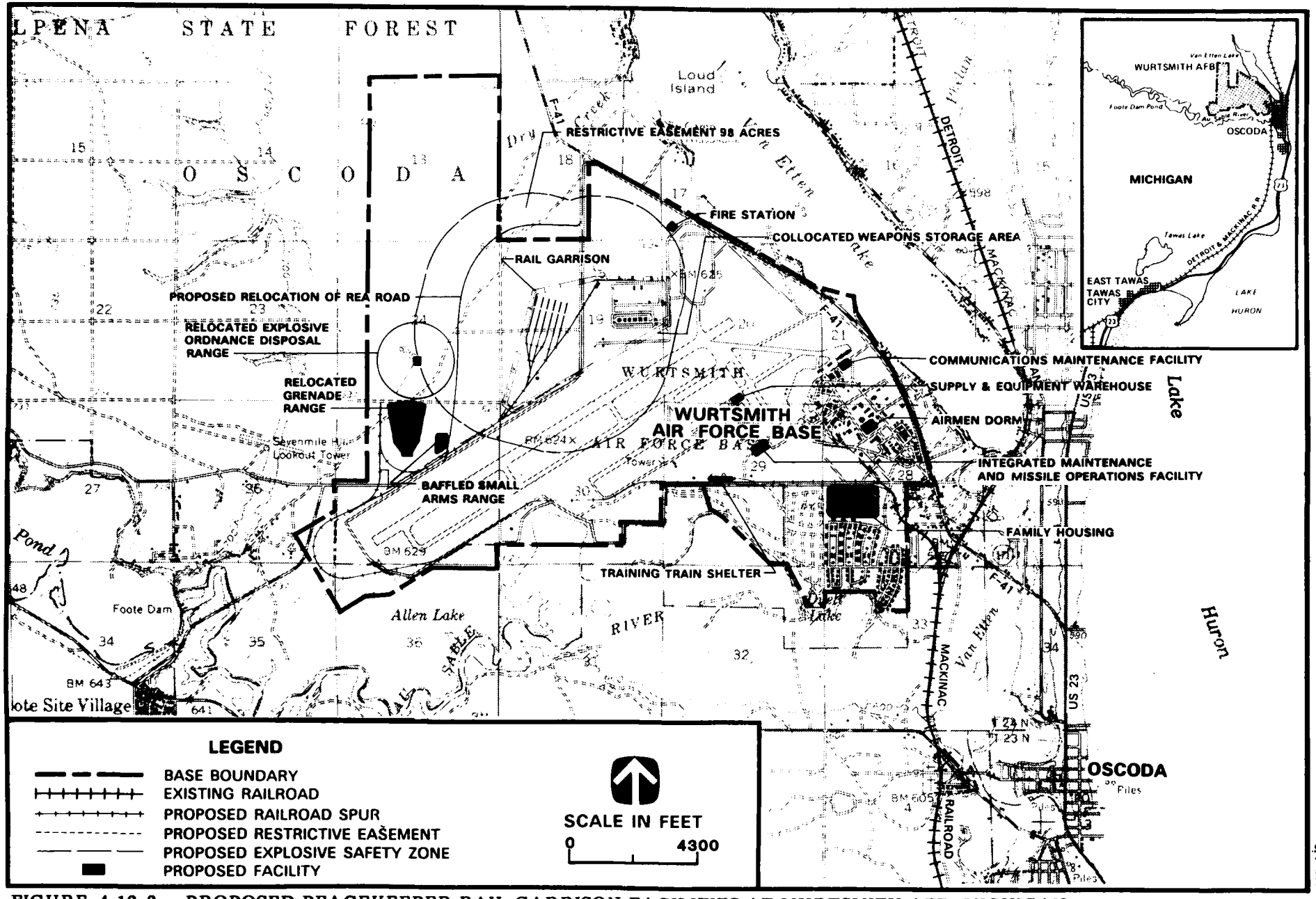


FIGURE 4.12-2 PROPOSED PEACEKEEPER RAIL GARRISON FACILITIES AT WURTSMITH AFB, MICHIGAN (ALTERNATIVE ACTION)

The connector rail spur for the Alternative Action would use the 0.8 mile of existing track (0.2 mi onbase and 0.6 mi offbase) and require the construction of 6.4 miles of new track. The 0.8 mile of existing track would require upgrading. For the Alternative Action, technical and personnel support facility requirements and the relocation of existing facilities would be similar to the Proposed Action.

Summary of Program Impacts. The Proposed Action at Wurtsmith AFB would result in significant impacts on three resources: socioeconomics, biological resources, and water resources. Short-duration impacts on socioeconomics would be moderate because the program-related inmigration would cause population in the Oscoda area to increase by 7.6 percent over baseline forecasts in 1992 and by 7.2 percent in 1993. These impacts would be significant because of a potential shortage of temporary housing during the construction phase of the program.

Long-duration impacts on biological resources would be moderate because disturbances of the wetland areas onbase and offbase would be of concern, local drainage patterns would be altered, and the wildlife populations inhabiting those areas would be affected. These impacts would be significant because of the ecological importance of the habitats which would be affected and the concern these impacts would elicit from natural resource management agencies. Long-duration impacts on water resources would be low because the additional water needed to supply program requirements is expected to have only a minor effect on local groundwater drawdown. These impacts would be significant because program water needs would be drawn from wells vulnerable to groundwater contamination from adjacent areas of the local aquifer.

Impacts on all other resources would not be significant.

The Alternative Action at Wurtsmith AFB would not alter the level of impact or significance ratings for any resource.

Both short- and long-duration beneficial socioeconomic effects would be generated by the Proposed and Alternative Actions, including increases in employment and income, and greater utilization of temporary and permanent housing.

4.12.1 SOCIOECONOMICS

4.12.1.1 Region of Influence

The Region of Influence (ROI) for Wurtsmith AFB, Michigan for the employment and income element includes the counties of Alcona, Alpena, Arenac, Bay, Iosco, Midland, Ogemaw, Oscoda, and Saginaw. For housing, the ROI is the four communities of Oscoda Census Designated Place (CDP), AuSable CDP, Tawas City, and East Tawas. The ROI for the remaining elements includes Iosco County, Oscoda Township, East Tawas, and Tawas City. Because a majority of the inmigrants are expected to reside in Oscoda Township, emphasis is given to socioeconomic conditions and impacts in this portion of Iosco County.

4.12.1.2 Existing and Future Baseline Conditions

Employment and Income. Total employment in the ROI was estimated at 204,059 in 984, a decline of 1.9 percent over the 1980 employment level of 208,024. Only the services and retail trade sectors experienced gains in employment. Manufacturing was the largest industrial sector followed by the retail trade and government sectors. Government sector employment represented approximately 14 percent of the total employment in 1984 in the ROI. Construction employment declined to 8,634 jobs in 1984 from a 1980 level of 10,346. The unemployment rate in the ROI was 10.4 percent in 1986, almost 1.6 percentage points higher than the state average unemployment rate.

In contrast, total employment in Iosco County increased 9.5 percent, from 10,740 in 1980 to 11,760 in 1984. Government sector employment, primarily federal-military and civilian, accounted for over 46 percent of the total employment in 1984, and the services and trade sectors each accounted for slightly over 14 percent of the total employment. Much of the services and trade sector employment is attributable to the tourism that occurs in the region. Between 1980 and 1984, employment in the government and services sectors increased by 16 and 14 percent, respectively.

Total employment in the ROI is projected to increase to 217,174 in 1990 and to 223,100 in 1995. The corresponding unemployment rates are projected at 10.0 and 9.5 percent, respectively.

From 1980 to 1984, total earnings (in current dollars) in the ROI increased from $3.5 billion to $4.1 billion and in Iosco County from $125 million to $167 million. Discounting for inflation, these increases in total earnings represented a 6.5-percent decline in the ROI and 6.6 percent growth in Iosco County over the 1980 to 1984 period. Per capita personal income in the ROI increased from $8,809 in 1980 to $11,133 in 1984 and in Iosco County from $7,014 in 1980 to $8,927 in 1984.

The projected total earnings (in 1986 dollars) for the ROI are $4.7 billion in 1990 and $4.8 billion in 1995. Corresponding per capita income is projected at $11,997 in 1990 and $11,905 in 1995. Per capita personal income in Iosco County is projected at $9,285 in 1990 and $9,261 in 1995.

Population and Demographics. The population of Iosco County in 1985 was estimated at 30,331, a 7-percent increase over the 1980 population of 28,349. The county's population is projected to increase to 31,101 by 1990 and 31,381 by 1995. The population of Oscoda Township, which includes Wurtsmith AFB, was estimated at 11,422 in 1985. Tawas City and the City of East Tawas had estimated 1985 populations of 1,805 and 2,694, respectively. Military personnel and their dependents accounted for 61 percent of the population in Oscoda Township in 1987.

The projected population for Oscoda Township is 11,507 in 1990 and 11,611 in 1995; for East Tawas is 2,799 in 1990 and 2,824 in 1995; and for Tawas City is 2,146 in 1990 and 2,165 in 1995.

Housing. The permanent year-round housing stock in the Oscoda CDP was estimated at 1,169 units in 1980, 232 of which were vacant and 106 of which were available. The 1980 estimate of permanent year-round units was 557, 1,219, and 917 for the AuSable CDP, East Tawas, and Tawas City, respectively. Available vacancies were estimated to be 23, 26, and 21 units for the same communities. Since the area is a popular summer resort, rental units are very difficult to find and local realtors believe that there are fewer available vacancies currently than in 1980. Local realtors have indicated that during the summer, rentals are very scarce and expensive. Some construction of new rental units in Oscoda Township is occurring, and public officials and local realtors have identified the need to add more multifamily units to the housing stock. There are approximately 600 hotel/motel rooms in the Oscoda-AuSable area. During the summer, the occupancy rate approaches 100 percent, and many are booked up to one year in advance.

Wurtsmith AFB has 1,342 onbase housing units. In 1987, there was a waiting list of 60 people with a waiting time of one month for enlisted personnel and up to one year for company-grade officers. As of 1985, the onbase unaccompanied personnel housing at Wurtsmith AFB consisted of 1,214 permanent enlisted and 22 permanent officer spaces. Transient facilities consisted of 41 enlisted and 18 officer spaces. There was a deficit of 649 unaccompanied enlisted personnel housing spaces.

The stock of permanent year-round housing units in the four communities is expected to reach 4,213 units by 1990. The number of available vacancies during September to May

are expected to number 180 units (4.3%), but will approach zero during the tourist season (June to August). By 1995, the stock of permanent year-round units in the four communities will have grown to 4,252 units. From September through May, it is estimated that 181 units (4.3%) will be vacant and available. Very few of these units will be available from June to August. Households seeking housing during the summer in any year from 1990 to 1995 will find virtually no available vacancies in the four communities. The local hotel/motel operators are discussing the construction of new temporary facilities in the area, but due to the seasonality of the demand for temporary facilities do not believe they could recover the cost of such construction in a reasonable time period. Therefore, no new temporary facilities are currently projected for the area.

Education. Two school districts in the ROI are primarily affected by activities at Wurtsmith AFB: Oscoda Area and Tawas Area Schools. Oscoda Area Schools operate three elementary, one junior high, one high, and one special education school. Oscoda Area Schools had a 1987-88 school year enrollment of approximately 3,300 students. The current overall pupil-to-teacher ratio at the elementary level is 21.3-to-1. The district also has one elementary school (currently being leased to Iosco County) that could accommodate 200 additional students. Approximately 47 percent of the students in the district are dependents of federal employees. The district is classified as both a "Super A" and "Super B" district. Over 95 percent of the students in the district are bused. Enrollment is projected to increase to 3,340 by 1990 and 3,370 by 1995, and staffing may increase to maintain existing pupil-to-teacher ratios.

Tawas Area Schools operate two elementary, one junior high, and one high school. In the 1987-88 school year, Tawas Area Schools enrolled 1,650 students. Approximately three percent of the district's enrollment are dependents of federal employees. Enrollment is projected to increase slightly over the next few years. A building program consisting of a new elementary school and additions to an existing elementary school and the high school will be up for voter approval in the spring of 1988. Most students in the district are bused.

Public Services. Oscoda Township has 28 full-time employees in seven departments. The Police Department has nine sworn officers. The township has a volunteer fire department with two fire stations and approximately 28 volunteer firemen. AuSable Township contracts with Oscoda Township for these public safety services. Staffing in Oscoda currently provides a public service level of 2.4 personnel per 1,000 population. Current staffing levels should meet the needs of the community into the near future.

East Tawas currently has 29 full-time employees. The Police Department has four full-time and two part-time employees. Tawas City contracts with East Tawas for police services. East Tawas Fire Department has one station staffed by 24 volunteers.

Iosco County employs approximately 100 people in 20 departments. The Iosco County Sheriff's Department employs 31 persons, including 9 patrol officers (a decrease of 4 patrol officers since 1986). Medical care in Iosco County is primarily provided by St. Joseph's Hospital, a private 65-bed facility in Tawas City. Staffing in Iosco County currently provides a public service level of 3.6 personnel per 1,000 population. To maintain these levels, county staffing would have to increase from 110 to 112 by 1990 and to 113 by 1995. If no additional personnel were hired, the number of personnel per 1,000 population would drop to 3.5 by 1990.

Public Finance. Funding for Oscoda Township services are principally provided through the general fund. General fund revenues were $1.1 million in 1986 and are projected to increases to $1.2 million in 1988. State-shared revenue (sales and income taxes) and property taxes are the principal revenue sources of the township. This total includes approximately $100,000 in charges for services provided to AuSable Township for shared public services. Expenditures were also $1.1 million in 1986 and are projected to be $1.2 million in 1988. Year-end balances in 1986 represented 7.3 percent of operating

expenditures in that year. Over the 1990 to 1995 period, revenues and expenditures are projected to remain around the $1.2 million level.

Oscoda Area Schools revenues were $10.9 million in fiscal year 1987. Property taxes, state-shared revenue, and federal aid in the form of P.L. 81-874 payments are the principal revenue sources. The district is categorized as a "Super A" district (more than 20% of the district enrollment are dependents of persons who live and work on federal property) and receives full entitlements from P.L. 81-874 programs. Together with entitlements for the "Super B" enrollments (more than 20% of the district's students are dependents of persons who work on federal property but live in the community) and other miscellaneous entitlements, payments from this source amounted to approximately $2.0 million in 1987. Expenditures in this year were $10.2 million, representing approximately $3,200 per pupil. The district has no general obligation bond indebtedness. Iosco County revenues and expenditures were approximately $8.7 million in 1986. Reserve funding levels were $1.9 million, representing approximately 22 percent of operating expenses. Over the 1990 to 1995 period, revenues and expenditures are projected to grow slightly to the $8.9 million level.

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4.12.1.3 Impacts of the Proposed Action

For the Proposed Action, a brief summary of the program-related effects on key socioeconomic indicators is presented in Table 4.12.1-1.

Employment and Income. The Proposed Action would create new jobs ranging from 324 in 1990 to 919 in 1991, and stabilizing at 585 during the operations phase beginning in 1993. During the peak construction year (1991), of the 919 total new jobs, 535 would be direct jobs (427 civilian and 108 military) and 384 would be secondary. Local hires would number 660.

Of the 585 total new jobs created by the Proposed Action during the operations phase, direct jobs would number 408 (345 military and 63 civilian) and secondary jobs would be 177. All direct and most of the secondary jobs would occur in Iosco County. The number of local hires would remain 195 throughout the operations phase.

Because the total number of new jobs created by the Proposed Action would be relatively few, not exceeding 0.4 percent of the total baseline jobs in the ROI in any given year, the with- and without-program unemployment rates would be almost identical.

The Proposed Action would have a measurable effect on personal income in both the ROI and Iosco County. The program-related personal income (in 1986 dollars) would range from $8.5 million in 1990 to $22.9 million in 1991, and stabilize at $11.9 million during the operations phase. Iosco County's share of that personal income would vary from $4.6 million in 1990 to $13.5 million in 1991, and then stabilize at $9.2 million in 1993 and thereafter. The program-related spending in the ROI would range from $6.6 million in 1990 to $17.3 million in 1991, and stabilize at $8.4 million during the operations phase.

Population and Demographics. The program-related inmigration to the ROI would range from 151 to 1,112 during the construction phase, and stabilize at 1,013 during the operations phase. Iosco County's share of that inmigration would range from 122 to 1,064 during the construction phase, and to 985 in 1993 and thereafter. As a result, the county's population increase would range from 0.4 percent in 1990 to 3.4 percent in 1992, and stabilize at 3.1 percent during operations. The corresponding percentages for the ROI would range from zero to 0.2. The number of weekly commuters would be less than 30 during the construction phase.

Table 4.12.1-1

Selected Socioeconomic Indicators, Peacekeeper Rail Garrison Program
Wurtsmith AFB, Michigan, 1990-1993
Proposed Action

	1990	1991	1992	1993[1]
Region of Influence				
Employment (Jobs)				
Total Program-Related Jobs	324	919	778	585
Direct Jobs	173	535	520	408
Civilian	167	427	173	63
Military	6	108	347	345
Secondary Jobs	151	384	258	177
Local Hires	263	660	349	195
Program-Related Spending (000s 86$)	$6,577	$17,297	$12,087	$8,385
Personal Income (000s 86$)				
Direct	$4,473	$12,997	$10,410	$7,516
Secondary	4,031	9,972	6,537	4,400
Total Personal Income	$8,504	$22,969	$16,947	$11,916
Oscoda[2]				
Population				
Baseline Population	11,507	11,528	11,549	11,570
Program-Related Change	68	400	875	831
Change as % of Baseline	0.6	3.5	7.6	7.2
Housing Demand				
Temporary Units	7	18	7	3
Permanent Units	19	63	75	63
Total Units	26	81	82	66
School District Enrollment				
Elementary	7	38	83	79
Secondary	5	31	67	64
Total Enrollment	12	69	150	143

Notes: [1]Program-related effects would continue at these levels throughout the life of the program.
[2]Includes Wurtsmith AFB for population and school enrollment.

Of the 985 inmigrants to Iosco County during the operations phase, 642 would live on the base, 189 in Oscoda, 69 in AuSable, 17 each in Tawas City and the City of East Tawas, and the remaining 51 in other surrounding communities.

The inmigration into the Oscoda area would increase the local population by 7.6 percent in 1992 and by 7.2 percent in 1993 and thereafter. The corresponding percentages for the persons living offbase in Oscoda would be 3.5 and 2.8, respectively. Military personnel and their dependents would account for 63 percent of the total population in Oscoda Township in 1993.

In both Tawas City and East Tawas, inmigrants would account for less than one percent of the local population in the peak inmigration year (in 1992, Tawas population would be 2,154 and inmigrants 21; East Tawas population would be 2,814 and inmigrants 21) and during operations (17 inmigrants to each city).

Housing. For the Proposed Action, the Air Force has programmed for up to 160 family housing units to be constructed on Wurtsmith AFB or in the proximity of the base. However, current projections of housing vacancies and potential new construction in the area suggest that about 300 units would have to be provided by the Air force through one of its housing programs. Because these conditions may change, the Air Force would continue to monitor the housing market in the area (the four communities of Oscoda, AuSable, Tawas City, and East Tawas) and would increase or decrease the extent of its participation as necessary to prevent housing impacts in the four communities.

Most program-related civilian and some military households would be housed in privately owned permanent housing units and temporary facilities in Oscoda. Some additional program-related households would reside in the AuSable CDP, East Tawas, and Tawas City. The remaining military households (160 accompanied and 105 unaccompanied) would be housed onbase or offbase in newly constructed family housing units and onbase in newly constructed unaccompanied enlisted personnel housing facilities.

The offbase program-related demand for housing is expected to begin in 1990. In the four communities, 35 permanent units (19.4% of available September to May vacancies) and 5 temporary facilities (about 1% of available September to May vacancies) would be required in the four communities. The peak short-duration demand for temporary facilities would be for 30 units (6.7% of available September to May vacancies) in 1991 and would end by 1993. The peak demand for permanent units would be experienced in 1992. This short-duration demand would be for 130 units (out of 181 available September to May or 71.8%) and would decline to the long-duration demand of 115 units (out of 181 available September to May or 63.5%) by the following year (1993). The long-duration available vacancy rate (September to May) would fall from 4.3 to 1.6 percent.

Three problems exist in providing permanent units to program personnel in the four communities. First, the lack of available housing units during the summer; landlords could rent their vacation-rentals out on a year-round basis, but would likely charge a premium rent. Second, if these vacation-rentals were rented year-round to program personnel, 115 units previously occupied by vacationers would no longer be available. This may adversely affect the local tourism industry because many families rent the same unit each summer and the program may cause a change in vacation plans. Third, because monthly Air Force housing expenditures (at a modest level of about $350 per month) are not sufficient for the development, financing, and construction of new two-, three-, and four-bedroom housing units, the housing shortfall would be offset through the use of unsuitable and potentially substandard housing. The competition for low- and moderate-income housing between military and civilian residents in the area would cause hardships for both groups because of increased housing costs and substandard housing conditions. In some cases, Air Force families may displace existing residents, placing an even greater burden on low-income households. The combined effects of insufficient affordable housing, higher housing costs, and potential displacement of low-income families would result in a high and significant housing impact. To avoid these significant impacts, the Air Force would provide adequate housing for its personnel to offset potential shortages.

The short-duration demand for temporary facilities in the area would cause a shortage during periods of peak baseline occupancy and would interfere with the local tourism industry. Therefore, these demands would be considered adverse effects of the program. However, during the off-peak season, these demands would not interfere with the local tourism industry and would create beneficial effects for the owners of temporary facilities. The demand for permanent units would create beneficial effects for landlords and property owners. However, without a larger commitment for family housing units, these impacts would adversely affect the local market.

Education. Program-related enrollment increases of 160 students are expected for Iosco County during the operations phase. Oscoda and Tawas Area Schools are expected to receive about 145 and 5 students, respectively. An additional ten students are projected to attend other districts in the county. Because of construction of onbase family housing for the program, approximately 100 students would be living onbase. The district buses over 90 percent of its students, and may be able to disperse onbase students throughout the system so as to alleviate any overcrowding at selected schools. The district also has an elementary school (currently being leased to the county) that could accommodate up to 200 students. The addition of these students to the Oscoda Area School District is expected to increase elementary level pupil-to-teacher ratios from 21.3-to-1 to 22.2-to-1 during the operations phase. This ratio would be below the state guideline of 25-to-1. These increases in class size could be accommodated by existing facilities, although some new staffing may be required. Given the minor enrollment addition to the Tawas Area Schools, current staffing levels and facilities for the area would be adequate.

Public Services. Program-related increases in population would lead to increases in demands for public services provided by Oscoda Township of 7.2 percent over baseline levels in 1993. The increased service demands would be experienced by a majority of the departments now providing service to area residents. These service demands may be overstated because with the construction of onbase family housing, a large number of the inmigrants would be living onbase and thus receiving some services through military channels. To maintain the current service level of 2.4 personnel per 1,000 population, the city would need 2 additional employees by 1993, increasing city staffing from a baseline level of 28 to 30. If no additional personnel were hired, the number of personnel per 1,000 population would drop from 2.4 to 2.2. This reduction in the number of personnel per 1,000 population would not result in an appreciable deterioration from the community's current level of public service provision.

The minor population increase (less than 1%) into Tawas City/East Tawas would lead to negligible increases in the demands for public services in that area. Current staffing and facilities would be able to accommodate the public service needs of the inmigrating population.

Program-related increases in population would lead to increases in demands for public services provided by Iosco County of 3.4 percent over baseline levels in 1993. To maintain existing service levels, the county would need to hire four additional employees by 1993, increasing county staffing from a baseline level of 113 to 117. The Sheriff's and Public Works departments would be expected to need most of these personnel. Without additional staffing, the number of county personnel per 1,000 population would drop from 3.6 to 3.5. This level of population increase would not affect the county's ability to deliver public services at current levels to area residents.

Public Finance. Program-related increases in county expenditures would be limited to outlays for additional personnel as required. Expenditures of up to $170,000 are estimated in Iosco County. This increase would represent about two percent of projected baseline expenditures. With reserve funding of approximately $1.9 million and additional revenues from sales, property taxes, and miscellaneous charges, fines, and fees, existing revenue sources would be adequate to meet these additional outlays.

Program-related increases in expenditures of Oscoda Township are estimated at $60,000 to $80,000. This increase would represent about six percent of projected baseline expenditures. Existing financial resources would be adequate to meet these additional outlays.

In Tawas City and East Tawas, existing staffing and facilities would be adequate to meet the increased service demands and expenditure increases would be negligible.

Based on an average per pupil cost of $3,200, increased expenditures of the Oscoda School District would be $460,000 to $480,000. These increases would represent about four percent of projected baseline expenditures. Entitlements from P.L. 81-874 programs would amount to about $210,000 during the operations phase. Temporary revenue shortfalls (less than $60,000 during the construction phase) could occur as state foundation program monies generally lag about one year behind the additional enrollments. Reserve funding levels of approximately $2.8 million should be adequate to cover potential shortfalls.

Summary of Impacts. For the Proposed Action at Wurtsmith AFB, short- and long-duration socioeconomic impacts would be moderate since inmigration would cause population in the Oscoda area to increase by 7.6 percent over baseline forecasts during the peak inmigration year (1992) and by 7.2 percent during program operations (beginning 1993). This level of program-induced population growth could result in moderate burdens on housing, education, public services, and public finance within the Oscoda area for both the peak and succeeding years. Short-duration socioeconomic impacts would be significant due solely to the shortage of suitable temporary and permanent housing for both construction and operations workers in the base area during the initial program years. The planned construction of new military family housing either offbase or onbase would eliminate this shortage during operations, resulting in long-duration impacts that would not be significant. Impacts for other socioeconomic elements (education, public services, and finance) would not be significant.

Socioeconomic impacts resulting from the Proposed Action in other communities in the Wurtsmith AFB area would be negligible.

Both short- and long-duration beneficial socioeconomic effects would be generated by the Proposed Action, including increased employment and income within the nine-county ROI, and greater utilization of both temporary and permanent housing vacancies within the Wurtsmith AFB area during the off-season.

Mitigation Measures. Mitigation measures that could be undertaken to reduce or eliminate potential significant impacts of the Peacekeeper Rail Garrison program at Wurtsmith AFB are listed below. All or some of these measures may be implemented. For each measure, the agencies that may be involved in implementation are identified.

- As appropriate, award multiple small contracts to enable local firms with limited bonding capacities the opportunity to bid. Contract awards to local firms would reduce population inmigration during the construction phase and subsequently lower demand for temporary housing units (U.S. Army Corps of Engineers).

- Provide information to local job service agencies about the availability of jobs (by type) and the skills needed for them. This information could help reduce the number of job seekers inmigrating into the area and reduce demand for local housing (U.S. Air Force contractors).

4.12.1.4 Impacts of the Alternative Action

For the Alternative Action, a brief summary of the program-related effect on key socioeconomic indicators is presented in Table 4.12.1-2.

Employment and Income. Impacts of the Alternative Action on employment and income in the ROI would be higher than the Proposed Action. During the construction phase, the Alternative Action would create new jobs ranging from 356 in 1990 to 971 in 1991, which is 32 to 52 more jobs than those created by the Proposed Action. Of the 971 new jobs during the peak construction year (1991), 569 would be direct (452 civilian and 117 military) and 402 would be secondary. The number of local hires would be 692, which

Table 4.12.1-2

Selected Socioeconomic Indicators, Peacekeeper Rail Garrison Program
Wurtsmith AFB, Michigan, 1990-1993
Alternative Action

	1990	1991	1992	1993[1]
Region of Influence				
Employment (Jobs)				
Total Program-Related Jobs	356	971	839	644
Direct Jobs	192	569	562	449
Civilian	186	452	180	69
Military	6	117	382	380
Secondary Jobs	164	402	277	195
Local Hires	288	692	369	214
Program-Related Spending (000s 86$)	$7,169	$18,141	$12,949	$9,230
Personal Income (000s 86$)				
Direct	$4,966	$13,801	$11,192	$8,269
Secondary	4,371	10,421	6,990	4,844
Total Personal Income	$9,337	$24,222	$18,182	$13,113
Oscoda[2]				
Population				
Baseline Population	11,507	11,528	11,549	11,570
Program-Related Change	74	431	959	914
Change as % of Baseline	0.6	3.7	8.3	7.9
Housing Demand				
Temporary Units	8	19	7	3
Permanent Units	20	67	81	68
Total Units	28	86	88	71
School District Enrollment				
Elementary	7	41	91	86
Secondary	6	34	74	71
Total Enrollment	13	75	165	157

Notes: [1]Program-related effects would continue at these levels throughout the life of the program.
[2]Includes Wurtsmith AFB for population and school enrollment.

is 32 more than for the Proposed Action. During the operations phase, total new jobs created by the Alternative Action would number 644, which is 59 more than those created by the Proposed Action. Of these 644 new jobs, 449 would be direct (69 civilian and 380 military) and 195 would be secondary. Local hires would number 214, which is 19 more than local hires for the Proposed Action.

During the construction phase, the Alternative Action would generate personal income (in 1986 dollars) ranging from $9.3 million in 1990 to $24.2 million in 1991 in the ROI, which is $0.8 million to $1.3 million more than that generated by the Proposed Action. Iosco County's share of that personal income would range from $5.1 million in 1990 to $14.3 million in 1991. During the operations phase, the Alternative Action would

generate $13.1 million in personal income for the ROI and $10.2 million of that personal income would go to Iosco County. In the ROI, the program-related spending would range from $7.2 million in 1990 to $18.1 million in 1991, and then stabilize at $9.2 million during operations phase.

Population and Demographics. The population increase associated with the Alternative Action would range from 165 in 1990 to 1,215 in 1992 in the ROI, which is 14 to 103 more persons than for the Proposed Action. During the operations phase, total inmigrants to the ROI would number 1,115, which is 102 more than for the Proposed Action. During the construction phase, Iosco County's share of the inmigration would range from 134 in 1990 to 1,164 in 1992. Of the 1,115 total inmigrants during the operations phase, 1,084 would move to Iosco County. As a result of inmigration, the county's population increase would range from 0.4 percent in 1990 to 3.7 percent in 1992, and stabilize at 3.5 percent in 1993 and thereafter.

With the Alternative Action, 707 of the 1,084 inmigrants to Iosco County during the operations phase would live onbase, 207 in Oscoda, 75 in AuSable, 19 each in Tawas City and East Tawas, and the remaining 57 in other surrounding communities. The proportional share of military personnel and their dependents in the population of Oscoda Township would be 63 percent in 1993.

The inmigration into the Oscoda area would increase the total baseline population by 8.3 percent in 1992 and 7.9 percent in 1993 and thereafter.

Housing. For the Alternative Action, the Air Force has programmed for up to 176 family housing units to be constructed on Wurtsmith AFB or in the proximity of the base. However, current housing vacancy projections and potential new construction in the area suggest that about 300 units would have to be provided by the Air Force through one of its housing programs. Because these conditions may change, the Air Force would continue to monitor the housing market in the area and would increase or decrease the extent of its participation as necessary to prevent housing impacts in the community. The Alternative Action would not change the expected occupancy patterns of program-related personnel moving into the area. An additional 16 accompanied and 11 unaccompanied personnel would live either onbase or offbase in newly constructed family housing units and onbase in newly constructed unaccompanied enlisted personnel housing facilities, respectively.

The initial demand for housing in the four communities would increase by five temporary facilities in 1990. In later years, the additional workers would not change the demand for temporary facilities appreciably, but would require an additional ten units (reducing the available September to May vacancy by a total of 77.3% in 1992 and by 69.1% from 1993 and thereafter). The available September to May vacancy rate in the four communities would decline from 4.3 to 1.0 percent in 1992, and from 4.3 to 1.3 percent in 1993. The combined effects of insufficient affordable housing, higher housing costs, and potential displacement of low-income families would result in a high and significant housing impact. To avoid these significant impacts, the Air Force would provide adequate housing for its personnel to offset potential shortages.

The additional demands for housing in the area, in the absence of a larger Air Force housing program, would create greater negative effects on the local housing market than the Proposed Action. However, the beneficial effects which would be experienced by local landlords would also be greater.

Education. During the operations phase, the Alternative Action would bring in an additional 15 students above those levels identified for the Proposed Action. The Oscoda Area Schools would receive a total of about 160 students under this alternative. The remaining students would be distributed among Tawas Area Schools as well as other districts within Iosco County. Approximately 110 students are expected to reside

onbase. Additional staffing may be required and the district has existing assets that can be utilized to expand operating capacity if needed. Pupil-to-teacher ratios would remain at those levels identified for the Proposed Action.

Public Services. The slightly higher population inmigration with this alternative would not result in a measurable increase in township or county personnel levels over the Proposed Action projections. The number of personnel per 1,000 population, for both Oscoda Township and Iosco County, would remain at those levels identified for the Proposed Action.

Public Finance. Because public service staffing levels would remain essentially unchanged with this alternative, expenditure increases would remain at levels estimated for the Proposed Action. The slightly higher population may result in slightly higher revenues from sources such as fines, fees, and charges for services, but these amounts would be inappreciable.

Summary of Impacts. For the Alternative Action at Wurtsmith AFB, short- and long-duration socioeconomic impacts would remain moderate because inmigration would cause population in the Oscoda area to increase by 8.3 percent over baseline forecasts during the peak inmigration year (1992) and by 7.9 percent during program operations (beginning 1993). This level of program-induced population growth could result in moderate burdens on housing, education, public services, and public finance within the Oscoda area for both the peak and succeeding years. Short-duration socioeconomic impacts would be significant due solely to the shortage of suitable temporary and permanent housing for both construction and operations workers in the base area during the initial program years. A commitment to providing more new military family housing either offbase or onbase would eliminate this shortage during operations, resulting in long-duration impacts that would not be significant. Impacts for other socioeconomic elements (education, public services, and finance) would not be significant.

Socioeconomic impacts resulting from the Alternative Action in other communities in the Wurtsmith AFB area would be negligible.

Both short- and long-duration beneficial sociceconomic impacts would be generated by the Alternative Action, including increased employment and income within the nine-county ROI, and greater utilization of both temporary and permanent housing vacancies during the off-season within the Wurtsmith AFB area.

Mitigation Measures. Mitigation measures for the Alternative Action would be the same as those for the Proposed Action.

4.12.2 UTILITIES

4.12.2.1 Region of Influence

The utilities ROI for Wurtsmith AFB includes the communities of Oscoda, AuSable, Tawas City, and East Tawas, as well as the base.

4.12.2.2 Existing Conditions and Future Baseline

Potable Water Treatment and Distribution. Potable water is provided to the urbanized portion of Oscoda and AuSable townships by shallow groundwater wells. The water presently requires no treatment, but it is anticipated that chlorination will be required in the future to control contamination from septic systems. The average daily water demand for 1987 was 0.83 million gallons per day (MGD) or 58 percent of the potable water pumping capacity. The township has 1.16 million gallons (MG) of potable water storage; this is adequate to handle increased summer demands. The estimated potable water demand is 0.84 MGD for 1990 and 0.85 MGD in 1994. The townships are

participating in a feasibility study with other water purveyors in the region to investigate the use of water from Lake Huron to supplement its current supply.

East Tawas supplies water to its residents and Tawas City from Lake Huron. The 1987 average daily potable water demand was approximately 0.7 MGD or 47 percent of the water treatment capacity, but a scheduled renovation will bring the capacity to 1.7 MGD. The cities do experience some shortages during the summer but a rationing program alleviates the problem. The cities collectively have 1.8 MG of water storage. It is estimated that the average daily potable water demand during the 1990 to 1994 time period will remain stable at 0.8 MGD.

Wurtsmith AFB provides its own potable water from shallow groundwater wells. This source presently requires only chlorination, but its availability over the long term is in question due to trichloroethylene contamination (Section 4.12.7). The base had an average daily water demand of approximately 0.72 MGD in 1987. The present well capacity is 1.86 MGD and current demand consumes 39 percent of that capacity. The water storage at the base is 0.8 MG. Lawn watering restrictions have been instituted during the summer to prevent shortages from occurring. The base is currently involved in a regional feasibility study to draw water from Lake Huron to supplement the base's water supply.

Wastewater. Wastewater treatment for the urbanized portion of Oscoda and AuSable Townships is accomplished through an activated sludge treatment facility. The average daily flow for 1987 was 0.22 MGD or 27 percent of wastewater treatment capacity. The expected wastewater flows for 1990 and 1994 are 0.26 and 0.27 MGD, respectively.

The wastewater facilities at Tawas City and East Tawas are both operating at or near capacity. The two cities have decided to jointly fund an expansion of the East Tawas treatment facility to handle their combined wastewater flows. The expansion is expected to be finished by late 1989 and will have a treatment capacity of 2.5 MGD. The 1987 collective average daily flow was 0.64 MGD; anticipated average daily flow for 1990 and 1994 are 0.64 and 0.65 MGD, respectively.

Wastewater processing for Wurtsmith AFB is accomplished at a 1.5-MGD activated sludge treatment plant. The base's average daily flow for 1987 was 0.52 MGD or 35 percent of the wastewater treatment capacity. The wastewater flows for the base are expected to equal 0.56 MGD without the program.

Solid and Hazardous Waste. Solid waste for Oscoda and AuSable townships, East Tawas and Tawas City, and Wurtsmith AFB is collected by private contractors. Oscoda and AuSable generated an estimated 16 tons per day (T/day) of solid waste in 1987, and are expected to generate 16 and 17 T/day in 1990 and 1994, respectively. East Tawas and Tawas City are estimated in 1987 to have generated nine T/day of solid waste and it is anticipated that generation in 1990 and 1994 will be ten T/day. Wurtsmith AFB in 1987 generated approximately 15.5 T/day of solid waste and is expected to continue to generate the same amount. These communities and the surrounding area are disposing of their solid waste at various landfill sites with lifespans of a few years. To provide a solution to the shortage of landfill space, a regional study is considering certain disposal options including siting an incinerator.

Onbase hazardous wastes are managed by Wurtsmith AFB and the Defense Reutilization and Marketing Office is responsible for providing for the proper handling of wastes and arranging for transport to treatment and disposal facilities. The base is constructing a conforming storage facility on the northwest corner to consolidate existing operations. The wastes include solvents, batteries and battery acid, oils, paints, thinners, and other regulated materials.

Energy Utilities. Electricity is provided to Wurtsmith AFB and the surrounding area by Consumers Power Company. In 1987, system sales equaled 27.4 billion kilowatt-hours (kWh). Peak demand grew by 5.3 percent to 5,400 megawatts (MW) with the reserve margin dropping to 12.9 percent. The company projects peak demands to increase to 5,540 MW in 1990 and to 5,960 MW in 1994. When the 1,370 MW Midland Cogeneration Venture is online in 1990, system capacity will increase to 7,940 MW. Adequate capacity will then be available to meet peak demands and accommodate new growth.

In FY 1987, Wurtsmith AFB consumed 42,112 kWh of electricity. The average weekly peak onbase power demands required 73 percent of the existing combined 10 megavolt-amperes (MVA) substation capacity. The base has three substations, two that serve base operations and one that serves base housing. The substation for the housing is operating at 40 percent of its rated capacity, while the operations substations are functioning at 106 percent of rated capacity. A new distribution system with two 10-MVA substations is proposed for construction in FY 1991 which will have adequate capacity to meet existing demands and future requirements.

Michigan Consolidated Gas Company supplies natural gas to one million customers in Michigan including the base. Natural gas sales have dropped from 500 billion cubic feet (Bcf) in 1979 to about 300 Bcf in 1987. The company has adequate interstate supply sources and storage to meet projected demands. Wurtsmith AFB consumed 148,026 thousand cubic feet (Mcf) of natural gas in FY 1987. With the recent conversion of the base heating plant to natural gas, the demand for natural gas will increase to 320,000 Mcf.

Liquid fuels at Wurtsmith AFB are stored in 11 aboveground tanks with a total capacity of 2.5 MG. Underground storage consists of 67 tanks with a total capacity of 0.76 MG. In 1987, 87,000 gallons of diesel fuel were used at the base. Diesel fuel storage capacity is 55,000 gallons.

4.12.2.3 Impacts of the Proposed Action

Potable Water Treatment and Distribution. In 1992, average daily requirements for the East Tawas/Tawas City system would reach a peak of 0.80 MGD from a baseline level of 0.79 MGD because of a 0.01 MGD or 0.85-percent program-related increase. The city's 1.7-MGD capacity treatment facility would be operating at 47 percent, and storage would be adequate to meet summer demands. Average daily requirements for the Oscoda/AuSable system would increase from a baseline level of 0.85 MGD to a peak of 0.89 MGD in 1992 because of a 0.04-MGD or 4.9-percent program-related increase. The city's 1.4-MGD capacity treatment facility would be operating at 64 percent, and storage would be adequate to meet summer demands. Daily requirements at Wurtsmith AFB with military housing onbase would increase from a baseline level of 0.72 MGD to 0.82 MGD or 14.4 percent in the same year. The base water supply system is adequate to meet program needs, however, the existing base wells are vulnerable to groundwater contamination (Section 4.12.7.3). The base is involved in a regional feasibility study for a permanent water supply from Lake Huron to supplement the well system. If housing for military personnel is built offbase, this requirement would decrease, while the overall community demands would increase slightly.

Wastewater. Average daily flows for the East Tawas/Tawas City system would increase from a baseline level of 0.65 MGD to a peak of 0.66 MGD in 1992 because of an increase of less than 0.01 MGD (less than 1%). The expanded treatment plant, with a 2.5-MGD capacity, would be operating at 26 percent and would adequately treat the increased flows. The Oscoda/AuSable system's average daily flows would increase from a baseline level of 0.27 MGD to 0.31 MGD in 1992 because of a 0.04-MGD or 13.7-percent program-related increase. The existing treatment plant, with a 0.84-MGD capacity, would be operating at 37 percent and would adequately treat the increased flows. Wastewater flows at Wurtsmith AFB, with military housing onbase, would increase from a baseline

level of 0.56 MGD to 0.64 MGD or 14.4 percent in 1992. The existing base treatment facility, with a 1.5-MGD estimated capacity, would handle the increased flow. If military housing is constructed offbase, then the flows at the base would be less while the overall flows in the communities would increase slightly.

Solid and Hazardous Waste. Program-related solid waste generation for Wurtsmith AFB and the communities of East Tawas/Tawas City and Oscoda/AuSable would increase by 2.5 T/day or six percent in 1992. Solid waste generation, with onbase military housing, would increase by 1.8 T/day or 11.6 percent in 1992 (the peak year). With the cities and private haulers already adequately disposing of 42 T/day, the program-related increase would require no additional equipment or personnel. If military housing is constructed offbase, the solid waste generated at the base would be less while overall solid waste generation in the communities would increase slightly. Existing landfills in the area have short lifespans and a regional study is under way to find a solution to solid waste disposal. Program-related hazardous waste generation at Wurtsmith AFB would be incorporated into the existing management system, stored onbase, and then transported to treatment and disposal facilities.

Energy Utilities. Program-related electricity demands would peak in 1993 with an increase of 5.43 MW. This demand would increase the projected peak demand of 5.43 MW for the Consumers Power Company system by 0.09 percent. The company system has adequate power supplies to meet this increase. Electrical requirements, with onbase military housing, would equal 5.2 MW or a 71-percent increase on the collective capacities of the substations. Adequate capacity of these substations is not certain; while the substation serving base housing has adequate capacity, the substation serving base operations is functioning near capacity. If two 10-MVA substations proposed for FY 1991 are built, then capacity would be adequate. If military housing is constructed offbase, the demands for electricity at the base would be less while overall consumption would increase slightly. Program-related natural gas consumption would increase demand by 42 million cubic feet (MMcf) or 0.23 percent. Michigan Consolidated Gas Company has adequate infrastructure and reserves to meet the new demand. Natural gas use at the base, with onbase military housing, would increase from a projected demand of 320 MMcf to 348 MMcf, or by 8.7 percent. If military housing is constructed offbase, the demands for natural gas would be less while overall consumption would be similar. Diesel fuel consumption at Wurtsmith AFB would increase as a result of the program. Supplies would continue to be filled by the Defense Fuels Supply Center (DFSC) through contracts with local and regional suppliers.

Summary of Impacts. Utility requirements associated with the Peacekeeper Rail Garrison program would increase demands on the communities of East Tawas/Tawas City by less than one percent in the peak year (1992). Utility requirements in the communities of Oscoda/AuSable would increase demands for potable water treatment by 4.9 percent and wastewater treatment by 13.7 percent. During the operations phase, the increases would be slightly reduced. Both peak year and operational requirements on energy utilities would be less than one percent. Long-duration impacts associated with the increased demand for utility service in the surrounding communities would be high because the increased demand for wastewater treatment in Oscoda/AuSable would be greater than ten percent. These impacts would not be significant because each utility system has adequate capacity to meet new demands without increasing personnel or expanding existing facilities. There would be no short-duration impacts.

4.12.2.4 Impacts of the Alternative Action

Potable Water Treatment and Distribution. With the additional construction associated with six Train Alert Shelters (TASs) and the operations personnel to support the program, potable water requirements in 1992 would be slightly higher than the Proposed Action, but would remain less than a 1-percent increase for East Tawas/Tawas City. The increased demands associated with the Alternative Action would increase the demand on

Oscoda/AuSable by less than 0.01 MGD over the Proposed Action to 0.05 MGD in the same year. The Alternative Action would increase the demand at Wurtsmith AFB by less than 0.01 to 0.05 MGD in the same year. In all of these cases, the slight increase associated with the Alternative Action would not create any additional problems or add to any problems that would be associated with the Proposed Action.

Wastewater. Average daily flows to the East Tawas/Tawas City treatment plant would peak in 1992 and would be less than 0.01 MGD larger than the flows identified for the Proposed Action. This increase in demand still represents less than a 1-percent increase over the baseline flow. The demand from the Alternative Action would increase the Oscoda/AuSable system by less than 0.01 MGD over the Proposed Action to 0.40 MGD. The demand at the base would increase by less than 0.01 MGD beyond the Proposed Action to 0.09 MGD. In all the previously mentioned cases, the slight increase associated with the Alternative Action would not create any additional problems or add to any existing problems that may occur as a result of the Proposed Action.

Solid and Hazardous Waste. Solid waste generation from the increased construction and operations activities of the Alternative Action would be slightly greater than the Proposed Action. Solid waste generation for both cities and the base is 0.3 T/day greater during the construction and operations phases. These increases would not adversely affect the city and private haulers or add to the already existing regional problem of solid waste disposal. Hazardous waste generation would be slightly greater than the Proposed Action as a result of the maintenance activities associated with the additional trains. These wastes would be incorporated into the existing management system and transported to treatment and disposal facilities.

Energy Utilities. Demands for electricity would be 0.6 MW greater for the Alternative Action than the Proposed Action. The additional demand associated with the Alternative Action would not create problems or add to problems that may occur as a result of the Proposed Action on the Consumers Power Company or base system. Demands for natural gas are 4.5 MMcf greater for the Alternative Action than the Proposed Action. Michigan Consolidated Gas Company has an adequate infrastructure and reserves to meet these increased demands. Diesel fuel consumption would be greater than the Proposed Action. Supplies would continue to be filled by the Defense Fuels Supply Center through contracts with local and regional suppliers.

Summary of Impacts. Utility requirements associated with the Alternative Action would be slightly greater than those identified for the Proposed Action. Because the peak year requirements would not be substantially greater than the impacts associated with the operations requirements, all utility impacts would be of long duration. These impacts would remain high because the increased demand for wastewater treatment in Oscoda/AuSable would be greater than ten percent. Impacts would not be significant because each utility system has adequate capacity to meet the new demands without increasing personnel or expanding existing facilities.

4.12.3 TRANSPORTATION

4.12.3.1 Region of Influence

The ROI for transportation includes the principal streets in Oscoda Township, Tawas City, and East Tawas, Michigan and the primary highways leading to Wurtsmith AFB.

4.12.3.2 Existing Conditions and Future Baseline

The principal streets in Oscoda Township consist of segments of the primary highways that pass through the town. Segments of U.S. 23 handled an estimated 10,200 to 21,700 vehicles per day in 1986. The principal city streets in Tawas City include Lake Street, part of U.S. 23, and Hemlock Street, part of Michigan State Highway 55. Lake

Street had an average annual daily traffic (AADT) of 12,000 in 1986. Hemlock Street had an AADT of 6,200. The principal streets in East Tawas include Lake Street, also part of U.S. 23, which had an AADT of 15,500 in 1986.

Current level of service (LOS) ratings at these principal streets are essentially free-flowing with reasonably unimpeded operations. Sections of U.S. 23 had an LOS of A and B during the peak hours in 1986. (Refer to Section 3.4.4 and Table 3.4.4-1 for descriptions of LOS letter scores.) In Tawas City, Lake Street was operating mostly at LOS B and Hemlock Street at LOS A during the peak hour in 1986. Lake Street in East Tawas provides service at LOS B during the peak hour. Based on population projections for the city, traffic volumes on these principal streets are not expected to change and the resulting LOS ratings would remain the same through the year 1994.

The primary access to the base is provided by north-south route U.S. 23, located about 1.5 miles east of the base, and by Michigan State Highway F-41, located along the northeastern border of the base. The main gate is located along Michigan State Highway F-41 through Skeel Avenue on the eastern side of the base. The section of Michigan State Highway F-41 from U.S. 23 up to the main gate of Wurtsmith AFB had an AADT of 14,600 in 1987. Traffic is reasonably free-flowing at LOS B.

4.12.3.3 Impacts of the Proposed Action

During the construction phase, an increase in incoming vehicular traffic would occur as a result of movement of construction workers, materials, and equipment. Construction activities would require an estimated 535 program-related personnel during the peak employment year (1991). Of these, 157 program-related employees would reside in Oscoda, AuSable, Tawas City, and East Tawas, and would commute daily to the base. They would generate an additional 143 passenger vehicle trips to the base during the peak hours each workday in 1991. This increase in traffic would add to the delays and queues at the main gate of Wurtsmith AFB. Additional heavy-vehicle trips to the base would also increase traffic volume at the gate. However, these movements could occur during off-peak hours and would not cause additional delays at the main gate during rush hours. During the construction phase, program-related commuters would cause increased traffic flow along principal streets in Oscoda, AuSable, Tawas City, and East Tawas, but would not reduce the LOS ratings. Traffic would increase along Michigan State Highway F-41, which leads to the base, increasing delays and congestion, but without reducing the LOS below B.

During the operations phase, an estimated 117 of a total 408 program-related employees would reside in Oscoda, AuSable, Tawas City, and East Tawas. They are expected to add 106 passenger vehicle trips to the base and would cause a slight increase in congestion and delays along Michigan State Highway F-41 without reducing its LOS rating of B. Operations personnel commuting from Oscoda, AuSable, Tawas City, and East Tawas would not increase congestion or delays along the principal city streets. Increased queues and waiting times would also occur at the entrance gate. In addition, occasional program-related deliveries of supplies and equipment could increase traffic volumes at the gates. However, deliveries are expected to occur during off-peak hours and could use other access routes to the base.

Interruptions to vehicular flow at public roads/railroad crossings along the garrison rail spur and the existing Detroit and Mackinac (D&M) rail line would occur. Current road and train traffic levels at these public roads/rail crossings are low; commercial trains would cross these intersections at most every other day. Because the existing D&M line is the only access to Wurtsmith AFB, the greatest percentage increase in train interruptions would occur along this line. The trains are only expected to move out of the garrison when either major maintenance or repair necessitates they be transported to the Main Operating Base or depot facilities, or when directed to disperse during times of national need. In addition, a training train would travel periodically to the garrison

installation to accomplish operations, security, and maintenance training. The additional train traffic could easily be handled by the rail line, and train interruptions at railroad/public road crossings would not substantially delay vehicular traffic. Moreover, these train interruptions would only occur occasionally.

Both short- and long-duration impacts on transportation would be negligible because the LOS rating along Michigan State Highway F-41, which leads to the base, would not be reduced below B. Employees commuting from Oscoda, AuSable, Tawas City, and East Tawas would not reduce the LOS rating along the principal streets.

4.12.3.4 Impacts of the Alternative Action

Compared to the Proposed Action (4 TASs), the Alternative Action (6 TASs) would require slightly more program-related personnel. During the construction phase, an estimated 569 program-related personnel would be needed in 1991 (the peak employment year). Of these employees, 168 are expected to reside in Oscoda, AuSable, Tawas City, and East Tawas. They are estimated to add 153 passenger vehicle trips to the base during the peak hours in 1991. They would also increase delays and queues at the entrance gate as with the Proposed Action. The LOS rating along Michigan State Highway F-41 would not be reduced below B. Program-related personnel commuting from Oscoda, AuSable, Tawas City, and East Tawas would not reduce the LOS rating along the principal city streets.

During the operations phase, an estimated 129 out of 449 program-related personnel may reside in Oscoda, AuSable, Tawas City, and East Tawas. They are expected to add 117 passenger vehicle trips (11 more than for the Proposed Action) to the base during the peak hours and would cause additional congestion along Michigan State Highway F-41 and at the main gate. The increase in congestion along Michigan State Highway F-41 would not reduce the LOS below B. Peacekeeper and training train effects on vehicular traffic at road crossings would be about the same as the Proposed Action. Impacts would not be significant.

Commuting associated with the Alternative Action would be slightly greater than with the Proposed Action. However, both short- and long-duration impacts on transportation would still be negligible because the LOS rating along the section of Michigan State Highway F-41 leading to the main gate would not change. The LOS ratings along the principal streets in Oscoda, AuSable, Tawas City, and East Tawas would also not change.

4.12.4 LAND USE

4.12.4.1 Region of Influence

The land use ROI includes Wurtsmith AFB; adjacent private and public lands in the vicinity of the base; and the existing connector spur corridor which extends southeast to the main line of the D&M Railroad.

4.12.4.2 Existing Conditions and Future Baseline

Wurtsmith AFB is located in Oscoda Township in Iosco County. A comprehensive plan is presently being prepared by the East Central Michigan Planning and Development Region agency for Iosco County. An adopted zoning ordinance and general development plan is administrated by Oscoda Township. The existing connector spur is located within the Township Forestry and Industrial Zone Districts.

Figure 4.12.4-1 presents a generalized overview of land use onbase and in the vicinity. The primary land uses are military, industrial, public, and residential. Military land uses are at Wurtsmith AFB on Air Force land which is fee simple and on lands leased from the U.S. Forest Service (USFS) (Huron National Forest) and the State of Michigan (AuSable State Forest). There is a 1,200-foot-wide buffer between the west base boundary and the

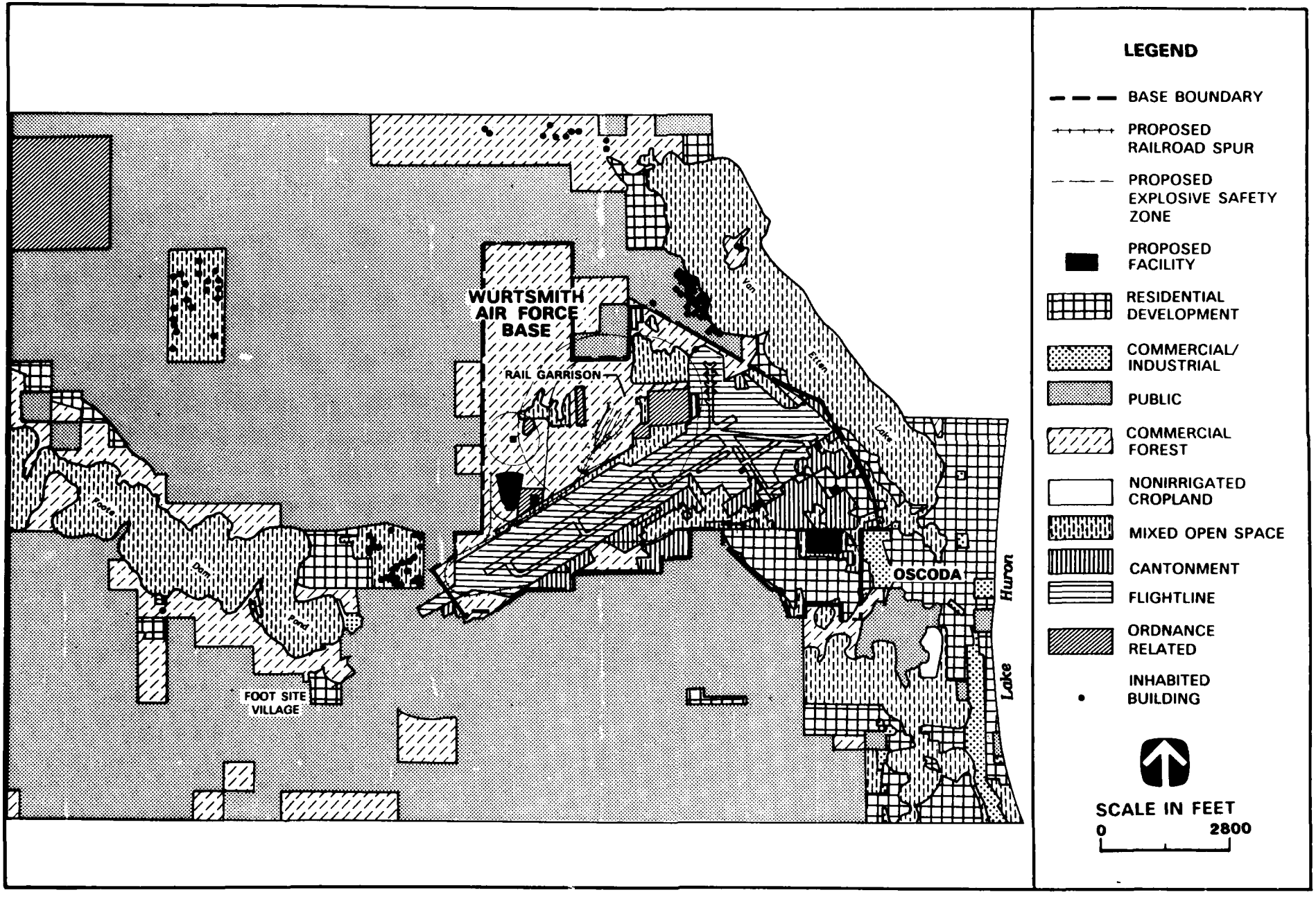


FIGURE 4.12.4-1 LAND USE AT WURTSMITH AFB, MICHIGAN AND VICINITY

public wood cutting areas within the AuSable State Forest west of the base. Public wood cutting within the buffer is prohibited. Other types of public multiple-use activities such as the established snowmobile trails are permitted within the buffer.

Nonmilitary public land in the ROI is administered by the USFS and the State of Michigan on a multiple-use basis. Private land use west of the program-affected area contains a low-density subdivision with approximately 12 inhabited buildings.

The land use southeast of the base along the existing connector spur consists of about 50 inhabited buildings located in a mobile home park adjacent to the southwestern boundary of the connector spur. Industrial land uses are present on both sides of the connector spur tracks south of the AuSable Golf Course, which is located at the junction of the connector spur and main line of the D&M Railroad on both sides of the tracks.

The visual attributes of the ROI are typical of the northeastern portion of the Central Lowlands Physiographic Province. The area of the base is quite flat with a bench rising to the west. Native vegetation includes both hardwood and coniferous forests, but part of the area is now in commercial forest or urbanized. Landscape forms are flat and lines are straight. Colors are medium to dark green, with white and dark brown in winter. Textures are smooth to medium. Considerable forest areas remain on, and in the vicinity of the base. Existing onbase structures are visible to the southwest of County Road F-41 (AADT 1,500) north of the base, but not from U.S. 23 (AADT 10,400-22,100) east of the base because of intervening trees and structures. These two highways are the key observation points for the TAS igloos. There are scattered residential uses along County Road F-41 which have views onto the base.

4.12.4.3 Impacts of the Proposed Action

The proposed program would be located entirely onbase; however, 70 acres of restrictive easement would be required north of the base. This easement area is presently vacant state-owned land which has been clear cut in a past lumbering operation, but presently has a population of young conifers. The restrictive easement would not affect this new stand of commercial forest, but new buildings for habitation could not be built in the easement area for the duration of the Peacekeeper Rail Garrison program.

The connector rail spur onbase would require the permanent removal of about 10.5 acres of commercial forest along several segments that are Air Force fee lands and lands leased from the Michigan State Forest Department. The land has been devoted to military uses associated with Wurtsmith AFB.

The Peacekeeper Rail Garrison program would require the relocation of the existing grenade range, explosive ordnance disposal range, and Rea Road. Rea Road would be relocated about 4,000 feet west of its present alignment to just outside the proposed public transportation route explosive safety zone. It would require the removal of about 8.5 acres of existing commercial forest (assuming a 60-ft-wide road right-of-way).

The TASs would be located about 15,000 feet from U.S. 23 and 5,000 feet from County Road F-41. They would be visible from County Road F-41, but so low on the horizon that they would not be noticed by the casual observer. Intervening onbase structures would also tend to block views from that road. Because of intervening trees and structures, there are no views onto the base from U.S. 23.

Summary of Impacts. No offbase land would be acquired for program use, and no inhabited buildings would be located in the proposed safety easements. The TASs would not be noticeable to users of key observation point highways. For these reasons, the short- and long-duration program impacts on land use would be negligible.

4.12.4.4 Impacts of the Alternative Action

Impacts of the Alternative Action at Wurtsmith AFB would be about the same as the Proposed Action, except that the restrictive safety easement would be about 100 acres. About 90 acres of this area is state-owned land, and the remainder is private. No inhabited buildings would require relocation and the TASs would not be noticeable to viewers from the key observation points. Therefore, the short- and long-duration impacts of the Alternative Action on land use would be negligible.

4.12.5 CULTURAL RESOURCES

4.12.5.1 Region of Influence

The ROI for cultural resources at Wurtsmith AFB consists of the drainage basin of the AuSable River west to Big Creek and the entire drainage basins of Pine and Thunder Bay rivers. Wurtsmith AFB is located near the mouth of the AuSable River, which drains most of the northeastern portion of Michigan's Lower Peninsula. Hilly terrain covered by coniferous forest characterizes the base area.

4.12.5.2 Existing Conditions and Future Baseline

Prehistoric Resources. According to the Michigan State Historic Preservation Officer, 23 prehistoric sites have been recorded within six miles of Wurtsmith AFB. The Huron National Forest archaeologist has recorded at least six additional prehistoric sites along the AuSable River one mile south of the base. Most cultural resources studies near the base have been small surveys for various timber sales and land exchanges.

Of the 23 prehistoric sites recorded, 8 are burials or mounds, 2 are listed as large villages, and the remaining 13 are habitation sites or camps. Nine of these sites are identified as containing either Archaic or Woodland period manifestations. The Goodwin-Gresham site, a Middle and Late Woodland fishing village, is located on the shore of Lake Huron less than 0.5 mile east of the base. The site contains cord-marked ceramics, projectile points, bifaces, debitage, and a faunal assemblage containing primarily fish remains. The Brandt I site, located less than 0.5 mile south of the base, is a deeply buried cemetery dating to the Archaic period (1140 B.C.). The site contained red ochre-stained pits, multiple-bundle burials, and evidence of one cremation. The cemetery had been dug into sand and gravel to a depth of 6 feet. Two sites have been determined not eligible for the National Register of Historic Places (NRHP), but most prehistoric sites have not been formally evaluated. Recent archaeological investigations in proposed Rail Garrison impact areas resulted in the identification of two prehistoric lithic scatters. One, dating to the Late Archaic period, occurs in the proposed family housing area, and the other is exposed along the AuSable River bluff on the garrison facility access rail route. Neither site appears to contain the quantity of material or stratigraphic integrity needed to be eligible for the NRHP.

Historic Resources. Historic resources near Wurtsmith AFB include standing structures and historic archaeological sites such as cemeteries, townsites, homesteads, lumber camps, trash dumps, sawmills, a Civilian Conservation Corps camp, and a mission. Approximately 29 standing structures and 25 archaeological sites are recorded near the base. Three historic structures, the Greenbush School, the Pack House, and the Brackenridge House, are listed on the Michigan State Register. The remaining 26 standing structures consist of pre-1945 residences, a church, a restaurant, and a commercial building. The 25 archaeological sites are primarily early twentieth-century sites. Only seven historic sites are listed as containing late nineteenth-century materials and include two homesteads, one trash dump, three lumber camps, and the Oscoda Indian Mission. None of the historic sites in the vicinity of the base have been evaluated to determine their eligibility for the NRHP.

Only two structures built before 1941 still remain on Wurtsmith AFB; all other pre-1941 buildings were demolished in preparation for rebuilding the air field at that time. The rest of the military buildings are not old enough to be considered eligible for the NRHP. A portion of abandoned rail bed for the AuSable and Northwestern Railroad has been identified in the area proposed for the relocated grenade range. This narrow gauge line was associated with late nineteenth century lumbering activities.

Native American Resources. Native American groups traditionally associated with the northeastern Michigan region are the Chippewa and Ottawa. The Chippewa moved south into the lower Michigan Peninsula by 1701. Two Chippewa families lived near Van Etten Lake in the early 1870s, but moved to land which became the Oscoda Indian Mission in 1878. The Ottawa ceded their land, including the area presently occupied by the base, to the United States in 1819 under the Treaty of Saginaw. A Chippewa cemetery is reported three miles northwest of the base. Consultation has been initiated with local Chippewa in an attempt to identify other areas of concern but no sensitive resources have yet been identified.

Paleontological Resources. Although bedrock formations in the vicinity of the base are covered with at least 100 feet of glacial deposits, some fossils may be found. Pleistocene materials such as mastodon and mammoth remains could be present in the glacial drift in primary contexts. Redeposited paleontological materials from the underlying Mississippian bedrock such as crinoids, corals, cephalopods, clams, snails, brachiopods, and trilobites could also occur. These paleontological materials would represent secondary gravel deposits.

4.12.5.3 Impacts to the Proposed Action

Areas to be affected by the Proposed Action comprise 422.2 acres for new and relocated facilities, and including 8.0 miles of new rail access spurs.

Prehistoric Resources. Two prehistoric sites would be affected by construction unde the proposed action but neither is likely to be eligible for the NRHP. Although some subsurface testing has been conducted in the proposed family housing area, the possibility exists that buried materials might be encountered on the Nippising period beach strand beneath the dunes.

Historic Resources. Three buildings onbase (Nos. 58, 512, and 3029) would be affected by the Proposed Action. The buildings were constructed between 1959 and 1963 and are not considered eligible for the NRHP. Some historic resources could be present in undisturbed portions of the northern program areas because numerous sites have been identified near the base. However, as a result of the devastating 1911 forest fire and continual military activity, these resources may lack the site integrity needed to qualify for the NRHP. The historic rail bed in the area proposed for the relocated grenade range is not likely to be NRHP eligible.

Native American Resources. Few Native American resources are expected in the northern program areas which are mostly marsh. However, burials have been located along former beachstrands and could be associated with campsites along the river bluffs. Burials may be encountered along the AuSable River bluffs where the proposed railroad line would be located.

Paleontological Resources. Paleontological localities are not expected to occur in program areas because thick glacial deposits cover bedrock onbase. Few Pleistocene materials in the glacial deposits have been previously identified in the region.

Summary of Impacts. As a result of the Proposed Action, two prehistoric campsites are likely to be affected. Long-duration impacts would be low because such sites are common in the ROI and their loss would not greatly affect the research potential of the

remaining data base. Impacts would not be significant because the sites lack the contents and integrity to have important research potential. There would be no short-duration impacts.

Mitigation Measures. The preferred site treatment is avoidance. However, if a site cannot be avoided, appropriate data-recovery measures would be implemented including surface collection, mapping, and excavation for archaeological sites. Because it is impossible to predict the location of all subsurface resources, ground-disturbing construction would be monitored by a cultural resource specialist to identify and record archaeological resources. Appropriate treatment for burials encountered during survey or construction monitoring is reburial, according to the local Native American traditions.

A finding of no adverse effect on cultural resources may be identified by the Michigan State Historic Preservation Office and Advisory Council on Historic Preservation if data-recovery plans, site treatments, and monitoring programs are implemented. By conducting appropriate data-recovery procedures, some scientific information could be obtained which would compensate for the destruction of the cultural resources.

4.12.5.4 Impacts of the Alternative Action

Ground disturbance from the Alternative Action would be similar to the Proposed Action with the exception of an additional 51 acres to be used for the expanded garrison. No additional NRHP-eligible sites would be affected by the Alternative Action. Long-duration impacts on cultural resources would be low and not significant because the affected sites do not appear to be historically important. There would be no short-duration impacts.

Mitigation Measures. Potential mitigation measures are the same as the those identified for the Proposed Action.

4.12.6 BIOLOGICAL RESOURCES

4.12.6.1 Region of Influence

The ROI for biological resources at Wurtsmith AFB is defined as areas where these resources would receive direct impacts as a result of construction of new facilities, including roads and the rail spur onbase, and 0.6 mile of rail spur upgrade offbase (Section 4.12, Figure 4.12-1). In addition, areas that may be disturbed by indirect impacts are those recreational facilities within an approximately 1-hour driving time of Oscoda, Michigan including Lake Huron, Van Etten Lake, Allen Lake, Duell Lake, Cooke Dam Pond, Loud Dam Pond, Long Lake, the AuSable River, and Huron National Forest.

4.12.6.2 Existing Conditions and Future Baseline

Biological Habitats. Wurtsmith AFB occupies 5,223 acres of land, 2,883 acres of which have been developed (Figure 4.12.6-1). Hardwood and evergreen trees and ornamental shrubs have been planted in these developed areas and are maintained in parks and green belts throughout the base. The undeveloped areas of the base include 1,590 acres of forest, which is dominated by northern jack pine. Red pine and bigtooth aspen also occur to lesser extents. Grasslands occupy 750 acres of the base and consist of meadow fescue, orchard grass, native grasses, sedges, and a number of common forbs. Forested and nonforested wetlands occur onbase, in the AuSable River floodplain, and in the large swamp onbase north of the current flightline. These areas provide valuable nesting, feeding, and cover habitat for a variety of animals. They also filter runoff prior to its eventual entrance into lakes and rivers.

The developed areas onbase provide limited habitats for some songbirds and small mammals. Grasslands, forests, and wetlands onbase offer quality havens for deer, skunk,

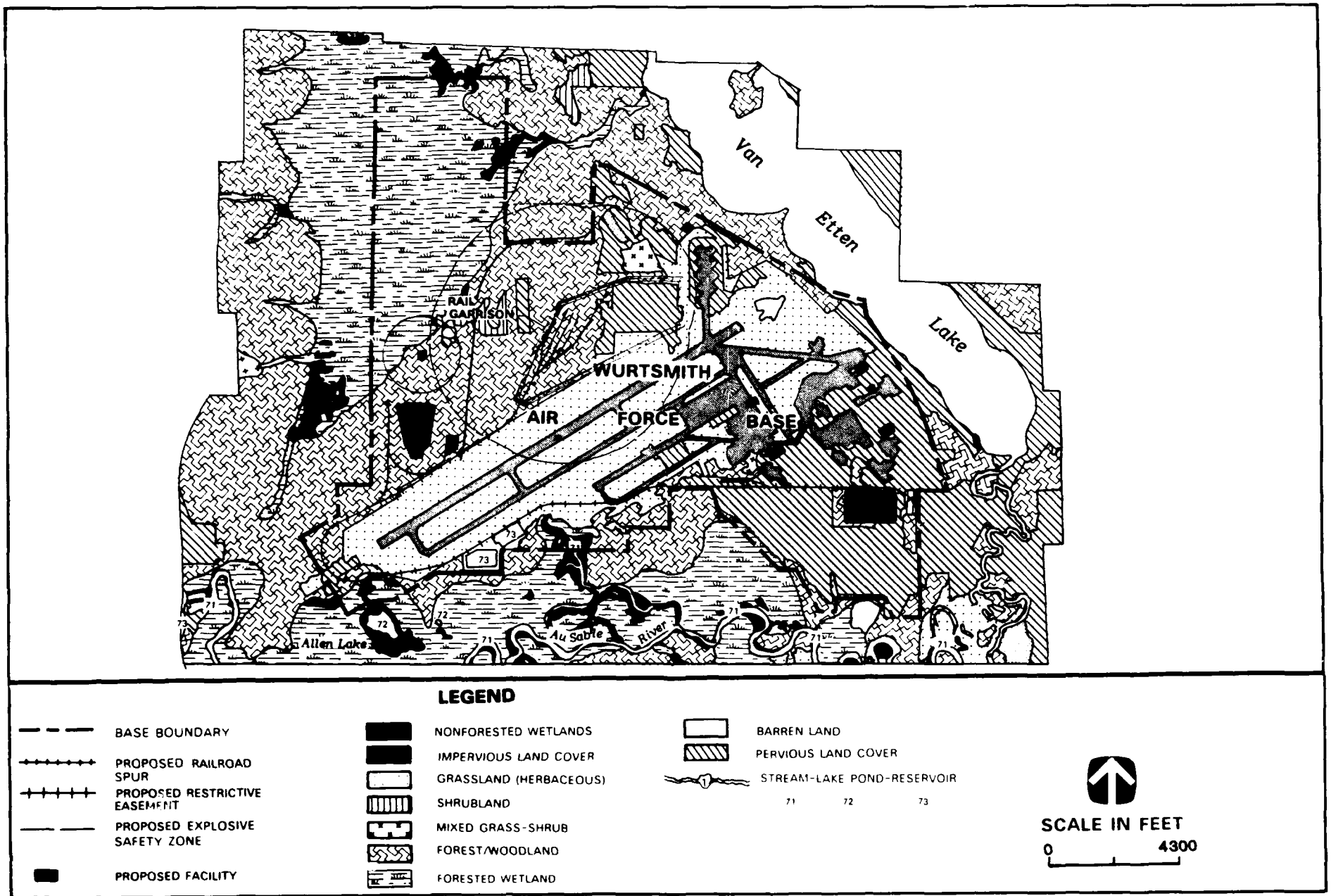


FIGURE 4.12.6-1 HABITAT AND LAND COVER TYPES AND POTENTIAL DISTURBANCE AREAS ON WURTSMITH AFB, MICHIGAN AND IN THE VICINITY

chipmunks, squirrels, rabbits, various rodents, and songbirds. In addition, the areas surrounding the base (primarily forest and wetland habitat) support many large and small mammals, scavenger and predatory birds, ducks, geese, and over 200 songbird species. Future baseline conditions onbase are expected to be similar to existing conditions based on current base management plans. Future baseline conditions in the ROI would also be similar to existing conditions based on projections for population increases and increased recreational use.

Threatened and Endangered Species. No threatened or endangered species are known to occur onbase; however, 11 threatened and endangered, federal-candidate, and state-sensitive species may occur in the region (Table 4.12.6-1). The federally listed Kirtland's warbler is known to occur south of the AuSable River, approximately one mile south of any proposed construction activity. The U.S. Fish and Wildlife Service (USFWS) is considering future listing of the lake sturgeon, which occurs in the AuSable River near Wurtsmith AFB, as an endangered species. The AuSable River may be a breeding area for the lake sturgeon. The lake sturgeon is not currently protected under the Endangered Species Act of 1973.

4.12.6.3 Impacts of the Proposed Action

Biological Habitats. Construction of program-related facilities would result in the disturbance of 436.5 acres of land, 139.2 acres permanently and 297.3 acres temporarily (Section 4.12, Table 4.12-3). Biological impacts resulting from facility construction would be greatest in the undeveloped areas onbase where wildlife diversity is highest. Construction of the TAS, support facilities, and rail line would require permanent removal of 244.2 acres of jack pine forest cover (Table 4.12.6-2). Construction of the rail line would permanently disturb 3.2 acres of wetlands in the AuSable River floodplain south of the base, with potential disturbance of the area near Allen Lake. In addition, construction of facilities and the rail line would disturb 32.8 acres of grassland and 1.2 acres of shrubland. All of these activities would result in long-duration impacts, including increased wildlife mortality, irreversible loss of habitat for some species, and displacement of other (mobile) species to adjacent habitats. Wildlife in forest and wetland habitats surrounding Wurtsmith AFB would be temporarily disturbed by construction activities. The location of the rail spur has been designed to minimize wetland disturbance and its relocation is not feasible. A detailed analysis of these impacts, mitigations, and alternative analysis would be made to satisfy permit requirements under Michigan Public Act 346 (Michigan's Inland Lakes and Streams Act), Michigan Public Act 167 (The Floodplain Control Act), and Michigan Public Act 203 (The Goemaere-Anderson Wetland Protection Act) if the base is selected for Peacekeeper Rail Garrison deployment.

In compliance with Executive Order No. 11990, alternative sites were considered for location of program facilities. In order to collocate facilities of the proposed program with existing facilities and meet engineering and operational constraints, it was determined that there is no practicable alternative to the proposed construction of some facilities in wetlands. Furthermore, the site-specific program design and construction techniques would include all possible measures to minimize harm to wetlands.

The program-induced population increase for Iosco County would result in increased usage of recreational facilities in the ROI, including increased camping, skiing, and snowmobiling in Huron National Forest, and a greater demand on local fisheries (e.g., Cooke Dam Pond, Loud Dam Pond, and Long Lake). The natural resources available for these activities are abundant, and no recreational impacts are expected.

Threatened and Endangered Species. No impacts on threatened and endangered species are expected to result from this program at Wurtsmith AFB. The proposed program is not expected to affect the Kirtland's warbler because its habitat is approximately 1 mile from any proposed construction activity and this habitat is not currently in active use by the species. Filling of a small portion of the AuSable River floodplain would occur, but

Table 4.12.6-1

Federally Listed, Federal-Candidate, and State-Sensitive Species Wurtsmith AFB, Michigan and Vicinity

Common Name	Scientific Name	Federal Status	State Status	Distribution
American peregrine falcon	Falco peregrinus anatum	E	--	Occurs in area
Bald eagle	Haliaeetus leucocephalus	T	--	South bank of AuSable River, 0.5 mi west of Allen Lake
Channel darter	Percina copelandi	--	T	AuSable River, near Foote Dam; Pine River, 1 mi north of Van Etten Lake
Kirtland's warbler	Dendroica kirtlandii	E	E	Occurs in area south of AuSable River
Lake cress	Armoracia aquatica	--	T	Southeast bank of Van Etten Lake
Lake sturgeon	Acipenser fulvescens	2	T	AuSable River, 0.5 mi east of Allen Lake
Pine marten	Martes americana	--	E	May occur in area
Piping plover	Charadrius melodus	E	--	May occur in area
Pitcher's thistle	Cirsium pitcheri	1	T	Lake Huron coast, east of Cedar Lake; Oscoda, Michigan
River darter	Percina shumardi	--	T	Au Sable River, near Foote Dam
Wild-rice	Zizania aquatica var. aquatica	--	T	Northern region of Van Etten Lake, near mouth of Pine River

Notes: E = Endangered
T = Threatened
1 = Federal candidate, Category 1
2 = Federal candidate, Category 2

Sources: U.S. Air Force 1978f; Schumann 1987; Michigan Natural Features Inventory 1988.

standard U.S. Army Corps of Engineers (COE) construction techniques are expected to keep sedimentation or other disturbances from affecting the river. Therefore, the lake sturgeon should not be affected by the program. All other sensitive species in the region do not occur in the program area.

Summary of Impacts. The short-duration impacts on biological resources would be low because disturbance would be confined to only a few locations and should not extend far into the surrounding natural habitats. These impacts would not be significant. The jack pine forest in the proposed rail garrison area is low-quality deer habitat (because of limited forage), but provides good habitat for nongame species. Disturbances to the

Table 4.12.6-2

Habitat and Land Cover Types Potentially Disturbed by the Peacekeeper Rail Garrison Program at Wurtsmith AFB, Michigan

Habitat Type	Garrison, Support, and Relocated Facilities (acres)	Rail Line (acres)	Total (acres)
Proposed Action			
Grassland	26.3	6.5	32.8
Forest/woodland	220.4	23.8	244.2
Forested wetland	0.0	3.2	3.2
Shrubland	1.2	0.0	1.2
Developed land	122.2	32.9	155.1
TOTAL:	370.1	66.4	436.5
Alternative Action			
Grassland	26.3	6.5	32.8
Forest/woodland	271.8	22.8	294.6
Forested wetland	0.0	3.2	3.2
Shrubland	1.2	0.0	1.2
Developed land	122.2	32.9	155.1
TOTAL:	421.5	65.4	486.9

wetland areas are of concern because approximately three acres would be filled, local drainage patterns would be altered, and the wildlife populations inhabiting those areas would be affected; therefore, long-duration impacts would be moderate. Long-duration impacts would be significant because of the ecological importance of the habitats which would be affected and the concern these impacts would elicit from natural resource management agencies.

Mitigation Measures. Implementation of mitigation measures would reduce the impacts on biological resources at Wurtsmith AFB. These mitigation measures could, over the long-term, help restore or create habitat similar to that lost. Mitigative measures which could be effective in substantially compensating for significant impacts on wetlands and other sensitive habitats and the agencies which would be responsible for their implementation include the following:

- Limit the areal extent of construction disturbance in wetlands and other sensitive habitats to the minimum possible. Operate construction equipment only on roads or within designated disturbance areas (U.S. Air Force and COE).

- Create new wetlands or enhance existing wetlands to substantially reduce impacts on wetlands onbase. A mitigation plan will be developed which will discuss the methods (e.g., grading and revegetation) to be used in creating new wetlands or enhancing existing wetlands. Development of the mitigation

plan will be coordinated with the COE and the U.S. Environmental Protection Agency and the Michigan Department of Natural Resources (COE, U.S. Environmental Protection Agency, and the Michigan Department of Natural Resources).

- Implement offsite habitat (other than wetlands) restoration or increasing protection of sensitive species or important habitats if offsite mitigation is considered the only feasible means to compensate for site-level impacts on important habitats or wetlands (U.S. Air Force and COE).

- Build sediment traps where appropriate on drainages flowing away from construction sites to control impacts from increased erosion in the area. Until new revegetation becomes established, a temporary sediment retention basin should be constructed and maintained downstream of the onbase housing construction site to minimize sedimentation to nearby Van Etten Creek (U.S. Air Force).

- Build railroad and road embankments at less than the normal angle of repose for the soil type involved. This would minimize long-term erosion and sedimentation (COE and participating railroad companies).

4.12.6.4 Impacts of the Alternative Action

The Alternative Action would result in the loss of 294.6 acres of upland forest habitat (jack pine and deciduous forest) 32.8 acres of grassland, 1.2 acres of shrubland, and 3.2 acres of wetland. The additional loss of forest habitat is minor when compared to the Proposed Action and is not expected to affect biological resources substantially more than the Proposed Action. No additional impacts on threatened and endangered species are expected to result from this alternative beyond those described for the Proposed Action. Therefore, short-duration impacts would remain low and not significant and long-duration impacts moderate and significant.

Mitigation Measures. The same mitigations considered for the Proposed Action would be considered for the Alternative Action.

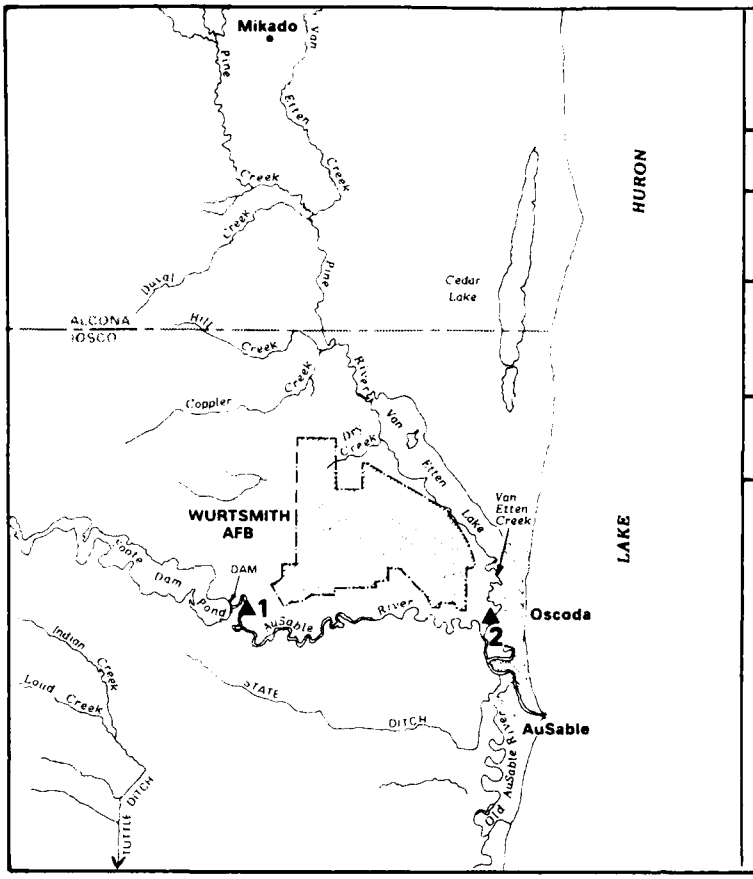
4.12.7 WATER RESOURCES

4.12.7.1 Region of Influence

The water resources ROI for Wurtsmith AFB is located within the Lake Huron drainage. The boundaries of the ROI are Van Etten Lake and Coppler Creek on the north, Lake Huron on the east, the AuSable River on the south, and a line extending north through Foote Dam, which is located on the AuSable River, on the west (Figure 4.12.7-1). The area covered by the ROI is 25 square miles and includes the base and the support communities of Oscoda and AuSable. The additional support communities of Tawas City and East Tawas are located 16 miles southwest of the ROI (Section 4.12, Figure 4.12-1) and are also included in this analysis.

4.12.7.2 Existing Conditions and Future Baseline

Major Water Users. Total water use in Iosco County in 1985 was about 20,000 acre-feet (acre-ft), excluding hydropower generation. Sixty-five percent was for self-supplied industrial use. Municipal use accounted for 15 percent. Recent and projected water use in selected entities is shown in Figure 4.12.7-1. The water supply for East Tawas is drawn from Lake Huron. East Tawas supplies all of the water used by Tawas City. Wurtsmith AFB and Oscoda-AuSable have separate water systems which utilize local groundwater. The base and the towns have sufficient water resources available to meet baseline needs. A feasibility study is currently being conducted on developing Lake Huron as the regional water supply for a number of municipalities, including the base and support communities.



ANNUAL WATER USE OF SELECTED ENTITIES
(acre-ft/yr)

ENTITY	RECENT USE	PROJECTED USE (1993)
Oscoda-AuSable	900	950
Tawas – E.Tawas	870	990
Wurtsmith AFB	920	920

SELECTED HYDROLOGIC CHARACTERISTICS

STATION ▲	DRAINAGE AREA (sq mi)	AVERAGE FLOW (cfs)
1	1,540	~ 1500
2	275	~ 160

LEGEND

STREAM
COUNTY BOUNDARY
1 ▲ STATION

SCALE IN MILES
0 3.5

1/9 - MS/A

FIGURE 4.12.7-1 HYDROLOGIC FEATURES OF THE WURTSMITH AFB, MICHIGAN REGION OF INFLUENCE

Table 4.12.7-1

Program-Related Water Use
Within the Wurtsmith AFB Region of Influence
Peacekeeper Rail Garrison Program (Proposed Action)
(values in acre-ft)

	1990	1991	1992	1993 Onwards
Wurtsmith AFB				
Construction/Operations	39	55	35	23
Domestic	0	25	86	86
Oscoda-AuSable Domestic	14	42	46	38
Tawas-E.Tawas Domestic	2	7	8	6
Other Towns Domestic	3	10	11	9
TOTAL:	58	139	186	162

Surface Water Hydrology and Quality. The AuSable River is the principal stream in the ROI. The river flows along the southern boundary of Wurtsmith AFB. Five miles downstream, the river empties into Lake Huron, the second largest of the Great Lakes. This stretch of river receives 290 acre-feet per year (acre-ft/yr) (0.25 MGD) of treated wastewater from Oscoda Township. Several small hydroelectric dams impound the lower AuSable River, including Foote Dam, just upstream of the base. Van Etten Creek flows along the eastern side of the base, connecting Van Etten Lake with the AuSable River. Several local streams issue from the bluffs to the west, flowing a short distance north or south of the base to Van Etten Lake or the AuSable River. The stormwater system at Wurtsmith AFB drains to both Van Etten Creek and the AuSable River. The southwestern corner of the base lies along the edge of the 100-year floodplain of the AuSable River. Tawas City and East Tawas draw their supply from Tawas Bay, which is connected to Lake Huron. Wastewater from these entities amounts to 1,400 acre-ft/yr (1.25 million gallons per day [MGD]) and is discharged to the Tawas River. Uses designated for these waters are public water supply and, during the warmer months, primary contact recreation. In addition, the AuSable River, Van Etten Lake, and Foote Pond are designated as suitable for a coldwater fishery. Surface water quality in the ROI is generally excellent and appears to support these uses.

Groundwater Hydrology and Quality. The principal groundwater aquifer in the ROI is the sand and gravel deposit that extends from the ground surface to a depth of about 65 feet. This shallow aquifer supplies all of the water used onbase and by the townships of Oscoda and AuSable. The aquifer is highly vulnerable to contamination from surface chemical spills and leaking storage tanks. Moderate to high levels of trichloroethylene, dichloroethylene, and benzene underlie several areas of the base (Figure 4.12.7-2). These plumes of contaminated groundwater have in the past resulted in the closure of severalwater supply wells. Extensive investigation of this problem has resulted in the installation of a series of purge wells in selected locations designed to remove and treat some of the most highly contaminated groundwater and prevent its migration offbase or into adjacent base supply wells. There is great concern in preventing further groundwater quality deterioration. Six hundred acre-ft/yr (0.5 MGD) of wastewater effluent from Wurtsmith AFB is discharged under a National Pollution Discharge Elimination System permit to this aquifer via infiltration ponds located on the southern side of the base near the AuSable River. Substantial increases in phosphorus and ammonia concentrations have been measured in the groundwater underlying the infiltration ponds. The infiltrated wastewater flows a short distance before discharging to the river and does not affect any water supply wells. No substantial decline in groundwater level has occurred in the ROI.

4.12.7.3 Impacts of the Proposed Action

Major Water Users. Program-related water use in the ROI would peak at about 180 acre-ft/yr in 1992 (Table 4.12.7-1). The long-term increase in water use would be about 160 acre-ft/yr. Most of this increase would occur at Wurtsmith AFB, where long-term water use would increase by about 110 acre-ft/yr (0.1 MGD), or 12 percent over the baseline water use of 920 acre-ft (0.8 MGD) in 1993. The base water supply is adequate to meet this increase on an average annual basis, though one or more additional wells may be needed to supply seasonal peak requirements over the long term. The long-term increase in water use at Oscoda and AuSable would be about 40 acre-ft/yr (0.04 MGD), an increase of four percent over the baseline water use of 950 acre-ft (0.9 MGD). Program-induced increases in water use at Tawas City and East Tawas would be minor. Existing water supplies available to these towns are adequate to meet these small increases. Other major water users in the ROI are not expected to be affected by this limited increase in water use.

Surface Water Hydrology and Quality. The wastewater system serving Oscoda and AuSable would experience a program-related increase of about 40 acre-ft/yr (0.04 MGD), or 14 percent over the baseline discharge of 300 acre-ft (0.3 MGD). This system has ample treatment capacity. The small increase in wastewater discharges to the AuSable

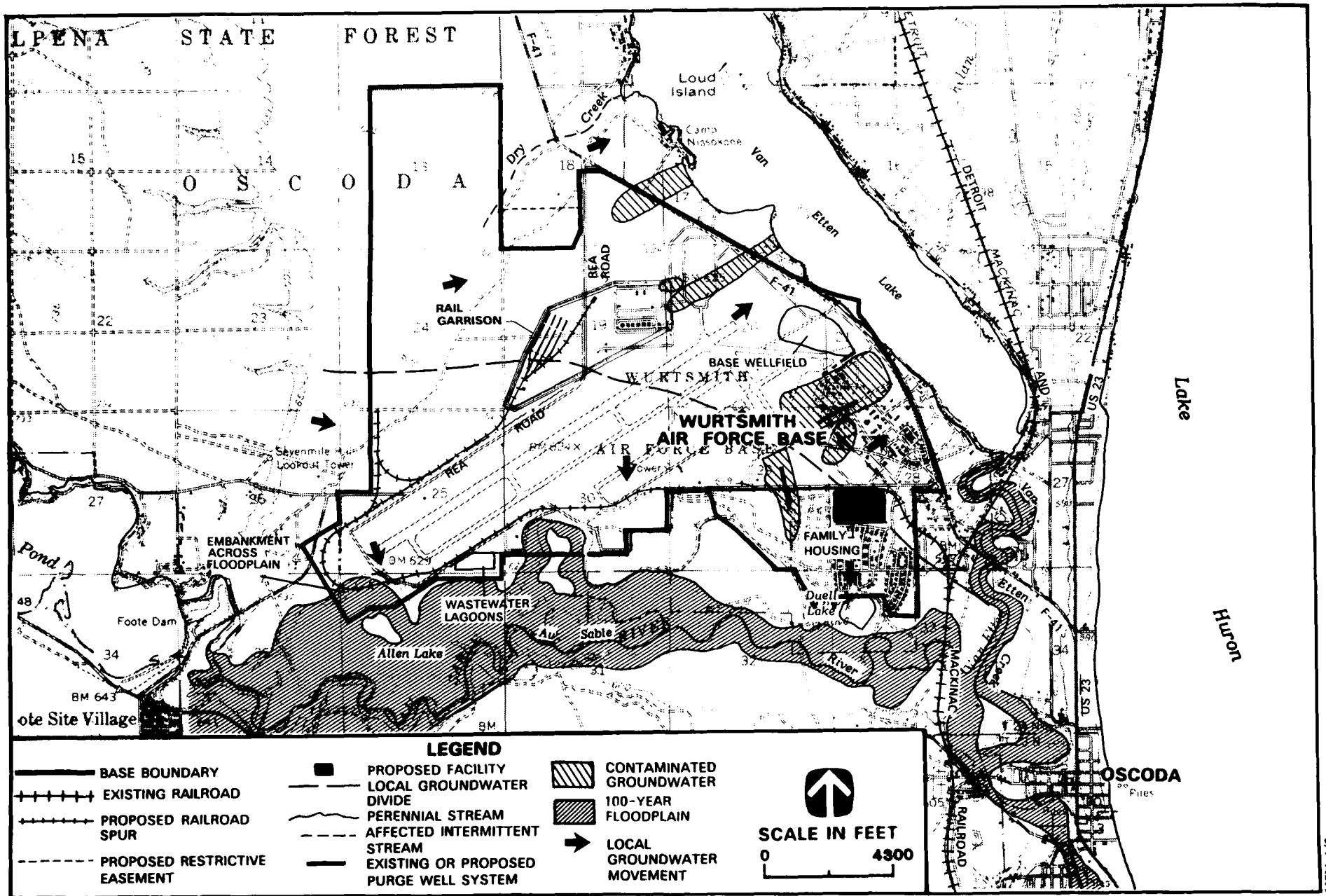


FIGURE 4.12.7-2 WATER FEATURES POTENTIALLY AFFECTED BY THE PEACEKEEPER RAIL GARRISON PROGRAM AT WURTSMITH AFB, MICHIGAN

River should have minimal water quality impact. Wastewater flows in the Tawas City-East Tawas area would increase by less than one percent over the baseline discharge of 1,980 acre-ft (1.4 MGD) in 1994, and would also have minimal impact on the receiving stream, the Tawas River.

Construction of the garrison site would result in 219 acres of disturbance north of the runway. This area is flat with a slope of about 0.15 percent, and drains toward Van Etten Lake, which is one mile to the northeast. No streams or drainage paths cross the site. The sandy nature of the soils at the site encourages infiltration of rainfall. All of this strongly suggests that little eroded soil is likely to be transported from the site into nearby water bodies. The surface water quality impacts of garrison site construction and operations are therefore likely to be minor. Approximately 6.6 miles of new rail spur would be constructed to connect the garrison to an existing rail line. This spur would generally be located on level terrain and more than 0.5 mile from perennial water bodies, producing generally minor water quality impacts. However, a 1,200-foot-length would traverse the northern side of the AuSable floodplain, at the southwestern side of the runway (Figure 4.12.7-2). That portion of the floodplain traversed is a former river meander which cut into the bluff on which the airfield sits. The rail spur would have a very small effect on the flood hydraulics of the river and should not affect existing flood elevations. The earthen embankment supporting that portion of the rail spur which crosses the floodplain would be subject to erosion until revegetation measures stabilize its side slopes. During this period, eroded material would be readily carried to Allen Lake, 0.2 mile downstream. The lake would experience increased turbidity levels and somewhat accelerated sedimentation for one or two years following construction. The lake should effectively trap most of this sediment and little impact on the quality of the AuSable River is expected.

The proposed new housing area is located in the Van Etten Creek drainage approximately 0.7 mile from the creek. The 34 acres of new onbase housing, if built, would require a new storm drain to the creek and would increase the amount of residential area draining to the creek by about 15 percent. The southern portion of the site has a 15-percent slope which would require some cut-and-fill activity during construction. An increase in sedimentation to Van Etten Creek can be expected until landscaping measures have taken effect.

Groundwater Hydrology and Quality. Program-related wastewater generation at Wurtsmith AFB would increase by 90 acre-ft/yr (0.1 MGD), or 15 percent above the baseline discharge of 600 acre-ft (0.5 MGD). The existing wastewater treatment system has ample capacity to treat this increase. This additional discharge to the groundwater (via the existing infiltration basins) would have a minor effect on the local aquifer.

The program would result in a 12-percent increase in groundwater pumpage from the supply wells at Wurtsmith AFB. The existing supply wells have sufficient capacity to meet program requirements. The major water supply concern for the base is to avoid the migration of contaminated groundwater into its supply wells. To this end, two systems of purge wells have been installed and a third is under design (Figure 4.12.7-2). These purge wells have been successful in removing and treating much of the most highly contaminated groundwater and several previously contaminated supply wells have been restored to service. However, it is expected to take many years to restore the natural quality of the local groundwater. Protection of the supply wells would require the continuance of an extensive monitoring program and an expensive system of purge wells. The base is seriously considering alternative sources of water as a long-term solution to this problem. In the meantime, any substantial additional water demands, such as that of the proposed program, would tend to intensify the problem of maintaining adequate water quality of the current supply wells.

Summary of Impacts. The proposed program would result in substantial increases in sedimentation to several water bodies located just outside of the base, particularly Allen

Lake. Turbidity and associated water quality impacts would be intermittent, occurring only after rainstorms. Standard revegetation measures should reduce sedimentation to background levels within a short period following construction. Short-duration impacts on water resources would be moderate. The quality of the larger streams and lakes in the ROI would not be greatly affected and impacts are not expected to be significant.

Program-related water use would result in a substantial increase in pumpage from base supply wells. The quantity of locally available groundwater is adequate and the long-duration impacts would be low. However, the supply wells are vulnerable to contamination from adjacent locations within the aquifer and expensive groundwater protection measures must currently be maintained to assure adequate quality. The demands of the proposed program would further aggravate this situation. Therefore, the impact would be significant.

Mitigation Measures. Alternate sources of water for Wurtsmith AFB should be considered. One potential source would be areas of the shallow aquifer which are upgradient of the known locations of groundwater contamination. Areas north and west of Rea Road (Figure 4.12.7-2) appear to fit this criteria and could be explored for siting new wells. Alternately, Lake Huron is currently being studied as a regional source of water to supply Wurtsmith AFB and a number of communities. Use of this surface water source by Wurtsmith AFB, should it prove economically feasible, would entirely avoid the possibility of contamination of onbase supply wells. Adoption of either measure would reduce long-duration water resource impacts to low and not significant. However, a new regional water supply from Lake Huron might cause substantial short-duration water resource impacts which would require further study should this measure be pursued.

4.12.7.4 Impacts of the Alternative Action

Major Water Users. Total program-related water use during the operations phase would be 175 acre-ft/yr, a 9-percent increase over the Proposed Action. Compared to the Proposed Action, baseline-plus-program water use at Wurtsmith AFB would increase by an additional one percent to a total of 1,030 acre-ft (0.9 MGD). The comparable increases in water use in the water systems of the support communities would be minor. The available water supply is adequate to meet the water needs of this alternative.

Surface Water Hydrology and Quality. With six TASs, the disturbed area at the garrison would increase by 23 percent to 270 acres. Given the flat nature of the terrain and the absence of drainages within or adjacent to the site, no additional water quality impact due to this alternative is expected.

Groundwater Hydrology and Quality. The groundwater impacts due to this alternative are expected to be similar to those of the Proposed Action.

Summary of Impacts. Impacts are expected to remain about the same as for the Proposed Action. Short-duration impacts would be moderate. These impacts would not be significant. Long-duration impacts would be low. The impacts would be significant for the reasons previously discussed in Section 4.12.7.3.

Mitigation Measures. The mitigation measures discussed for the Proposed Action should also be considered for implementation if the Alternative Action is adopted at Wurtsmith AFB.

4.12.8 GEOLOGY AND SOILS

4.12.8.1 Region of Influence

The ROI at Wurtsmith AFB for geology and soils includes the installation and associated program-related areas in the immediate vicinity. The land within a 1-mile radius of the

installation and a 1,000-foot-wide corridor along the connecting rail spur was characterized for purposes of establishing the local baseline context. In addition, a regional ROI was established for geologic hazards for the purpose of developing a regional framework for seismicity at the installation.

4.12.8.2 Existing Conditions and Future Baseline

Wurtsmith AFB lies within a nearly level coastal sand plain of the Eastern Lake section of the Central Lowland Physiographic Province. Quaternary glacial-fluvial deposits of sand and gravel occur on the surface at the base and overlie Quaternary glacial-lacustrine silty clays. The contact between these glacial deposits and the underlying Mississippian Age bedrock of carbonaceous shales and dolomitic limestone occurs at a depth of 200 to 250 feet. The installation lies in seismic zone 1 (Uniform Building Code 1985) in which a maximum credible earthquake with a magnitude of 6.1 is the largest predicted for the area. Maximum horizontal acceleration in rock is expected to be less than 0.04 g, with a 90-percent probability of not being exceeded in 50 years (Algermissen et al. 1982). Active faults have not been identified in the local ROI and the area is not susceptible to liquefaction. Areas susceptible to landslides or terrain failure were not discovered at program affected areas. However, 80-foot-high glacial bluffs west of the garrison restrictive easement could be prone to terrain failure.

Energy and Mineral Resources. No oil, gas, or coal leases/fields have been identified in the ROI. No uranium mines/leases, Known Geothermal Resource Areas, or metallic/nonmetallic mineral resource mining operations or leasing activities exist in the ROI.

Soil Resources. A detailed soil survey has not been completed by the U.S. Soil Conservation Service (SCS) for Iosco County or Wurtsmith AFB. A general soils map has identified three soil associations in the ROI, but only one association occurs in areas where program-related facilities may be located. The soils occur on level surfaces, have a sandy texture, and are excessively drained. Soil erosion susceptibility was evaluated for wind and sheet erosion. Wind erosion of unvegetated/disturbed ground in the ROI is a concern of the SCS in Michigan, but has not been identified as a major problem for soils in the ROI. However, the prevailing southwesterly wind direction would make northeast-southwest elongated tracts of land susceptible to wind erosion. The proposed garrison, rail spur, and other facilities would all be located on soils with a high susceptibility to wind and a low susceptibility to sheet erosion.

4.12.8.3 Impacts of the Proposed Action

Energy and Mineral Resources. No energy or mineral resources have been identified in the ROI. Therefore, impacts on energy and mineral resources are not expected.

Soil Resources. Program-related wind erosion at the other facilities and rail spur is primarily projected to occur at a rate of 3.1 tons per acre per year (T/ac/yr). The application of one ton per acre (T/ac) of straw mulch would temporarily reduce the rate of erosion for the soils affected to less than 0.1 T/ac/yr. During garrison construction, soil would erode at a rate of 7.1 T/ac/yr for large exposed areas of a soil type. The application of one T/ac of straw mulch would temporarily reduce the rate to less than 0.1 T/ac/yr. Program-related sheet erosion at the proposed garrison, other facilities, and the rail spur is projected to occur at rates of 1.8 T/ac/yr to 8.5 T/ac/yr. The application of one T/ac of straw mulch after construction would temporarily reduce the rate of erosion to 1.7 T/ac/yr for the soils affected. The range of soil erosion rates identified for the proposed program (4.9-15.6 T/ac/yr) are comparable to those determined for general urban development (16-156 T/ac/yr) as supplied by the U.S. Department of Housing and Urban Development (1981).

Soil erosion impacts are based on the combined effects of wind and sheet erosion values and how they compare to the maximum tolerable soil loss for each soil type. Soil erosion

rates would exceed the maximum tolerable soil loss (5 T/ac/yr) of the affected soil type during construction. Program-induced soil erosion is therefore expected to cause short-duration impacts. Long-duration impacts are not expected because accelerated rates of erosion would occur for only a short period of time prior to mulching and reestablishing a vegetative cover in the disturbed areas.

Summary of Impacts. Overall short-duration impacts from the proposed program on the geology and soils resource are expected to be high because accelerated rates of erosion during program-related construction would exceed the maximum tolerable loss of the soils affected. Long-duration impacts are expected to be negligible because accelerated erosion rates would not continue into the operations phase of the program. Short-duration impacts would not be significant because increased rates of erosion would not result in an appreciable net loss of topsoil over the short period of time under consideration.

4.12.8.4 Impacts of the Alternative Action

The Alternative Action would slightly increase the size of the garrison. Therefore, impacts on the geology and soils resource would be about the same as for the Proposed Action. Consequently, all levels of impact and significance would remain the same as for the Proposed Action. Short-duration impacts would be high and not significant while long-duration impacts would be negligible.

4.12.9 AIR QUALITY

4.12.9.1 Region of Influence

The ROI for the air quality resource includes Wurtsmith AFB, Tawas City, Oscoda Township, and the principal highways and arterials in Iosco County.

4.12.9.2 Existing Conditions and Future Baseline

The area that may be affected by air emissions from the proposed program includes Wurtsmith AFB and Oscoda Township. The area is included in the Central Michigan Air Quality Control Region (No. 122). There are no Prevention of Significant Deterioration Class I areas within 50 miles of the base. Ambient air quality at Wurtsmith AFB has not been monitored. The nearest large urban area to Wurtsmith AFB is the Bay City/Midland/Saginaw complex, about 70 air miles to the south-southwest. Because of its isolated location and rural, forested surroundings, and the absence of large point sources, the existing air quality around the base is good.

The nearest monitoring station which could represent the air quality in Iosco County is located approximately 45 miles north in the City of Alpena. A particulate matter (PM_{10}) monitor, one which measures particulate matter less than 10 micrometers, was installed at a downtown site in Alpena. In 1987, the maximum recorded 24-hour average was 91 micrograms per cubic meter ($\mu g/m^3$) and the highest annual arithmetic mean was 27 $\mu g/m^3$; both are within the standards.

The Michigan Air Quality Division has classified the area within the ROI as attainment for all criteria pollutants in which none of the National Ambient Air Quality Standards (NAAQS) are being exceeded. The area is classified into the Group III PM_{10} category, which is presumed to be in compliance with standards. Wurtsmith AFB is itself in attainment for all criteria pollutants.

The Iosco County emissions (total suspended particulates [TSP], sulfur oxides [SO_x], nitrogen oxides [NO_x], carbon monoxide [CO], and volatile organic compounds [VOC, a measure of reactive hydrocarbons]), where Wurtsmith AFB is located, are shown in Table 4.12.9-1.

Table 4.12.9-1

Iosco County, Michigan Air Emissions Inventory, 1987
(tons per year)

Emission Source	TSP	SO_x	NO_x	VOC	CO
Fuel Combustion	634	74	116	1,372	3,893
Industrial Process	0	0	0	918	0
Solid Waste Disposal	25	4	7	46	139
Air/Water Transportation	0	3	17	360	1,345
Land Transportation	447	83	1,106	841	5,066
Miscellaneous	959	0	0	0	0
Wurtsmith AFB	0	0	0	0	0
TOTAL:	2,065	164	1,246	3,537	10,443

Source: U.S. Environmental Protection Agency 1988a.

Wurtsmith AFB and Iosco County will continue to be in attainment for all pollutants.

4.12.9.3 Impacts of the Proposed Action

Direct air emissions would result from construction of the rail spur line and support facilities, and operation of the proposed program at Wurtsmith AFB. Emission sources associated with construction include light-duty vehicle traffic, diesel trucks, offsite heavy-duty vehicles, diesel construction equipment, and fugitive dust from ground disturbance.

The highest monthly fugitive dust emissions from proposed program construction activity would be approximately 23 tons. Fugitive dust calculations assume a 50-percent reduction due to watering of the construction sites. All of the fugitive dust emissions at Wurtsmith AFB were conservatively assumed to be within the 10-micrometer particle size and referenced against the PM_{10} standard for impact analysis. It is expected that actual PM_{10} emissions would be smaller than the emissions calculated under the U.S. Environmental Protection Agency guidelines for TSP.

Fugitive dust generated at Wurtsmith AFB for the peak construction year would have short-duration, moderate impacts on Iosco County air quality. Construction-related impacts were calculated for 24-hour and annual averaging periods. A program-related increase of 12.2 $\mu g/m^3$, which includes particulates from combustion products, would occur increasing the 24-hour average background concentration to 103.2 $\mu g/m^3$. The predicted fugitive dust background concentration would not equal or exceed the 24-hour NAAQS of 150 $\mu g/m^3$ (PM_{10}) and, therefore, would not be significant. The annual background concentration would increase to 30.6 $\mu g/m^3$, which would not equal or exceed the PM_{10} standards of 50 $\mu g/m^3$.

Short-duration air quality impacts would be moderate. However, these impacts would not be significant because they would not violate the NAAQS. Long-duration air quality impacts from the Proposed Action would be negligible.

4.12.9.4 Impacts of the Alternative Action

The Alternative Action (6 TASs) would cause a 4.4-percent increase in fugitive dust emissions over the Proposed Action. This would result in a total increase of 16.8 $\mu g/m^3$, increasing the 24-hour average ambient concentration to 107.8 $\mu g/m^3$. Short-duration impacts would be moderate. These increases would not cause any violation of the NAAQS and, therefore, would not be significant. The long-duration air quality impacts would be negligible.

4.12.10 NOISE

4.12.10.1 Region of Influence

The ROI for the noise resource is broadly defined as the area where program-related noise level increases occur. Specifically, the ROI includes Wurtsmith AFB, Oscoda Township, and Tawas City, and the principal highways and principal arterials in Iosco County.

4.12.10.2 Existing Conditions and Future Baseline

The major noise source in the vicinity of Wurtsmith AFB is associated with air traffic. Airfield and aircraft noise levels were derived for the Wurtsmith AFB vicinity and reported as part of an Air Installation Compatible Use Zone (AICUZ) study (U.S. Air Force 1978). The identified onbase noise is attributed to aircraft during both ground and air operations. Therefore, noise contours obtained from the AICUZ study are centered on the main runway and are generally shaped like an ellipse with the major axis extending along the primary runway. Noise levels for the onbase family housing area vary from 65 decibels on the A-weighted scale (dBA) to 70 dBA expressed as day-night equivalent sound level (L_{dn}).

4.12.10.3 Impacts of the Proposed Action

Temporary impacts resulting from construction-related noise would occur within the immediate vicinity of construction sites. The various activities that would take place include construction of industrial structures, the rail spur line, and roadways (grading, compacting, and paving); landscaping; and cleanup at Wurtsmith AFB.

Construction of new family housing, the rail spur line, and the Training Train Shelter adjacent to the current onbase residential area would increase background noise levels. Assuming the simultaneous operation of a bulldozer, a dump truck, a front loader, and a scraper, the estimated construction noise in the residential area would be 77 dBA, causing an increase of 8 dBA above background concentrations in the onbase residential area. The short-duration noise impacts on these sensitive receptors would be moderate. These impacts would not be significant because the increase in noise levels would not exceed the 10-dBA criterion.

The TAS construction-related noise at Wurtsmith AFB is not anticipated to affect offbase or base residential areas because such noise levels from point sources attenuate quickly with distance. Potential construction-related noise levels of 80 dBA to 85 dBA at 100 feet from the source within the TAS construction site would be reduced to 47 dBA at the offbase residential areas (Camp Missokone) which are located about 7,900 feet from the construction location. The noise levels at the base residential area, which is located about 13,200 feet from the TAS construction site, would be 43 dBA. These noise levels would be masked by ambient noise levels of about 60 dBA to 65 dBA (L_{dn}). Once the construction activity ceases, noise levels would return to near ambient conditions.

Operations-phase offbase training train activities would cause minor, temporary increases in average noise levels on sensitive receptors along the main rail line. Overall long-duration noise impacts would be negligible.

Overall the short-duration noise impacts would be moderate and not significant while the long-duration impacts would be negligible.

4.12.10.4 Impacts of the Alternative Action

The noise levels resulting from the construction of six TASs at the garrison site would be about the same as the Proposed Action. The short-duration noise impacts at the onbase residential receptors would be moderate. However, these noise impacts would not be significant because they would not exceed the 10-dBA criterion. The long-duration, operations impacts would be negligible.

4.12.11 Impacts of the No Action Alternative

With the No Action Alternative, the Peacekeeper Rail Garrison system would not be deployed. Activities at Wurtsmith AFB will continue to support other existing or proposed missions. For the host communities in the vicinity of the base, environmental changes would occur as a result of normal community growth. Future baseline conditions reflecting the No Action Alternative were described in earlier portions of this chapter.

4.12.12 Irreversible and Irretrievable Resource Commitments

Deployment of the Peacekeeper Rail Garrison program at Wurtsmith AFB would result in the irreversible and irretrievable commitments of some human and natural resources. The affected resources are the following:

- The proposed program requires the use of relatively small amounts of labor, materials, energy, and other economic resources during both the construction and operations phases. The local procurement of building materials (such as cement, sand, and gravel) may alter some resource characteristics in the deployment area. Although these economic factors, once used by the proposed program, generally cannot be recovered for other purposes, the extent of their use would be small in comparison to total resource availability.

- Both irreversible and irretrievable commitments would occur if prehistoric sites along the AuSable River eligible for the National Register of Historic Places (NRHP) are destroyed or damaged during program construction and operations.

- No historic structures are expected to be affected by program impacts; however, historic NRHP-eligible archaeological sites could be identified, and irreversible and irretrievable commitments would occur if these sites are damaged or destroyed.

- Both irreversible and irretrievable commitments would occur if Native American resources, particularly potential burial areas along the AuSable River, are destroyed or disturbed.

- Disturbed biological communities, given sufficient time, can recover to a state approximating predisturbance conditions once the disturbance ends. However, filling of wetlands represents, for all practicable purposes, an irreversible and irretrievable loss of valuable habitat. Creation of new wetland will not fully compensate the impacts because the newly created habitat is unlikely to have the same ecological value as the habitats lost.

- Water is by nature a renewable resource. Water demands by the proposed program can revert to other uses once the program is terminated; however, irreversible impacts could occur. The additional well water pumped at

Wurtsmith AFB to meet program water demand might contribute to migration of existing contaminated groundwater underlying the base. Aquifer cleanup measures are currently being carried out and the contamination is not irreversible in the strict sense of the word. But restoration of groundwater quality is a very slow and uncertain process; once groundwater has become contaminated, the process is not readily reversible.

- Soils would be permanently disturbed at construction and related sites (e.g., borrow pits, roads, and rail spur.

4.12.13 Relationship Between the Local Short-Term Use of Man's Environment and the Maintenance and Enhancement of Long-Term Productivity

Deployment of the Peacekeeper Rail Garrison program at Wurtsmith AFB would result in the short-term use of some human and natural resources that may affect the maintenance and enhancement of long-term productivity. The affected resources are the following:

- Short-term program-generated disruptions and delays of traffic would result in a decrease in the comfort, convenience, and safety afforded users of primary roads leading to the base. No effect on long-term productivity is expected.

- Additional information gained during program-related surveys of archaeological and historic resources may contribute to the data base and improve man's knowledge of the area's history. This would enhance the management of remaining cultural resources in the region.

- Areas temporarily disturbed by the construction activities would result in short-term losses of biological habitats. However, recovery rates are expected to be relatively fast and no effect on long-term productivity is expected.

- Soil erosion during construction would increase sedimentation to local streams resulting in a short-term deterioration of surface water quality. However, the additional loss of soil would not affect productivity or the long-term quality of streams.

- Reductions in air quality levels would result from fugitive dust during construction. However, no long-term reduction in air quality is expected.

4.12.14 Environmental Concerns Associated With a Possible Future Second Rail Connector

A second rail access to Wurtsmith AFB could be achieved by providing a southerly rail connector to the main line of the Chesapeake and Ohio Railroad (Figure 4.12.14-1). This connector would require the acquisition of approximately 896 acres of land and the construction of 74 miles of new track. Additionally, twelve 300-foot bridges and one 500-foot bridge across the AuSable River would be required.

Construction costs for this second rail connector would be approximately $94.3 million (1986 dollars) and would required approximately 740 direct construction workers and 660 secondary workers over a 1-year period. Most of these workers would be from the local area, including Alcona, Alpena, Arenac, Bay, Iosco, Midland, Ogemawd, Oscoda, and Saginaw counties in Michigan. The communities of Oscoda Census Designated Place (CDP), AuSable CDP, Tawas City, and East Tawas as well as other communities along the rail corridor could experience temporary population increases that exceed their normal growth capacities.

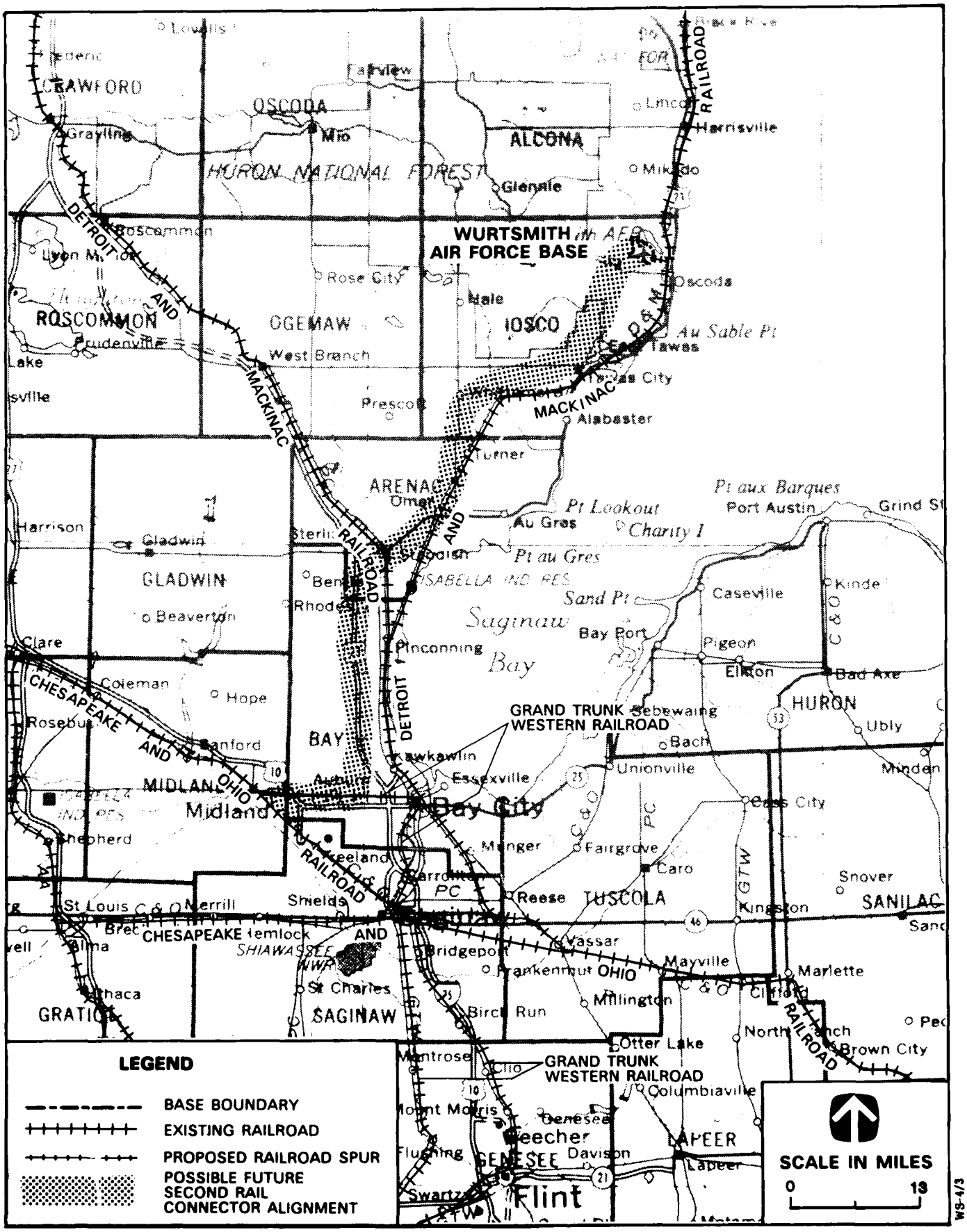


FIGURE 4.12.14-1 CONCEPTUAL ALIGNMENT OF A POSSIBLE FUTURE SECOND RAIL CONNECTOR FOR WURTSMITH AFB, MICHIGAN

Potential shortages of temporary and permanent housing could occur during the construction period. In some locations, the capacity of local school systems to accommodate new students may be exceeded.

Local governments and agencies may find it difficult to maintain existing service levels for public services and utilities, especially if adequate new revenues are not available. Increases in traffic resulting from construction activity and commuting workers may result in additional traffic congestion along some roads and highways.

The connector spur right-of-way (ROW) would run southwest from the base through approximately two miles of AuSable State Forest (approximately 25 acres), approximately two miles of Huron National Forest, and the remainder through private land (approximately 820 acres) which is mostly nonirrigated cropland with some mixed open space. Some conflict with residential land use could occur where the ROW would pass through or near eight small communities. The ROW would pass near two dams, two state highway roadside parks, and the Mt. Forest oil field. The ROW would also cross the Cedar Creek state fishing easement, and would require an overcrossing of Interstate 75. It would be necessary to construct 13 large railroad bridges over rivers that are heavily used by recreationists. These bridges could cause considerable visual intrusion in a relatively pristine environment. The most western three miles (36 acres) of ROW would be located near the urban area of Midland, Michigan. Specific land use in this area is unknown, but there could be conflict with inhabited buildings on the eastern edge of that city.

The extensive southern railroad spur would cross numerous rivers and drainages in east central Michigan, including the AuSable, AuGres, Rifle, Pine, Pinconning, and Kawkawlin rivers. The few prehistoric sites identified in this area are located primarily along drainages and the potential for encountering numerous prehistoric villages sites and associated agricultural fields is high. Large earthworks have been identified along the Rifle River and similar types of sites could occur along the proposed railroad route adjacent to major streams or drainages. The route also crosses Huron National Forest and AuSable State Forest; numerous historic lumber camps would most likely be present along the northern portion of the corridor. Historic homesteads and farmsteads would most likely occur along the southern portion of the route, located in the prairie region.

Construction of a bridge across the AuSable River could potentially impact sensitive species and other wildlife living in and around the river. Wildlife in riparian areas along the other streams crossed by the rail connector could also be affected adversely. Large areas of wetland in the AuSable River flood plain and along the remainder of the rail corridor would be drained and filled, resulting in permanent loss of critical habitat. Wildlife in areas of state and national forest traversed by the rail connector could also be disturbed. Construction activities could disrupt the habitat of some migratory birds in the Lake Huron coastal area.

There are major water resource concerns associated with this long rail connector. Bridges would be constructed over a number of rivers, including three which are of statewide importance: the AuSable, AuGres, and Rifle. Substantial, short-term water quality degradation would occur during and following construction of bridges and their approaches over these and other rivers. Several dozen lesser streams and ditches would also be crossed along the connector route, adding to the short-term regional water quality degradation. The local hydrology of some of these streams may also be permanently altered. This is a particular concern along the northern portion of the connector where a new rail bed could alter the size or location of existing wetland areas immediately down-gradient of the new rail bed.

Aggregate (rail ballast) production due to substantial construction requirements could be an issue. Soil erosion during construction will increase rates of sedimentation to local drainages. Terrain failure may need to be further investigated due to the nature of the

glacial topography and glacial/lacustrine sediments. Soils with a moderate to high shrink-swell potential may also be encountered in lacustrine sediments.

Wurtsmith AFB and the surrounding area is included in the Central Michigan Air Quality Control Region. Because of its isolated location and rural, forested surroundings, and the absence of large point sources, the air quality around the base and the vicinity is very good. Construction of the alternative rail connector would cause temporary local increases in fugitive dust and gaseous pollutant emissions. These emissions should not cause any violations in the National Ambient Air Quality Standards.

The existing noise levels along the alternative rail connector corridor range from 65 dBA to 75 dBA (L_{dn}) near the base and from 45 dBA to 55 dBA (L_{dn}) in rural areas. Temporary increases in noise levels would result from rail construction activities in the vicinity of sensitive noise receptors in towns and villages along the route.

5.0 SAFETY CONSIDERATIONS

Public safety has been and will continue to be of utmost concern throughout the development and proposed deployment of the Peacekeeper Rail Garrison system. Safety programs implemented during the original Peacekeeper development are being continued and those involving deployment are being revised and expanded to reflect the Rail Garrison basing concept. The analysis of safety concerns associated with the proposed deployment of the Peacekeeper Rail Garrison system included an evaluation of the risks posed by rail, air, and truck transportation of the missile stages and warheads. The potential for fires, explosions, and radioactive material releases was evaluated. In addition, the risk to the missile crews from exposure to radiation during day-to-day operations (the "mishap-free" risk) was analyzed along with the mishap-free risk to the general public that might exist during dispersal operations.

The major findings of this analysis are: (1) while there is a very slight potential for mishaps with the deployment of the Peacekeeper Rail Garrison system, the system would be safe and would pose a negligible risk to human health and the environment; and (2) in the absence of a mishap, the materials in the Peacekeeper missile would impose an extremely small health risk to those who would be exposed to them on a daily basis or to the general public.

The Peacekeeper program will build upon the excellent safety programs of the rail industry, the Federal Railroad Administration (FRA) and the American Association of Railroads (AAR). Peacekeeper trains are expected to have a substantially better safety record than commercial rail traffic because the Peacekeeper locomotives and cars would be the most modern available, contain special safety features, be better maintained, and would be subjected to less wear than commercial rolling stock. If there were a mishap involving a train carrying missiles, the missile would be protected by the launch canister and the missile launch car structure. Furthermore, the inherent stability of the solid propellants makes the missile an unlikely source of explosion or fire. Only operational Peacekeeper trains would have the potential of a mishap involving radioactive materials. In the exceedingly unlikely event of a fire or explosion causing airborne dispersal of radioactive materials, the chance of exposed persons eventually developing cancer would increase. Though the consequence is potentially very serious, radioactive material dispersal would be so unlikely that it is considered a negligible risk.

The proposed routine uses of the national rail network are for training trains, for occasional movement of missiles (without warheads) between garrison installations and the Main Operating Base (F.E. Warren Air Force Base [AFB], Wyoming) for maintenance, and for transporting a small number of missiles to Vandenberg AFB, California for flight testing. Because the training trains would not carry missiles or warheads, there would be no propellant or nuclear materials hazard from the train cargo in a mishap. The train transport of missiles (without warheads) for maintenance and flight testing would involve few trips and constitute a very small risk.

United States nuclear weapons include safety and arming mechanisms that assure there is virtually no possibility of an inadvertent nuclear detonation during transportation or handling of the reentry system or while it is on alert in the garrisons. There has never been even a partial nuclear detonation of a United States nuclear weapon as a result of a mishap. The few past mishaps involving nuclear weapons have imposed forces on the weapons as great as those which could result from a Peacekeeper Rail Garrison mishap. The Peacekeeper weapons can withstand these forces, and even greater ones, without resulting in a nuclear detonation.

Air transport will be the primary means of moving the reentry systems, with nuclear warheads, to the deployment installations. The reentry systems would be transported to the deployment bases by nuclear-certified Air Force transport aircraft and crews. The probability of a mishap during air transport of the reentry systems is extremely small. In

fact, the Air Force Special Cargo Squadron that handles these systems has transported nuclear materials for 25 years and has never experienced a mishap which created possibility of damage to the reentry system.

In the unlikely event of a mishap, the Department of Defense (DOD) and the U.S. Environmental Protection Agency (EPA) would respond by deploying teams specially trained and equipped to deal with any contingency. The control of access to the site, fires, and the rescue and treatment of casualties would be the most immediate concerns, and DOD teams would assist responding local, state, and federal agencies with these efforts. Recovering and rendering safe any weapons would begin as soon as DOD or U.S. Department of Energy (DOE) explosive ordnance disposal and emergency response personnel arrived at the site. If radioactive materials were dispersed, the public would be kept at a safe distance and all contaminated areas would be treated to comply with EPA cleanup standards.

The DOE is responsible for manufacturing, transporting, and decommissioning weapons components using radioactive materials when they are outside of DOD control. Therefore, potential impacts from these activities are not discussed further in this document. Some documents that cover the environmental impacts of these activities include: Final Environmental Impact Statement, Pantex Plant Site, Amarillo, Texas (U.S. Department of Energy 1983), which covers nuclear weapons assembly, stockpile monitoring, maintenance, modification, retirement (disassembly), and final disposition of components; Final Environmental Impact Statement, Rocky Flats Plant Site, Golden, Colorado (Nuclear Regulatory Commission 1980), which assesses the impacts of mishaps associated with nuclear weapons production and stockpiling, radioactive effluent released into the environment, and actions associated with plutonium-contaminated soil cleanup; Final Environmental Impact Statement on the Transportation of Radioactive Material by Air and Other Modes (Nuclear Regulatory Commission 1977); Draft Environmental Analysis on the Transportation of Radionuclides in Urban Environs (Nuclear Regulatory Commission 1980); and Shipping Container Response to Severe Highway and Railway Accidents (Nuclear Regulatory Commission 1987). The final three documents address the risks associated with transportation of radioactive materials and associated concerns.

This chapter began with a summary of the principal findings of the study. The remainder of this chapter continues with a discussion of the Peacekeeper Rail Garrison System Safety Program, which describes the steps that will be taken during design, deployment, and operations to assure the safest possible program. Following that, the hazardous materials associated with the system are listed, along with the potentially harmful characteristics of these materials. Then, the method of analysis is described, including the methods used to calculate risks and the types and sources of data that were used. Next, the environmental and human health effects which would result from releases of the system's hazardous materials are described in detail. Finally, the response and cleanup plans for mitigating any environmental damage that might a result in the unlikely event of a mishap are discussed.

5.1 System Safety Program

The Peacekeeper Rail Garrison System Safety Program developed by the Air Force extends from concept development and system design and extends through deployment and operations. Military Standard 1574A, System Safety Program for Space and Missile Systems, was used by the designers of the Peacekeeper weapon system for the specific purpose of designing safety into the system. Experience gained from previous missile programs was incorporated, along with the latest system safety hazard analysis methods, to produce the "Integrated System Safety Program for the M-X (Peacekeeper) Weapon System" (Space and Missile Systems Organization STD-79-1).

The Air Force conducts a rigorous, integrated safety program for nuclear and explosive safety. The objective of the Integrated System Safety Program is to identify risks and

define methods to eliminate or minimize these risks. This is an integrated, formally documented safety program which began during the conceptual phase and includes the active participation of numerous Air Force and DOD contractor safety staffs. The program encompasses the design, development, fabrication, checkout, modification, testing, servicing, maintenance, transportation, handling, training, deployment, and operations of all system components.

5.1.1 System Certification

Prior to testing, deployment, and operations, the Peacekeeper Rail Garrison system must receive explosives safety siting approval for facilities from the Air Force Inspection and Safety Center and the DOD Explosive Safety Board. In addition, nuclear safety certification for the weapon system and support equipment must be received from the Director of Nuclear Security (DNS). All major modifications affecting nuclear safety are studied by the DNS prior to incorporation. Two years after initial operations begin, and then at five-year intervals, the Nuclear Weapons Systems Safety Group (NWSSG) will review all aspects of the system to ensure continued compliance with the DOD nuclear weapons system safety standards. The NWSSG is chaired by the Air Force, with representatives from several Air Force major commands, the DOE, and the Defense Nuclear Agency.

Continuing review and evaluation of system modifications, technical manuals, and training programs for maintenance and operation of the system is performed by the System Safety Working Group (SSWG). This group is composed of Air Force and associate contractor technical staffs. It was formed at the inception of the original Peacekeeper missile design phase and is being continued in the Peacekeeper Rail Garrison system to monitor all design and engineering activities. This group provides technical support to the NWSSG to ensure that all serious hazards are eliminated or minimized and the system is safe to operate. The SSWG will continue to review and monitor the system throughout its functional life.

5.1.1.1 Explosive Safety Requirements

Air Force Explosives Safety Standards (Air Force Regulation 127-100) are applied to prevent or minimize mishaps and associated damage. Before accepting an explosive component, the Air Force determines its hazard classification. Contractors who manufacture Peacekeeper Rail Garrison explosive components provide the Air Force with data on the explosive hazard properties. The explosive hazard classification of each Peacekeeper stage and its associated explosive properties are shown in Table 5.1.1-1. These classifications are used to establish procedures to assure safe handling, packaging, storage, and use.

5.1.1.2 Nuclear Safety

Air Force Regulation 122-3, Air Force Nuclear Safety Certification Program, outlines policies, responsibilities, and the evaluation process for safety certification of equipment and procedures used with nuclear weapons. The weapon system, support and transportation equipment, test equipment, and procedures must be certified. The certification process ensures that no inadvertent ignition, launch, or explosion of the reentry vehicle is possible.

Design Certification. The NWSSG evaluates a nuclear weapon system for compliance with DOD Directive 3150.2, Safety Studies and Reviews of Nuclear Weapon Systems, using the process defined in Air Force Regulations 122-3 and 122-9, Nuclear Surety Design Certification Program for Nuclear Weapon System Software and Firmware. In addition, computer software is certified in accordance with the evaluation criteria in Air Force Regulations 122-9 and 122-10, Safety Design and Evaluation Criteria for Nuclear Weapon Systems. This analysis is an independent cross-check that ensures that software does not initiate any unauthorized functions.

Table 5.1.1-1

Peacekeeper Missile Components
Explosive Characteristics

Component	Net Equivalent Explosive Weight (lb TNT)	Explosive Hazard Properties	Explosive Hazard Classification[1]
Stage I	117,900	Burns vigorously; does not normally produce propagating shock waves or damaging overpressures (mass burn).	1.3C
Stage II	64,980	Burns vigorously; does not normally produce propagating shock waves or damaging overpressures (mass burn).	1.3C
Stage III	19,550	Most of the available quantity explodes or may burn when a small portion is initiated (mass detonation).	1.1C
Stage IV	1,420	May explode if mixed in uncontrolled fashion.	1.3L
LEGG	324	Burns vigorously; does not normally produce propagating shock waves or damaging overpressures (mass burn).	1.3C
Shroud Tractor Motor	30	Burns vigorously; does not normally produce propagating shock waves or damaging overpressures (mass burn).	1.3C

Note: [1]As determined by Air Force Technical Order 11A-1-47.

Operational Certification. A comprehensive functional and physical checkout of the weapon system and its critical components is required before the nuclear weapon is mated to the rest of the system and before initial operational deployment. This checkout uses procedures approved by the Air Force Directorate of Nuclear Surety.

Nuclear Surety Inspection. After a nuclear weapon system has received nuclear design certification and has been operationally certified, but before it may be put on operational alert, the system must successfully pass an initial nuclear surety inspection. Air Force inspectors review all procedures required prior to placing the operational system on alert. Facilities and physical security procedures and activities are also reviewed during this inspection.

Decertification and Recertification. If two-man control (see Section 5.1.2) is lost, or prior to maintenance work on a nuclear weapon or a critical weapon system component, the weapon or critical component is decertified. Decertified components or weapons may not be returned to use in an operational weapon system until they are recertified.

The process for recertification of a system or component is functionally the same as that for the deployment/operational certification process and follows Air Force Directorate of Nuclear Surety-approved procedures.

5.1.2 Personnel Programs

All Air Force personnel assigned to critical nuclear weapons activities and operations are evaluated under the criteria specified in Air Force Regulation 35-99, Personnel Reliability Program, and Air Force Regulation 40-925, Civilian Personnel Reliability Program. These programs are designed to ensure that military and civilian personnel who are assigned to nuclear weapons duties have no medical problems or psychological traits that might result in behavior that could threaten the national security of the United States. These programs also assist in protecting against acts that could lead to an attempt at an unauthorized launch, tampering with the system, or theft of the nuclear weapon. Both personnel programs are designed to ensure high standards of individual reliability for those whose duties are associated with nuclear weapons and nuclear components. Candidates must meet all requirements of the personnel reliability programs before they may perform duties associated with nuclear weapons. These requirements include security clearance, random drug testing, and medical and psychological screening. Personnel are continuously evaluated throughout the entire period of their assignment to critical nuclear weapons-related work to ensure their reliability. The programs are designed to promptly identify and eliminate unreliable personnel from such positions.

The two-man control concept, which forbids individuals to work alone while performing critical nuclear weapons duties, provides an additional safeguard for ensuring the safe operation of the missile system. Air Force Regulation 122-4, The Two-Man Concept (Nuclear), details the requirements of this concept.

5.1.3 Training Programs

A comprehensive Air Force training program will ensure that only highly-trained and qualified personnel are permitted to perform work on the Peacekeeper weapon system. Just as the Air Force trains its flight crews, the train crews will be fully qualified before they work on Peacekeeper trains. The training program will provide a mixture of classroom training, training on Peacekeeper Rail Garrison train simulators, demonstration of job proficiency and safety on training trains, observation of job performance in locomotive simulators, and performance evaluation during exercises and maintenance moves.

Maintenance teams that handle nuclear weapons will receive special task certifications. All work will be performed in compliance with special Air Force directives called Technical Orders. In addition, a comprehensive quality control program will include periodic reviews of maintenance operations. The inspection and evaluation teams will perform periodic and unannounced maintenance and technical inspections. Air Force Occupational Safety and Health Standards (AFR 40-925) and Nuclear Weapons Personnel Reliability Program (AFR 35-99) will be strictly enforced. Thus, the chance of a mishap due to deliberate or inadvertent acts of an assigned individual is extremely remote.

5.1.4 Safety Framework of Rail Systems

The Peacekeeper trains would operate on track over which the FRA has jurisdiction regarding safety. Rail safety issues such as track maintenance, signal systems equipment standards, and operating practices are addressed in the Code of Federal Regulations (49 CFR §209-236). Transportation of hazardous materials is addressed in 49 CFR §100-199. The Air Force will be the beneficiary of the considerable research into track safety standards that has been conducted by the FRA. These standards address the problems of faulty track and set safety speed limits on track segments. Rules for the design and

maintenance of signal systems and special operating procedures have developed in a similar manner. Some of these rules and standards have also been enacted into law.

The AAR has also developed a set of standards, design principles, and recommended practices that member railroads must follow in order to safely interchange cars from one railroad to another. The Peacekeeper Rail Garrison program will comply with these standards, principles, and practices. These criteria incorporate fundamental safety-related issues, such as the need for standardization of couplers and brake systems, so that cars and locomotives can move freely from one railroad to another. The railroad industry has kept pace with technology and continually advances new equipment designs to the AAR for approval. As a result, very high factors of safety are incorporated in the design of all rail vehicle components.

5.1.5 Operating Framework of Rail Systems

The Peacekeeper train will follow operating practices that are common to most railroads in the United States, recognizing that there are minor variations among railroads. As discussed in Chapter 1.0, a railroad pilot will accompany the Peacekeeper trains to ensure safe movement. A pilot is a railroad employee assigned to a train, to advise crews on the physical characteristics or traffic rules of the specific railroad, or portion of the railroad, over which the train is to be moved.

The movement of trains on the nation's railroad network is controlled by a system of dispatchers. Each railroad company has its own dispatchers, who operate from one or more dispatch centers located along that company's track. Dispatchers have various means for tracking trains under their control and maintaining separation between them, primarily traffic control and communication systems.

The nation's railroads are rapidly expanding the use of voice, data, and remote control communication systems. VHF radio with microwave links is the primary system used to communicate between trains and control centers. Company-owned telephone and closed circuit television systems are also used for monitoring trains. The AAR and the Railway Association of Canada are developing an integrated railroad command, control, and communications system for deployment in the near future. When operational, the Advanced Train Control System will rely on onboard locomotive computers and transponders in the gravel bed (ballast) beneath the tracks. System control centers would automatically receive position and velocity information from trains and other vehicles occupying the track, and verify their position and velocity against information that is stored in a central dispatch computer. Locomotives, track units, and wayside equipment could communicate with the central control system using a common network. Locomotives would communicate with the central control system through a distributed network of base stations. In the event of a system failure, train operators would revert to current operating rules and procedures.

5.1.6 Unauthorized Access

The Air Force will take positive steps to deny access to the Peacekeeper Rail Garrison system by unauthorized persons. These measures include, but are not limited to, onboard protective devices, remote sensor systems, protective barriers, and security response forces. Such measures are designed to deny or slow the efforts of any unauthorized persons attempting to gain access to the missile or warhead. These measures are classified because of their sensitive nature and are not discussed further in this document. Even in the event of a successful attack on the system, no impacts worse than those described in Section 5.4, Environmental and Human Health Effects, are expected.

5.2 Potential System Hazards

The primary risks associated with the deployment and operation of the Peacekeeper Rail Garrison system are those that are inherent in operation of trains on the national rail network. Grade crossing collisions between trains and other vehicles are the most likely causes of death or injury. Other risks arise from very improbable mishaps that have a potential for release of nonradiological or radiological hazardous materials, as well as a very small radiation risk in mishap-free operation.

5.2.1 Transportation

Analysis of transportation hazards of the Peacekeeper system includes consideration of the various phases of rail transportation involved, and air and truck transport of the reentry system. The different phases of rail transport are described separately because the hazardous materials present vary among the phases.

5.2.1.1 Rail Transportation

The FRA mishap reporting procedures define a "mishap" as an event which causes damage to railroad equipment in excess of a specified monetary threshold. An "incident" is defined as an event resulting in a death or reportable injury or illness. A mishap which meets both definitions is reported as both a mishap and an incident.

For this analysis, potential Peacekeeper system railroad mishaps are divided into incidents and mishaps, as defined in FRA mishap reporting regulations. Potential rail mishaps are further divided into phases of operations (deployment, training, dispersal, etc.), since the potential hazards vary among the phases.

Railroad Incidents. The majority of railroad incidents are highway grade crossing collisions or instances of trains striking pedestrians. The national rail network averages, as a result of commercial train operation, are approximately six injuries and less than two fatalities for every million miles of rail travel. The FRA and AAR are continually researching measures for reducing the probability of these inherent incidents. The means to be used and their effectiveness is not certain at this time, so the current rates for inherent rail incidents were used to compare to the hazardous material risks of Peacekeeper rail operations. For the purpose of this analysis, it is assumed that the rate at which Peacekeeper system trains may be involved in such incidents will be the same for all trains, whether they are being used for training, are on deployment or maintenance runs, or are Peacekeeper trains operating on the national rail network in time of national need.

Railroad Mishaps

Deployment/Maintenance. In the deployment and maintenance phase, the trains would carry missiles without the warheads, therefore, there is no potential for radioactive material release. The only risks analyzed for this phase were those from the missile propellants aboard the trains. The estimated train travel analyzed includes transportation of the 50 missiles without reentry systems for deployment of the system, and return of the missile without reentry systems to F.E. Warren AFB and Hill AFB from the deployment installations, and the trips from the deployment installations to Vandenberg AFB, California, via F.E. Warren AFB, for operational readiness testing of the missiles.

Training. Two training trains and instructor crews would be stationed at F.E. Warren AFB. They would visit each garrison installation quarterly to provide instruction to the train alert crews. All training operations would be conducted using a training train which electronically and physically simulates an operational train, but does not carry any weapons or missiles. The risk associated with training operations was calculated as if the

train was an ordinary freight train, even though such operations are expected to be substantially safer than those of ordinary freight trains. Since no missiles or warheads are carried, the only increase in risk would be that due to the slight increase in rail traffic from training operations on the United States rail network.

Dispersal. In times of national need, the Peacekeeper trains could be dispersed on the national rail network where they could randomly move throughout the United States. For analytical purposes, a hypothetical dispersal was used that continued long enough to allow all of the national rail network to be accessible to the trains. That hypothetical dispersal consisted of 25 trains (50 missiles) running nonstop for the first 12 hours of dispersal, then moving approximately 4 hours out of every 24 hours for a period of 4 weeks, for a total of 100,000 miles of train travel.

Rail Safety for Peacekeeper Rail Garrison System. The application of military standards in addition to the excellent safety programs and strict requirements of the AAR and FRA in the design of cars for the Peacekeeper train will result in even safer, stronger, and more reliable vehicles than the standard commercial rail car design criteria would require. Due to requirements of the Peacekeeper weapon system, the wheels, axles, bearings, truck frames, springs, bolsters, couplers, and underframes of the missile launch cars will be designed for even greater strength and durability than those of ordinary freight cars. Similarly, the manufacturing process for both the Peacekeeper locomotives and cars will be under much greater scrutiny, with tighter quality control inspections than would normally be the case for conventional rail vehicles due to the requirement to comply with the nuclear certification process. Maintenance activities will be more frequent and intense than normal railroad practice. Inspections will be almost continuous, to ensure early detection of any incipient problems with the vehicles. In addition, the mileage expected to be accumulated by the Peacekeeper trains is a small fraction of that traveled by freight trains; therefore, less wear will occur on Peacekeeper train components. Thus, opportunities for equipment failures are expected to be extremely low.

Operational safety would also be improved in many ways. Most important of these would be the intensive training and qualification of the operating crews to know and understand the railroad operation. It is essential and expected that the Peacekeeper operating personnel will receive the most comprehensive training and retraining of any railroad operating personnel.

Other improvements in operational safety would be realized as a direct result of special features of the Peacekeeper trains, including onboard component monitoring devices such as ho wheel bearing detectors and brake equipment monitors. Potential locomotive problems are expected to be mitigated by more frequent inspection and maintenance, as well as by onboard diagnostic equipment used to detect problems and permit their correction before they become serious. When the Advanced Train Control System is incorporated, it will be able to anticipate problems with signal systems and traffic conditions on various routes of the Peacekeeper Rail Garrison network. Special communication links will keep the onboard personnel aware of track conditions and problems as they occur.

As a consequence of these special operational and design safety factors, the inherent mishap rate of Peacekeeper Rail Garrison trains is expected to be substantially lower than the commercial rail rate used for this analysis. Though there is only a very remote possibility of a mishap causing a release of hazardous materials during rail operations, the potential consequences of such a release are discussed.

5.2.1.2 Aircraft Transportation

The potential for mishaps while airlifting Peacekeeper reentry systems during the deployment and maintenance phases was examined. For the purpose of conservative risk analysis, the mishap rate for all Air Force C-141B aircraft operations for 1983 through 1987 was used to predict the probability of mishaps during the transport of Peacekeeper reentry systems during those phases. All air transport of reentry systems would be carried out by special nuclear certified C-141B squadrons whose aircraft are specially modified and maintained for added assurance of safe operations, and whose crews are specially selected and trained. These squadrons have been transporting nuclear weapons for over 25 years and have had no mishaps that created any possibility of damage to the weapons. Though there is only a very remote possibility of a mishap causing a release of hazardous material during air transport of the reentry system, the potential consequences of such a release are discussed.

5.2.1.3 Truck Transport

The Peacekeeper reentry systems would be transported by truck convoy between F.E. Warren AFB, where they are assembled, and Cheyenne Municipal Airport. The route is approximately two miles long, over well-maintained urban roads with a maximum speed limit of 25 mph. Past and current Peacekeeper and Minuteman III missile operations likewise involve movement of reentry systems by truck in the F.E. Warren AFB deployment area. Precautions taken during these movements include escort by Air Force Security Police, control of other traffic in the vicinity by United States marshalls, and constant helicopter surveillance. The Peacekeeper reentry system movements would continue to use those same precautions. There have been no mishaps during these operations which posed any potential threat to the public. No credible mishap during this phase would cause a release of hazardous materials.

5.2.2 Hazardous Materials

The hazardous materials aboard the Peacekeeper trains will include both nonradiological and radiological materials. Nonradiological materials include missile propellants, which present explosive, fire, and exhaust fumes hazards; and diesel fuel and train lubricants, which present fire and noxious fumes hazards. Radiological materials refer to the warhead materials that present a potential radiation hazard.

5.2.2.1 Missile Propellants

The first three stages of the Peacekeeper missile are fueled by solid propellants carried in Kevlar/epoxy cases. The fourth stage uses hypergolic liquid bipropellants. Table 5.2.2-1 lists the major propellant materials used in the missile. These materials present a number of potential environmental hazards, including explosion, fire, toxicity, and corrosiveness.

Stage I is approximately 25 feet long and weighs 108,000 pounds. It includes a rocket motor containing hydroxyl-terminated polybutadiene, aluminum powder, and ammonium perchlorate. Stage II is 18 feet long and weighs 61,000 pounds. It uses the same propellant ingredients as Stage I, but in slightly different proportions. Stage III is 8 feet long and weighs 18,000 pounds. Its propellant contains nitroglycerine in a polyethylene glycol solution, cyclotetramethylene tetranitramine, aluminum powder, and ammonium perchlorate.

Stage IV is approximately 4 feet long and weighs about 3,000 pounds. Stage IV thrust is delivered by hypergolic liquid bipropellants of monomethylhydrazine fuel and nitrogen tetroxide oxidizer. To prevent fuel leakage, the tanks containing the liquid propellants are not pressurized prior to launch.

Table 5.2.2-1

Peacekeeper Missile Propellant Materials

Missile Component	Material Identification	Approximate Weight (lb)
Stage I	Aluminum Powder	19,000
	Ammonium perchlorate	68,000
	Hydroxyl-terminated polybutadiene	12,000
Stage II	Aluminum Powder	11,000
	Ammonium perchlorate	37,000
	Hydroxyl-terminated polybutadiene	6,500
Stage III	Aluminum Powder	2,700
	Ammonium perchlorate	800
	Cyclotetramethylene tetranitramine	8,000
	Nitroglycerine/Polyethylene glycol	4,200
Stage IV	Monomethylhydrazine	540
	Nitrogen tetroxide	880
Launch Eject Gas Generator	Aluminum Powder	16
	Ammonium perchlorate	250
	Carboxy-terminated polybutadiene	52
	Iron (III) oxide	6
Shroud tractor motor	Hydroxyl-terminated polybutadiene	4
	Aluminum Powder/Ammonium perchlorate	26

The assembled missile is housed in a steel launch tube for transport and launch. During launch, the missile is ejected from the launch tube by the launch eject gas generator (LEGG). The gas generator portion of the LEGG is an environmentally sealed, steel pressure vessel containing 324 pounds of propellant grain that is cast into a steel cartridge. The hot gases released from the burning propellant turns the water contained in the water coolant assembly into steam, which, in turn, ejects the missile from the canister. The propellant in the gas generator is similar to that in Stage I.

The shroud tractor motor consists of approximately 30 pounds of solid propellant. The motor is mounted in the shroud assembly directly behind the nose cone. It is designed to move the shroud assembly away from the flight path of the missile after the shroud has been separated from the reentry vehicle, prior to reentry of the earth's atmosphere.

System Integrity. An analysis was performed of both head on and rear end collisions involving the Peacekeeper and commercial trains at various speeds. The existing structural capabilities of the Peacekeeper missile coupled with the structural integrity to be designed into the missile launch car will ensure that the system can withstand collisions of up to 60 miles per hour. Mishaps which would impose lateral forces on the missile, such as an accordian pile-up derailment, would impose much lower g-forces than head-on or rear-end collisions. Consequently, analysis supports the conclusion that the forces that might be imposed on the missile launch car and, in turn, on the missile, would not be sufficient to ignite, explode, or detonate the missile.

In the highly improbable instance of a side collision, it is possible that sufficient forces might be present to create a potential for ignition, explosion, or detonation. The very small probability of such an event is taken into account in the analysis of potential hazardous material releases.

Analysis of the current concept of the missile launch car shows that the canisterized missile could break loose from its mounting hardware when a force of 8 g is exerted on it during a head-on collision, or a force of 4.5 g during a rear-end collision. The structural capability of the missile/missile launch car interface could easily be increased by simple engineering design changes. Analysis of the missile structural capability indicates that the weakest point is the aft Stage I skirt, at slightly greater than 8 g. The strongest explosive components on the missile are the Stage IV propellant and pressurization tanks which can withstand approximately 24 g.

5.2.2.2 Diesel Fuel

The locomotive and launch control car fuel tanks have a total capacity of approximately 13,000 gallons of diesel fuel. This material presents an exhaust fume hazard to the train crew during system operation and a potential for environmental contamination in the event of a spill. The diesel fuel could also be a source of fire in a mishap. Design factors such as heavy duty fuel tanks on the locomotive and launch car are expected to help prevent inadvertent release of the diesel fuel in case of a mishap.

5.2.2.3 Reentry System Hazards

Peacekeeper warheads containing radioactive materials continuously emit a very low level of ionizing radiation. The radiation level at a distance of 1 meter (3.1 feet) from the reentry system is 0.0009 rems per hour. Missile handlers, train crew members, and to a much lesser extent other persons near the train would be exposed to a very low, but measurable, radiation dose. The general public is not expected ever to be close enough to the missile reentry system to encounter radiation emissions measurably higher than normal background radiation. The effect on workers would be negligible. The predicted health effects of the cumulative dose to workers and others are referred to as the mishap-free radiological risk. Radiation monitoring of personnel will continue for the duration of the Peacekeeper Rail Garrison program.

Peacekeeper missile warheads which contain plutonium and other radioactive materials emit radiation of several types, including alpha particles, beta particles, gamma rays, and X-rays. If the radioactive constituents of the warhead were released in a mishap, the most important radiation hazard would be the alpha particles emitted by the plutonium. While there would be beta, gamma, and X-ray radiation present, the quantities would be so small that they pose no real hazard. The radioactive material release hazard is therefore calculated as though plutonium were the only radioactive material dispersed.

Because they are large and have a high electrical charge, alpha particles are absorbed by even thin materials, such as a rubber glove, piece of paper, or the outer layer of human skin, which consists of dead cells not harmed by the radiation. Thus, plutonium contamination of clothing or unbroken skin poses no substantial health risk. However, the inhalation and lodging of a particle of plutonium "dust" next to unprotected lung cells would constitute a significant exposure to harmful radiation.

While the radioactive materials are encased in the warhead, very little of the radioactivity escapes. Most of it is absorbed by various components of the warhead and surrounding structures. To illustrate the level of radiation that escapes, a worker who stood 1 meter (3.1 feet) from the reentry system continuously for a full work year would receive only 40 percent of the Nuclear Regulatory Commission maximum allowable annual dose. Several meters away from a missile launch car or Train Alert Shelter (TAS)

containing a reentry system, the radiation would not be measurable, compared to background radiation.

RV Integrity The warheads for Peacekeeper missiles are delivered to the Air Force in the aft body sections of assembled reentry vehicles (RVs). The RVs are assembled by the Air Force in the assembly, surveillance, and inspection building at F.E. Warren AFB. The warheads are not dismantled by the Air Force, so the radioactive materials are always contained inside and protected by the RV structure. In tests of strength and fire resistance, the RVs have been able to withstand a fuel fire (gasoline, diesel fuel, propane) of unlimited duration without release of any radioactive materials.

A missile propellant fire would be much hotter and the RV could not withstand a propellant fire of unlimited duration. A propellant fire would not likely last more than six minutes before the propellant was totally consumed; therefore, an RV would not be exposed to a propellant fire long enough (more than 7 minutes) to breach the RV and begin aerosolization of plutonium unless the RV is breached by means other than the fire and the radioactive materials are thus exposed prior to exposure to the fire. Also, the pressure generated in the fire would likely to cause the RV to be expelled from the fire, further reducing the likelihood of dispersal of plutonium. The RV is the strongest component in the Peacekeeper Rail Garrison system. Tests have shown that it is capable of withstanding forces up to 30 g. Therefore, in the absence of the most severe mishap, the chance of a radioactive material release is extremely remote. However, to provide a complete environmental analysis, the human health effects of exposure to aerosolized plutonium are discussed.

5.2.3 Natural Hazards

Natural hazards considered to have the potential to affect Peacekeeper Rail Garrison system safety included lightning, blizzards, tornados, earthquakes, and flooding. Such occurrences could cause rail distortion or obstruction leading to train derailment. Derailment caused directly by natural forces is also a remote possibility. However, none of those mishaps could result in a release of any hazardous materials.

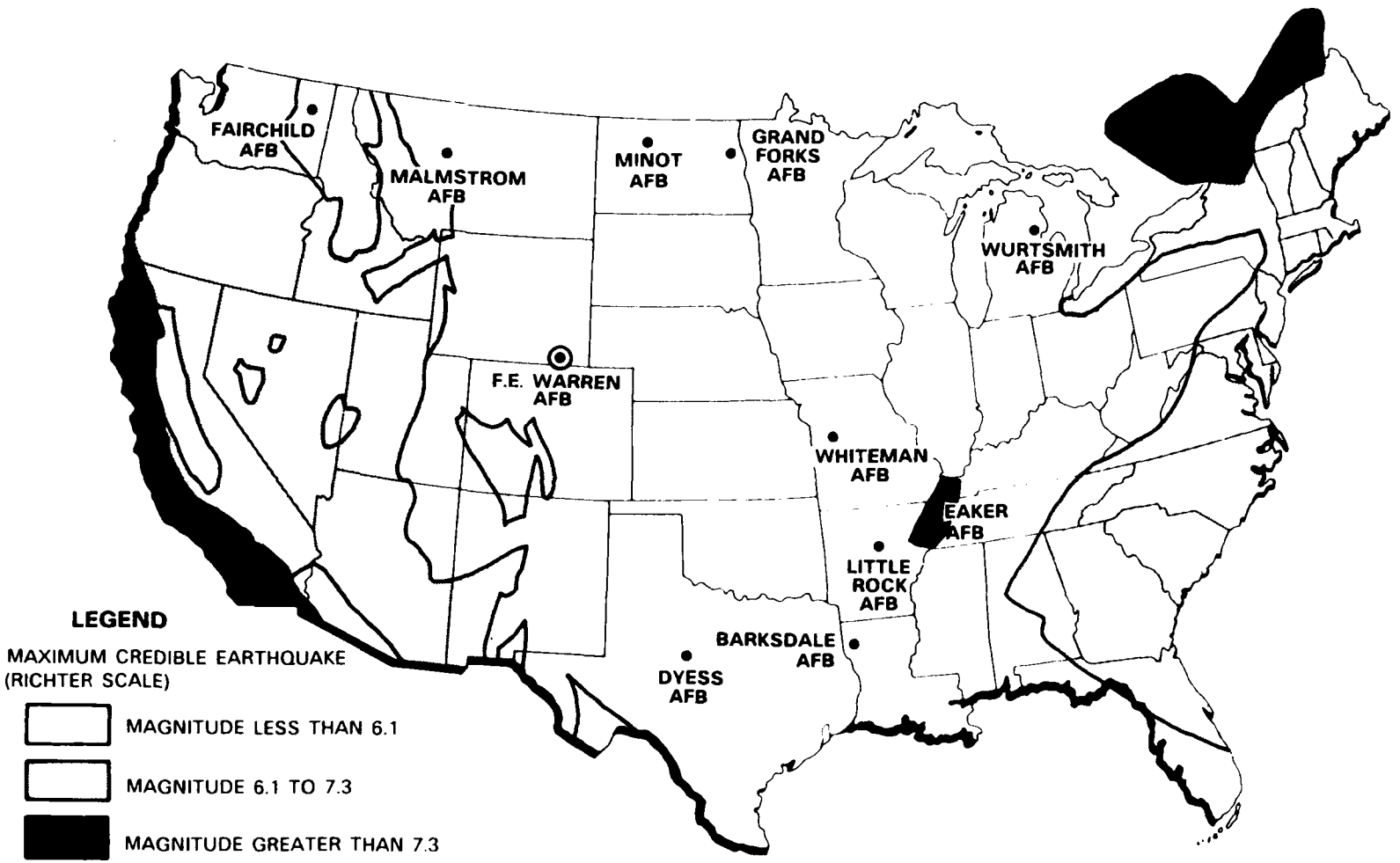
Lightning strikes, though frequent and severe in many parts of the country, would pose no safety hazard to the Peacekeeper Rail Garrison system. The missile launch cars and launch control cars will be specially shielded and grounded to protect against damage from lightning strikes.

Blizzards occur two to three times per year at several candidate locations and stall local rail traffic for several days. No increased risk would be associated with blizzards. The few trains affected by the blizzards would be able to wait out the blizzard with very little impact on overall system effectiveness.

Tornados have the potential to affect the Peacekeeper Rail Garrison system when the train is moving. The TAS will provide adequate protection from tornados when a train is in the garrison, but a moving train could be derailed by track damaged by a tornado or could be derailed by the force of the tornado. The probability of such a mishap is very small and none would be severe enough to cause a release of any hazardous material.

Flooding is likely at Barksdale AFB, Louisiana, since the proposed location of the garrison facilities is in the floodplain of the Flat River. Floods may soften roadbeds, causing track disruption and derailments. The forces in these derailments would not be sufficient to cause any serious impacts. Impacts due to flooding may be avoided by elevating the proposed facilities and track and inspecting the roadbeds and tracks following flooding episodes.

Earthquakes of an intensity greater than 6.1, or greater, on the Richter Scale could disrupt roadbeds, causing derailment of trains subsequently using the track. A larger



Note: Eaker AFB formerly Blytheville AFB.

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FIGURE 5.2.3-1 SEISMIC SOURCE ZONES IN THE CONTERMINOUS UNITED STATES

earthquake (magnitude greater than 7.3 on the Richter Scale) could destroy buildings, bend rails, and derail trains. However, it would not result in damage to the Peacekeeper missile which could cause a hazardous material release. Eaker AFB, Arkansas, and, to a lesser degree, Little Rock AFB, Arkansas, may experience damage to program components as a result of seismic activity related to the New Madrid Seismic Province (Sections 4.5 and 4.8). The last occurrence of an earthquake of this magnitude was in 1811 near the present location of Eaker AFB. Figure 5.2.3-1 shows the areas most susceptible to seismic activity.

5.3 Risk Calculations

The accepted method of reporting environmental impacts of unlikely events that would have serious consequences is in terms of overall risk. Risk is defined as the probability that a mishap might occur, multiplied by some measure of the consequences of the mishap, were it to occur. The probability that a mishap will occur in the future is estimated from records indicating how often mishaps occurred in the past. Risk is a term which combines that estimate (probability) of how many (or few) mishaps will occur and the expected consequences if the mishaps did occur in the operation of the system.

5.3.1 Rail Transport Risk Calculation

There are a number of variables necessary to analyze the probability of harm to persons or the environment. It was necessary to use a computer program which could handle the many individual calculations necessary to take into account the range of values possible for each of the variables. The computer program RADTRAN, developed by Sandia National Laboratories in an earlier study of risks associated with air, rail, and truck transport of radioactive materials, was used for assessing the radioactive materials hazard. A variation of RADTRAN, named HAZTRAN, was used for assessing the nonradioactive hazardous material risk.

The calculations done by RADTRAN and HAZTRAN can be stated, in simplified form, as:

$Prob_A$ x $Prob_B$ x pop density x area x consequence = unit risk factor (U.R.F.).

U.R.F. x distance traveled = risk.

Where: $Prob_A$ is the probability that there will be a mishap involving the train or airplane transporting hazardous materials.

$Prob_B$ is the probability that the mishap will result in release of hazardous material (by spill, fire, explosion, etc.).

Pop. density is the average number of people expected to be found, per unit of area, in the vicinity of the mishap.

Area is the number of square kilometers affected if the consequence were to occur.

Consequence is the (quantified) human health or environmental impact expected as a result of the release.

U.R.F. is unit risk factor, the amount of risk created by the transport of hazardous materials, per unit of travel.

Sections 5.3.1.1 through 5.3.1.6 describe the derivation of values for each of the variables of the formula for all rail operations associated with the Peacekeeper Rail Garrison. The descriptions of events in this section should not be taken to imply a likelihood that such events would occur. The results of the risk calculations are reported in Section 5.3.1.7.

5.3.1.1 Probability A (Mishap Rate)

Analysis of FRA train mishap data shows that different types of trains (freight, passenger, or special purpose) have different mishap rates. Though it will not be exactly like other trains, a Peacekeeper system train will most closely resemble a freight train in make up and operations, so freight train mishap data was examined to estimate the Peacekeeper rail mishap rate for analysis in this environmental impact statement. Freight train mishap rates for the years 1983 to 1986, derived from FRA data, are shown in Table 5.3.1-1.

Table 5.3.1-1

Freight Train Mishap Rates

Year	Train Mileage	Mishaps	Mishap Rate (per million miles)
1983	483,188,000	2,471	5.11
1984	513,451,000	2,487	4.84
1985	491,800,000	2,104	4.28
1986	487,444,000	1,775	3.64
Average	493,970,750	2,209	4.47

The average rate for those years, 2.77 mishaps per million kilometers traveled (4.47 per million miles), was used to analyze potential risk of Peacekeeper train movements. For the reasons given below, this rate does not represent the mishap rate expected for Peacekeeper train operations; it is expected to be substantially lower.

The United States rail mishap rate has been declining due to the ability of the railroads to upgrade their track after passage of the Staggers Rail Act of 1980. Also, there have been important technological advances on safety features for both equipment and track. These factors suggest the long-term trend will be a further reduction in rail mishaps.

In addition to these industry changes that tend to make the mishap rate conservative are the special design and maintenance provisions that will be implemented for the Peacekeeper train as discussed in Section 5.1.5. These features will both prevent mishaps and minimize the effects in the unlikely event the train is disabled in an mishap.

The FRA freight train mishap rate includes mishaps occurring on all track and during all phases of operation. Almost half of all freight train mishaps occur in switching yards and most of those occur during switching and coupling. Though Peacekeeper trains may travel through yards, most switching and coupling will be done in the garrisons or at the MOB, before entering the commercial rail network. This operational feature further reduces the expected mishap rate. Atomic Energy Commission and DOE transport of nuclear weapons by rail is an example of the ability to conduct special train operations very safely. Those operations were conducted for over 29 years without any mishaps that were reportable under FRA standards.

5.3.1.2 Probability B

The probability that an unforeseeable, severe mishap would result in the release of hazardous materials was derived from data on forces created in various types of mishaps,

and the vulnerability of hazardous materials to the stresses which might be imposed on them. The mishap rate described in the previous section includes some that are railroad equivalents of automobile "fender-benders." $Prob_B$ expresses the very small proportion of the total number of railroad mishaps which would generate enough force to create the potential for a release of hazardous materials from a Peacekeeper train.

To convert the many combinations of stresses in a mishap to a manageable form, the mishap severity model used in the computer program divides the range of mishaps into a set of eight severity categories. The probability of a mishap of the severity represented by each category is predicted from analysis of historical mishap data and engineering estimates of the probability of hazardous material releases. Table 5.3.1-2 lists the probabilities of mishap severity categories for rail mishaps.

Table 5.3.1-2

Probability That a Rail Mishap Involving a Peacekeeper Missile Train Will Have the Characteristics Described

Severity Category	Characteristics of Mishap	Probability (% of Mishaps in Category)
I	Max. impact velocity-15 mph Max. fire duration-15 min. No hazardous materials release	50.20
II	Max. impact velocity-30 mph Max. fire duration-30 min. No hazardous materials release	31.10
III	Max. impact velocity - 50 mph Max. fire duration - 45 min. No hazardous materials release	14.40
IV	Max. impact velocity - 70 mph Max. fire duration - 55 min. No hazardous materials release	3.00
V	Max. impact velocity - 90 mph Max. fire duration - 1 hr. 50 min. Missile propellant release occurs No radioactive materials release occurs	0.64
VI	Max. impact velocity - 95 mph Max. fire duration - 3 hours Missile propellant release occurs Max. radioactive materials release - 0.02%	0.44
VII	Max. impact velocity - 110 mph Max. fire duration - 6 hours Missile propellant release occurs Max. radioactive materials release - 0.2%	0.16
VIII	Max. impact velocity - 150 mph Max. fire duration - 11 hours Missile propellant release occurs Max. radioactive materials release - 2.0%	0.06

Each of the conditions listed in the mishap severity category descriptions is an independent factor. For example, for a mishap to be a Category IV mishap, the impact velocity must be 70 miles per hour (mph), or less, any fire must last 55 minutes, or less, and there must be no hazardous materials release. If the impact velocity or fire duration were within the Category IV limits, but there was a hazardous materials release, the mishap would be a category V to VIII mishap, depending on the extent of the hazardous material release. Thus, if between 0.02 percent and 0.2 percent of the radioactive materials were released, the mishap would be a category VII mishap, if none of the other conditions were exceeded.

5.3.1.3 Population Density

The population density figures used to estimate the number of people potentially affected by a mishap were calculated by a two-step averaging process. The first step was a division of all areas adjacent to railroad tracks into three population density groups: urban, suburban, and rural. The average population in the areas designated urban is 3,860 persons per square kilometer (sq km) (10,000 per sq mi). In suburban areas, the average is 770 persons per sq km (2,000 per sq mi), and in rural areas it is 6 persons per sq km (16 per sq mi). The population in each of those groups was considered to be uniformly spread over the area.

In the second step, the proportional amount of usable track within each of the three population density groups was equated to the amount of travel by the Peacekeeper trains expected to occur in each of the population density areas. It was determined that 91 percent of the track (and travel) is in rural areas, 8 percent is in suburban areas, and 1 percent in urban areas.

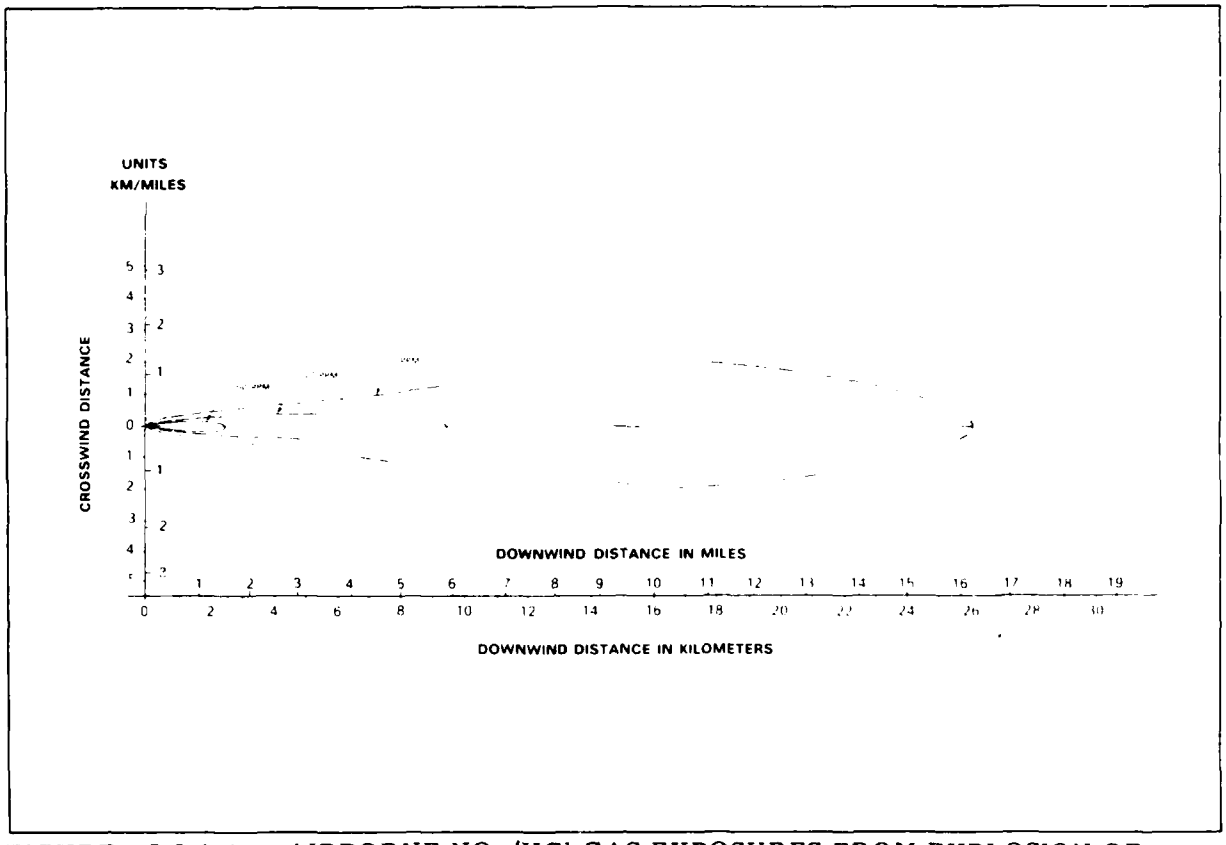
5.3.1.4 Area

The area factor is a multiplier to convert the density figures into persons exposed. The areal extent of contamination is derived from computer modeling of the plume rising from the fire or explosion that is necessary to spread the hazardous materials downwind from a mishap. For the purpose of this risk assessment, hypothetical meteorological data giving a plume description causing the greatest adverse consequences were used. The total area impacted varies with the hazardous material being considered. For example, aerosolized radiological materials could impact up to 15 sq km as shown in Figure 5.3.1-5. Table 5.3.1-3 lists these assumptions. Figures 5.3.1-1 through 5.3.1-6 show the results of the computer modeling.

Table 5.3.1-3

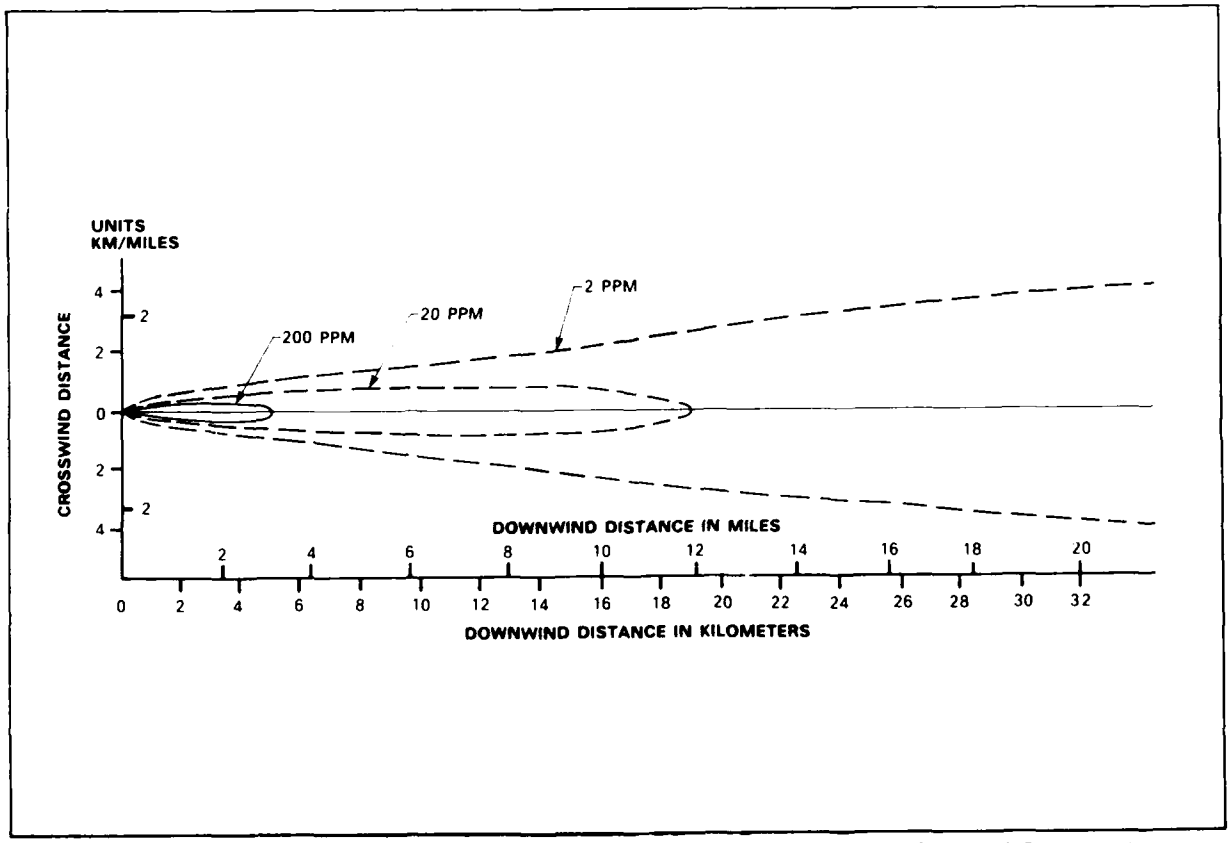
Meteorological Assumptions of Computer Modeling

- ground level winds - 2 meters/second (4.5 mph)
- mixing layer depth - 500 meters (1,600 ft)
- atmospheric stability - E (moderate instability)
- ambient temperature - 20°C (68°F)
- atmospheric pressure - 1013 millibars (29.92 inches mercury)



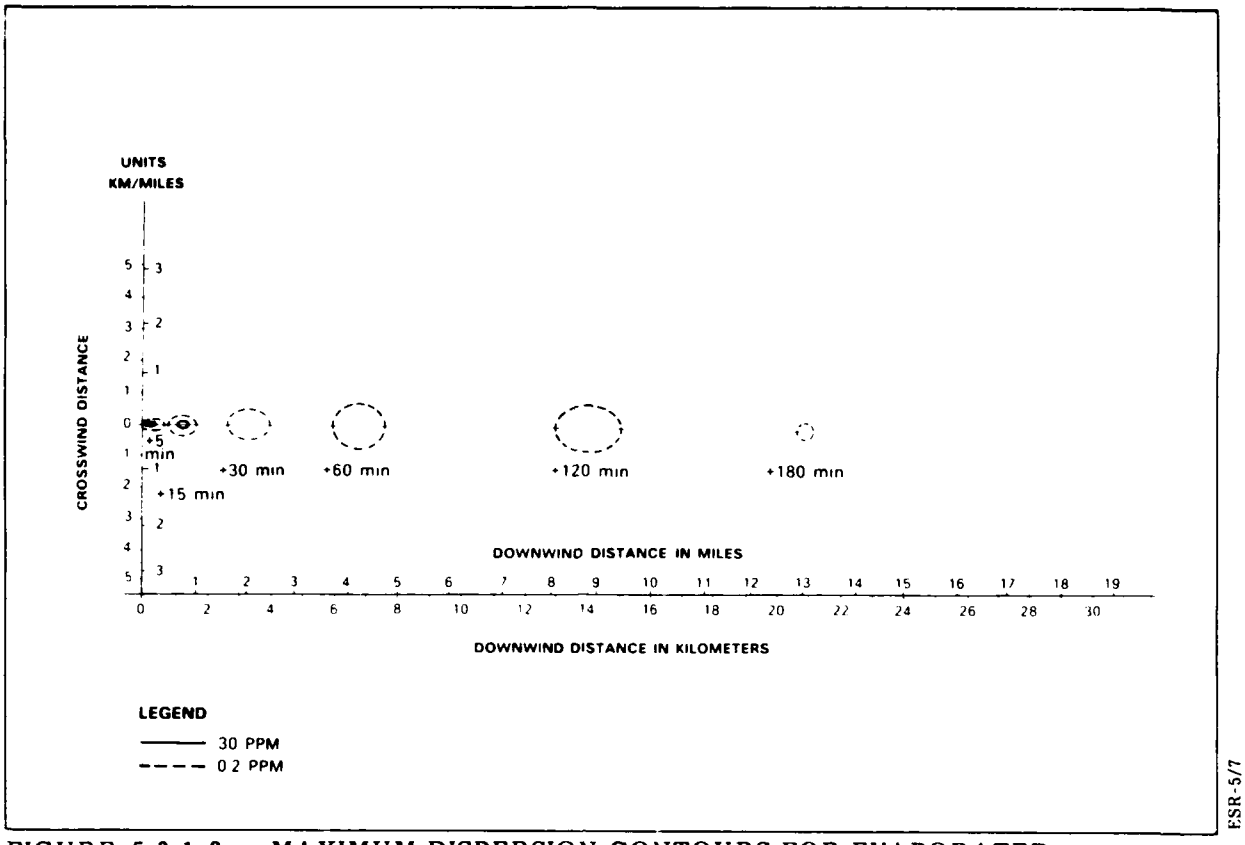
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FIGURE 5.3.1-1 AIRBORNE NO_2/HCl GAS EXPOSURES FROM EXPLOSION OF SOLID PROPELLANT BOOSTERS



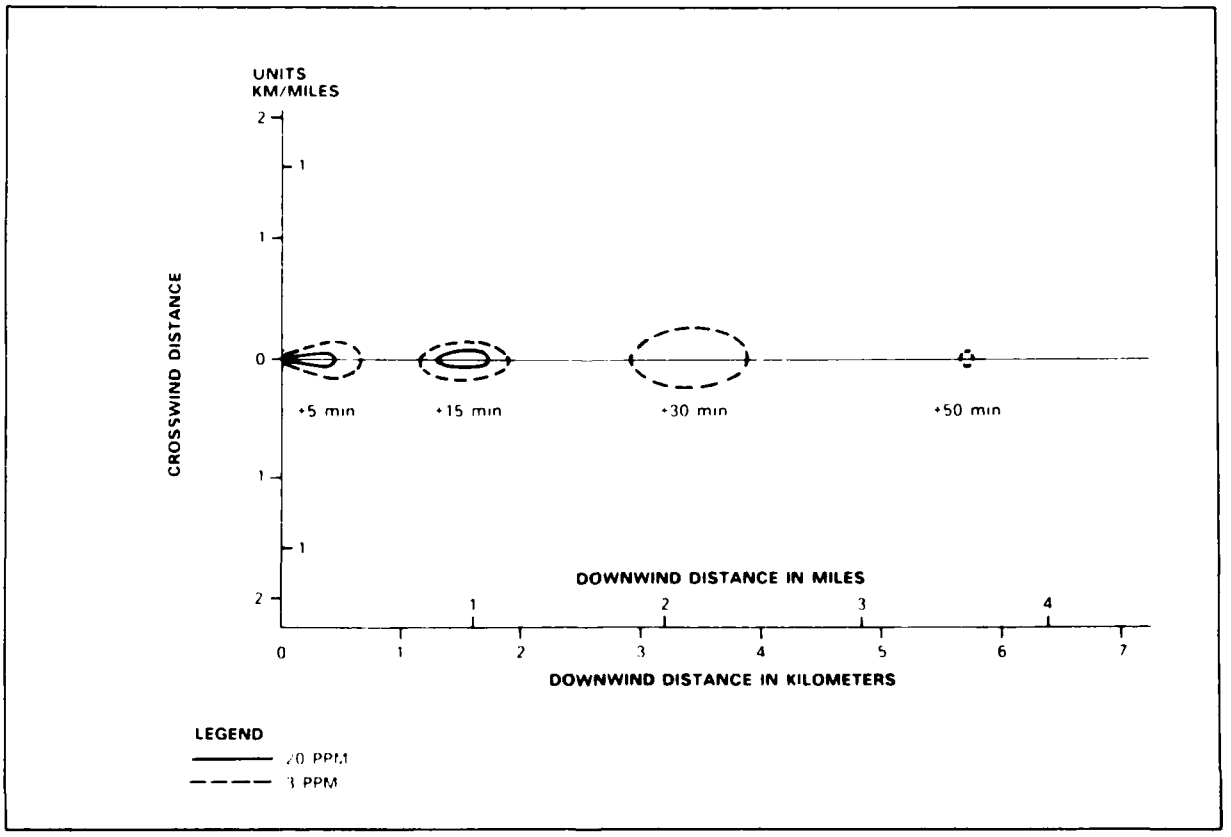
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FIGURE 5.3.1-2 SUSPENDED PARTICULATE CONCENTRATIONS FROM A SOLID PROPELLANT BURN



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FIGURE 5.3.1-3 MAXIMUM DISPERSION CONTOURS FOR EVAPORATED MONOMETHYLHYDRAZINE



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FIGURE 5.3.1-4 MAXIMUM DISPERSION CONTOURS FOR EVAPORATED NITROGEN TETROXIDE

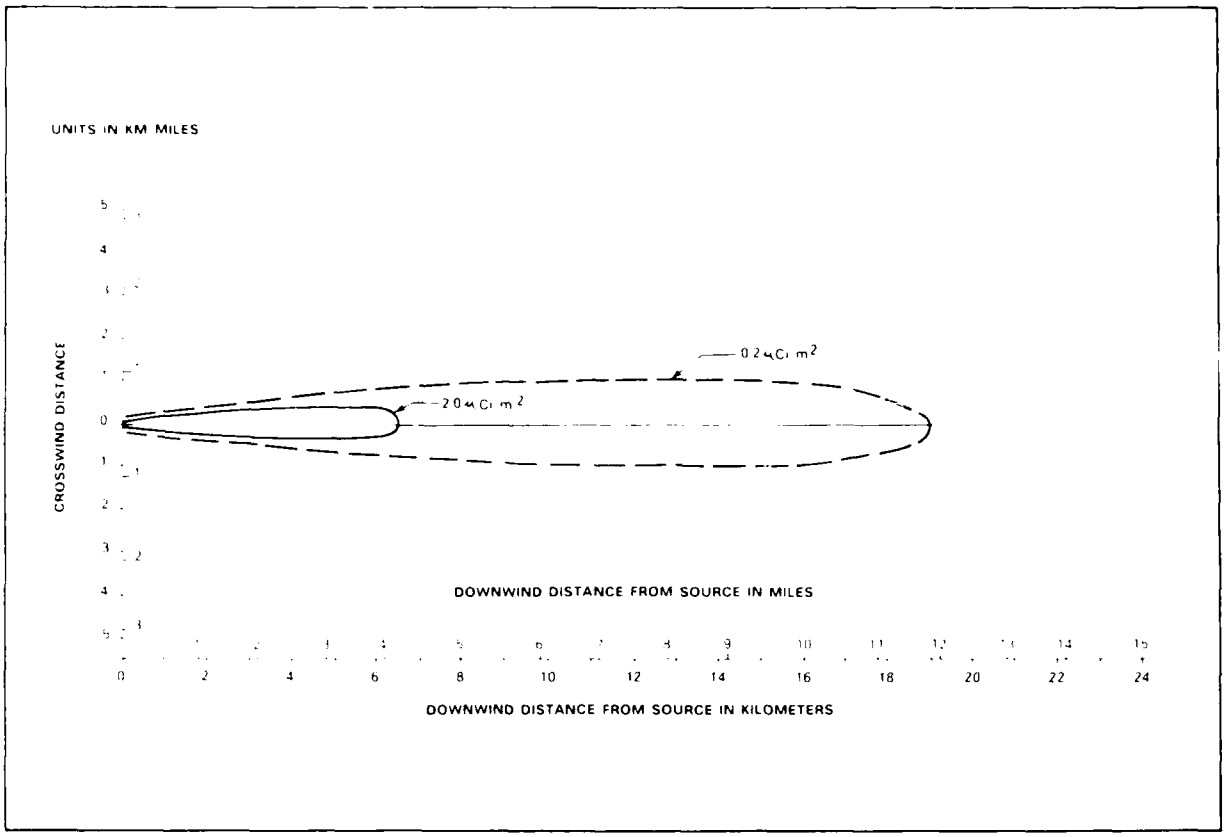


FIGURE 5.3.1-5 SURFACE RADIATION CONCENTRATIONS AS A RESULT OF PLUTONIUM AEROSOLIZATION (MICROCURIES/SQUARE METERS)

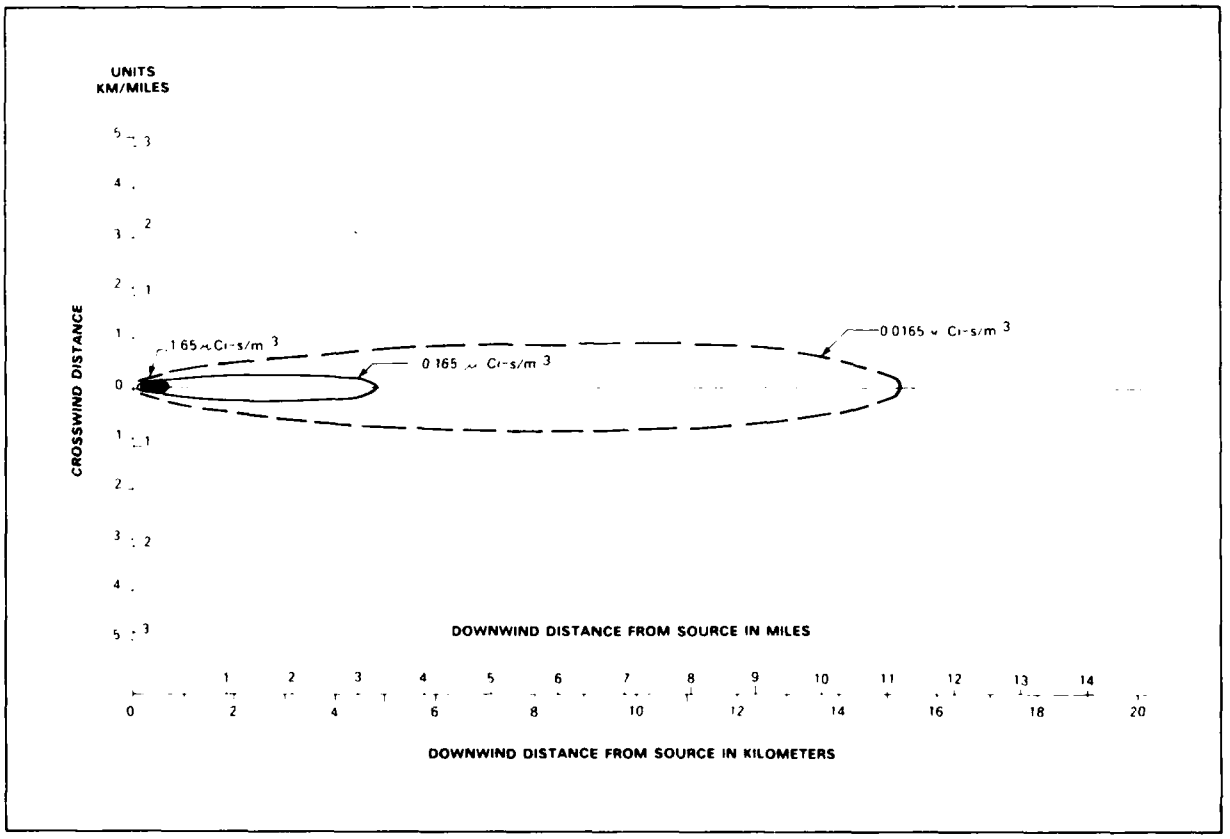


FIGURE 5.3.1-6 AIRBORNE RADIATION CONCENTRATIONS (MICROCURIE-SECONDS PER CUBIC METER)

5.3.1.5 Consequences

Estimates of the consequences of radiation exposure are less precise than for the consequences of fire and explosion, for example, because the health effects of low doses of radiation cannot be measured accurately. Radioactivity (ionizing radiation) doses to humans are reported in rems, which is a standard unit adopted by the NRC to measure radiation absorbed by body tissues. One human health effect of low doses of ionizing radiation is the very small possibility that an exposed person may develop cancer. That highly unlikely occurrence of cancer will typically develop years (as many as 30 or more) after the exposure. The delay in developing the illness is termed latency, and the human health effect is reported as latent cancer. Another human health effect resulting from low dose radiation exposure is genetic effects, including congenital defects and spontaneous abortions. Genetic effect are estimated to occur as frequently as latent cancer fatalities for a given level of exposure.

The individual dose rate is a function of many variables, including the amount of radioactive material released, the dispersion of the material by the wind, the breathing rate of the individuals and the length of time exposed. The hypothetical dispersal used to calculate the risk from radiation exposure would result in an average radiation dose per person of 0.23 rems. The latent cancer fatality rate for persons exposed to that much radiation is 46 per million people exposed. The threshold radiation level for causing early fatality (within one year of exposure) is approximately 250 rems. No radiological exposure levels approaching that magnitude would occur in a rail mishap. In an aircraft mishap, that level could be reached in a very small area immediately adjacent to a damaged reentry system.

The potential thermal consequences of propellant fires were calculated based on the estimated temperature and size of the fire. Life threatening radiated heat from a propellant fire was estimated to extend to a distance of 55 meters (180 ft) from the visible flame of the fire. Heat radiation up to 85 meters (280 ft) from the flame could cause disabling burns.

In a maximum yield explosion of the missile propellants, the air overpressure (shock wave) could be fatal to persons within 120 meters (400 ft) of the center of the blast. Persons within 300 meters (1,000 ft) could receive disabling injuries.

5.3.1.6 Unit Risk Factor

The number calculated by multiplying mishap rate, severity probability, population density, area and consequence factors represents the expected number of latent cancer fatalities for each kilometer the train travels. That number is referred to as the unit risk factor. When it is multiplied by the distance that the train is expected to travel, the resulting number represents the risk created by the operation. The expected travel distances used to calculate the risks of Peacekeeper Rail Garrison are summarized in Table 5.3.1-4.

5.3.1.7 Results of Analysis

The result of multiplying the unit risk factor times the distance traveled is the total risk. The risk is reported as the expected fatalities and incapacitations for nonradiological hazards and as the expected latent cancer fatalities and genetic effect incidents for radiological hazards. The hazards vary among the phases of Rail Garrison activity and the total risk is divided into mishap-free and mishap-induced risk components. Rail mishap-free risk occurs only during dispersal. The potential mishap-risk for the hypothetical dispersal is shown in Table 5.3.1-5. The nonhazardous material risk is injuries and fatalities resulting from mishaps that are inherent in train operations such as collisions at grade crossings. The mishap-induced risk from maintenance, operational readiness testing, and training activities is shown in Table 5.3.1-6. The mishap-induced risk associated with initial deployment is summarized in Table 5.3.1-7.

Table 5.3.1-4

Estimated Rail Travel Distances

Activity	Rail Miles Traveled Missile With RV	Rail Miles Traveled Missile Without RV	Rail Miles Traveled Without Missile Without RV	Occurrence
Deployment	0	25,258	0	Once over life of program
Training	0	0	59,456	Per year
Maintenance	0	13,114	2,975	Per year
Operational Readiness Testing	0	32,770	0	Per year
Dispersal	100,000	0	0	Only in times of national need

The reported mishap-induced risks for deployment, dispersal, and operational readiness testing (i.e., those operations involving rail transport of missiles), are higher than will be experienced. This is because for all circumstances in which the missile propellant was involved in any way that created the potential to ignite or explode, it was assumed that ignition or explosion would occur. This assumption was made because test data is not available to demonstrate that a fire or explosion could not occur.

5.3.2 Aircraft Transport Risk Calculations

The simplified description of the formula for the RADTRAN computer code calculation of air transport risks is the same as for rail transport.

It is:

$$\text{Prob}_A \times \text{Prob}_B \times \text{pop. density} \times \text{area} \times \text{consequence} = \text{unit risk factor (U.R.F.)}$$

$$\text{U.R.F.} \times \text{distance traveled} = \text{risk}$$

Some of the values for the terms in this formula are different for air transport than they were for rail transport. For those that are different for air transport, a description of those assumptions and variables is given below in Sections 5.3.2.1 through 5.3.2.5. In those instances in which they are the same, reference is made to the rail transport section discussion of that variable.

5.3.2.1 Probability A (Mishap Rate)

Peacekeeper missile reentry systems will be transported by Air Force C-141B aircraft and perhaps, by successor aircraft. Special nuclear-certified aircraft and crews will be used. Those aircraft and crews have experienced no mishaps which would pose any threat to the integrity of the reentry system.

Table 5.3.1-5

Rail Risks Per Hypothetical Strategic Dispersal[1]

Activity	Fatalities			Incapacitations		
	Hazardous Material			Hazardous		
	Radiological Latent Cancer	Non-Radiological	Inherent	Radiological Genetic Effects	Non-Radiological	Non-Hazardous
Strategic Dispersal[1]						
Mishap-Induced	0.0045	0.0531	0.1230	0.0045	0.3272	0.6910
Mishap-Free	0.0062	0	0	0.0062	0	0

Note: [1]Assumes 160,000 km (100,000 mi) traveled.

Table 5.3.1-6

Rail Mishap-Induced Annual Risk

Activity	Fatalities			Incapacitations		
	Hazardous Material			Hazardous		
	Radiological Latent Cancer	Non-Radiological	Inherent	Radiological Genetic Effects	Non-Radiological	Non-Hazardous
Maintenance	N/A	0.0043	0.0198	N/A	0.0263	0.1112
Operational Readiness Testing	N/A	0.0087	0.0403	N/A	0.0536	0.2264
Training	N/A	N/A	0.0731	N/A	N/A	0.4108

Note: N/A = Not applicable

Table 5.3.1-7

Rail Mishap-Induced Risk for Initial Deployment of 50 Missiles on 25 Trains to Selected Garrison Installations

Activity	Fatalities			Incapacitations		
	Hazardous Material			Hazardous		
	Radiological Latent Cancer	Non-Radiological	Inherent	Radiological Genetic Effects	Non-Radiological	Non-Hazardous
Initial Deployment	N/A	0.0134	0.0311	N/A	0.0826	0.1745

Note: N/A = Not applicable

For the purpose of conducting an analysis of the mishap risk, the overall C-141B aircraft mishap rate was used. That rate is approximately nine mishaps per billion miles of travel.

5.3.2.2 Probability B

As is the case with potential rail mishaps, only a very small proportion of potential aircraft mishaps would generate enough force to create a potential for release of the hazardous materials in the reentry system. A set of mishap severity categories unique to the C-141B transport of reentry systems was constructed and the probability of an mishap of the severities represented by each of the severity categories was derived from historical data on aircraft mishaps. The mishap severity category descriptions and probabilities are reported in Table 5.3.2-1. The mishap severity categories for air transport are constructed in the same manner as for rail operations. See Section 5.3.1.2 for an explanation of the category descriptions.

Table 5.3.2-1

Probability That an Aircraft Mishap Involving a Peacekeeper Reentry System Will Have the Characteristics Described

Severity Category	Characteristics of Mishap	Probability (% of Mishaps in Category)
I	Max. impact velocity- 100 ft/sec Max. fire duration- 20 min. No radioactive materials release	46.0
II	Max. impact velocity- 200 ft/sec Max. fire duration- 30 min. No radioactive materials release	9.0
III	Max. impact velocity - 300 ft/sec Max. fire duration - 60 min. No radioactive materials release	40.0
IV	Max. impact velocity - 400 ft/sec Max. fire duration - 1 hr. 40 min. No radioactive materials release	2.0
V	Max. impact velocity - 500 ft/sec Max. fire duration - 2 hrs. Release of 0.02% of radioactive materials	1.2
VI	Max. impact velocity - 700 ft/sec Max. fire duration - 2 hrs. 20 min. Release of 0.2% of radioactive materials	0.8
VII	Max. impact velocity - 900 ft/sec Max. fire duration - 2 hrs 40 min. Release of 2% of radioactive materials	0.6
VIII	Max. impact velocity - 1,050 ft/sec Max. fire duration - 3 hours Release of 2% of radioactive materials	0.4

5.3.2.3 Population Density

The population density assumptions and calculations are the same for air transport risk as for rail transport except that the population examined was not limited to areas adjacent to rail track. The areas considered were limited, however, to the vicinity of the aviation routes between Cheyenne Municipal Airport and the candidate deployment bases. The percentage of the area along those routes considered rural is 97, suburban is 2.8, and urban is 0.2.

5.3.2.4 Area

The assumptions and calculations on the area factor in assessing air transport risk are similar to those for the assessment for rail transport but the aerosolizing fire in that instance is an aircraft fuel fire, which is cooler and less energetic than a missile propellant fire. The affected area is thus smaller for this calculation than for the rail mishap-induced release.

5.3.2.5 Consequences

The consequences considered for air transport are only those resulting from exposure to radioactive materials. The assumptions and calculations for air transport are the same as for rail transport.

5.3.2.6 Unit Risk Factor

The unit risk factor for air transport is derived from the same formula as that used for rail transport, but most of the variables have different values. The probabilities of mishap and severity are derived specifically for each mode of transportation and unrelated to each other. The population density and area values are calculated very similarly to each other, but the air operations are conducted only on the air routes between the bases, so the population data used are for only the vicinity of those routes. The hazardous material consequences of radioactive material dispersed in an air transport mishap would be the same as for radiological material dispersed in a rail transport mishap.

The total travel expected in the transport of reentry systems is approximately 634,000 statute miles over a 20-year system life. This includes 38,600 miles during initial deployment of the system and approximately 29,750 miles per year of transport for routine maintenance. The product of the unit risk factor for that air transport and the expected number of miles of travel gives the risk for this mode of operation and is reported in Table 5.3.2-2. The reported risk shows that a great deal less than 1 person (0.00045 person) would be expected to die from latent cancer as a result of exposure to radiation and other causes over the life of the system.

Table 5.3.2-2

Total Aircraft Risks
Over 20-Year Life of System

Phase	Latent Cancer Fatalities	Genetic Incidents
Deployment (50 reentry systems)		
Mishap-Free	0.00040	0.00040
Mishap-Induced	0.00003	0.00003
Maintenance		
Mishap-Free	0.00400	0.00400
Mishap-Induced	0.00040	0.00040
TOTAL:	0.00483	0.00483

5.3.3 Truck Transport Risk

The Peacekeeper reentry systems would be transported by truck convoy between F.E. Warren AFB, where they are assembled, and Cheyenne Municipal Airport. The route is approximately two miles long over well-maintained urban roads with a maximum speed limit of 25 miles per hour. Past and current Peacekeeper and Minuteman III missile operations likewise involve movement of reentry systems by truck in the F.E. Warren AFB deployment area. Precautions taken during those movements include escort by Air Force Security Police and control of other traffic in the vicinity by U.S. marshalls. The Peacekeeper reentry system movements would use those same precautions. There have been no mishaps during those past operations which posed any potential threat to the public. No credible mishap during this phase would cause a release of hazardous materials. The low level of the contributing factors to the level of risk posed by truck transport operations (i.e., very few miles traveled, low speeds, low probability of an mishap, and low severity of credible mishaps) makes the risk of these operations too small to calculate. Therefore, the risk from this mode of transport can safely be disregarded.

5.3.4 Summary of Risks

Even the most severe credible mishap involving a Peacekeeper missile or component would pose only a very small risk of release of hazardous materials. The total risk over a projected 20-year life of the Peacekeeper Rail Garrison system is summarized in Table 5.3.4-1. This table assumes the deployment, a single hypothetical dispersal, and 20 years of maintenance, training, and operational readiness testing activities. For comparison, the expected fatalities that are likely to occur as a result of various other sources activities are shown in Table 5.3.4-2. To illustrate the meaning of the numbers reported, the expected fatalities for rail deployment operations is 0.013. That means that as a result of rail transport of the missile to the deployment bases, there is a very substantial probability that less than one person (or none) will be killed. The very small fractions of fatalities, latent cancer deaths, incapacitations, and genetic incidents shown in the table indicate that the total risk is negligible.

5.4 Environmental and Human Health Effects

Even though a mishap resulting in the release of hazardous materials is exceedingly unlikely, for the sake of a complete analysis this section describes the environmental and human health effects that could be expected from: (1) solid propellant explosion or burn, (2) liquid propellant spill or burn, (3) combined solid and liquid propellant release, (4) nuclear material release, (5) nuclear material aerosolization, and (6) diesel fuel spill or burn. In this discussion, the term "release" is used to identify any escape of a hazardous material from its containment.

5.4.1 Mishaps Involving Solid Propellants

The Peacekeeper missile system carries approximately 168,000 pounds of solid propellants that has a net equivalent explosive weight of 202,000 pounds TNT. The solid propellants used in this missile are Class 1.3 and Class 1.1 explosive proprietary mixtures. Although they will not react at ambient temperatures, they will ignite when exposed to sustained temperatures above 360° F (Class 1.1) and 600° F (Class 1.3).

The following sections examine the environmental impacts on air quality soil and water quality, biological resources, and human health that could result from the release of solid propellant and its combustion products into the environment. These impacts could be severe in the immediate vicinity of the mishap. However, the probability of a mishap being serious enough to cause severe impacts is very small.

Table 5.3.4-1

Summary of Mishap-Induced and Mishap-Free Risks
Over 20-Year Life of System[1]

Operational Phase	Total Fatalities: Radiological Latent Cancer	Total Fatalities: Nonradiological	Total Fatalities: Inherent Rail[2] Transport Risk
Initial Deployment			
Rail	N/A	0.0134	0.0311
Air	0.0004	N/A[3]	N/A
Maintenance and Flight Test			
Rail	N/A	0.2593	1.2019
Air	0.0044	N/A[3]	N/A
Training	N/A	N/A	1.4626
Strategic Dispersal[4]	0.0045	0.0531	0.1230

Operational Phase	Total Incapacitations and Genetic Effects: Radiological Genetic Effects	Total Incapacitations and Genetic Effects: Nonradiological Incapacitations	Total Incapacitations and Genetic Effects: Inherent Rail[2] Transport Injuries
Initial Deployment			
Rail	N/A	0.0826	0.1745
Air	0.0004	N/A[3]	N/A
Maintenance and Flight Test			
Rail	N/A	1.5986	5.4510
Air	0.0044	N/A[3]	N/A
Training	N/A	N/A	7.0633
Strategic Dispersal[4]	0.0045	0.3272	0.5940

Notes: [1]The values shown here are considered upper bound values because of conservative assumptions made in their calculations (see Section 5.2.1.7).
[2]The inherent rail transport risk is reported separately to allow comparison of the inherent risk with the additional risk from the hazardous materials.
[3]Data not sufficient and rate too low to calculate.
[4]Assumes 160,000 km (100,000 mi) of train dispersal.
N/A = not applicable.

Table 5.3.4-2

Comparison of Expected Fatalities from Various Activities

Mishap Type	Expected Annual U.S. Fatalities	Individual Risk per Year
Motor Vehicle Travel	55,000	1 in 4,000
Fires	7,500	1 in 25,000
Drowning	6,200	1 in 30,000
Air Travel (all civil)	1,800	1 in 100,000
Falling objects	1,300	1 in 160,000
Rail Travel	864	1 in 210,000
Lightning	160	1 in 1,300,000
Hurricanes	93	1 in 2,500,000
Tornadoes	91	1 in 2,500,000
Peacekeeper Rail Garrison[1] (all causes, including radiological)	0.335	1 in 700,000,000
Peacekeeper Rail Garrison[1] (latent cancer deaths due to radiation)	0.009	1 in 25,800,000,000

Note: [1]Assumes 100,000 miles of dispersal.

5.4.1.1 Consequence of Solid Propellant Explosion

Although the solid propellant stages will not ignite spontaneously, there is a remote possibility that a fire could ignite the solid missile stages, causing a pressure vessel explosion. This extremely unlikely event would be fatal to unprotected personnel within 180 feet and would cause severe lung hemorrhages and third degree burns to personnel as far as 280 feet. Debris, and burning and unburned propellant, could be scattered in a radius of 1,000 feet, and small secondary fires are possible. Within this 1,000-foot-radius, damage, injury or loss of life to personnel may occur. The effects of air overpressure (shock wave) would extend to approximately 2,900 feet from the mishap. Light structures (1- and 2-story wood-framed buildings such as houses) in the 400- to 1,000-foot-range would be in virtual collapse. From 1,000 feet to 1,800 feet, damage is progressively less severe. Structures within the 1,800- to 2,900-foot range would be subject to window breakage but would not be expected to receive other-structural damage. The primary dangers in the 1,800- to 2,900-foot range would be flying glass from broken windows and possible ear damage from overpressure. The environmental and human health effects of an explosion over varying distances are summarized in Table 5.4.1-1.

Intact RVs would likely be among the debris ejected by the explosion. Tests conducted by the DOE indicate that the possibility of the explosion rupturing any of the RVs is extremely remote.

A solid propellant explosion would result in the downwind dispersion of combined nitrogen dioxide (NO_2) and hydrogen chloride (HCl) gas. A concentration of 200 parts per million (ppm) might be experienced as far away as 2.6 kilometers (1.6 mi) and could be lethal to up to 50 percent of the exposed population. A concentration of 20 ppm could be experienced up to 9.5 kilometers (6 mi) from the source. People exposed to 20 ppm concentrations would be subject to a burning irritation of the eyes, nose, throat, and

Table 5.4.1-1

Environmental Effects of Peacekeeper Solid Propellant Explosion

Distance From Explosion	Environmental Effects
Less than 120 meters (400 ft)	Severe injury or loss of life due to overpressure, flying debris, and secondary fires. Possibility of fuels, lubricants, or firefighting chemicals running into local surface water, and migrating into groundwater.
120 to 300 meters (400-1,000 ft)	Total collapse of light structures, major damage to heavy structures due to overpressure. Chance of human injury or loss of life due to flying debris and secondary fires.
300 to 550 meters (1,000-1,800 ft)	Lesser damage to buildings, chance of human injury due to overpressure.
550 to 880 meters (1,800-2,900 ft)	Chance of damage to buildings due to overpressure, and chance of human injury due to flying glass.
880 to 5,100 meters (2,900 ft-1.6 mi)	NO_2 and HCl gas concentrations exceeding 200 ppm possible, causing potentially lethal exposures.
5,100 to 9,600 meters (1.6-6 mi)	NO_2 and HCl gas concentrations exceeding 20 ppm possible, causing dizziness, nausea, vomiting and fevers.
9.6 to 24 kilometers (6-15 mi)	NO_2 and HCl gas concentrations exceeding 2 ppm possible, causing irritation of eyes, nose, throat, and lungs.

lungs as well as dizziness, nausea, vomiting, and fevers. No life-threatening effects would be experienced at this or lesser concentrations. Concentrations of 2 ppm might occur as much as 30 km (18 mi) downwind. Persons exposed to 2 ppm concentrations might experience irritation of the eyes, nose, and throat.

5.4.1.2 Consequence of Burning Solid Propellant

The release of particles and vapors from a propellant fire results in a plume that rises to between 1,500 meters and 2,000 meters (4,900-6,600 ft) from the ground and spreads downwind. This plume is buoyant (lighter than air) and acts like smoke from a smokestack (i.e., it rises and carries the entrained particles aloft). At altitude, the buoyancy of the plume is offset by atmospheric factors (temperature, pressure, and density) that cause the plume to spread laterally. The major gas components of the cloud are hydrogen chloride, nitrogen oxides, and ozone, which are potentially toxic; however, the plume cloud disperses these gases at altitude sufficiently to entirely remove risk of serious harm. Other components include water, nitrogen, carbon monoxide, carbon dioxide, aluminum oxide, and hydrogen, which would be essentially harmless in the expected concentrations occurring at ground level. Hydrogen chloride and nitrogen oxide gas from burning propellant may react with and coat the aluminum oxide particles. These particles are transported downwind and gradually settle, causing vegetative spotting and minor acidification of surface water supplies. Rain could also scavenge residual hydrogen chloride and nitrogen oxides from the cloud, producing acid rain. Table 5.4.1-2 summarizes the environmental effects of a solid propellant burn.

Table 5.4.1-2

Environmental Effects of Peacekeeper Solid Propellant Burn

Distance From Mishap	Environmental Effects
Less than 1 km (0.6 mi)	Local damage and human injury or loss of life due to fire. Chance of fuels, lubricants, and firefighting chemicals running off into local surface water. Federal air quality standards exceeded for up to 30 minutes, causing irritation of eyes, throat, and skin. Chance of groundwater contamination by fuel, lubricant, or firefighting chemicals.
1 to 25 km (.6-15 mi)	Federal air quality standards exceeded for 30 minutes to 1 hour. Spotting of vegetation due to acid droplets. Irritation of the eyes, throat, and skin of exposed people and animals.
Greater than 25 km (15 mi)	Possible acid rain. Federal particulate standard exceeded for periods over 1 hour. No measurable human health effects.

Air Quality Impacts. The concentration of hazardous material particles in the centerline of the downwind plume was simulated by computer model. Concentrations at the ground level, and at various altitudes above the source, were calculated for various times after the initiation of the propellant burn. The total available propellant was calculated to be burned in less than six minutes.

Computer modeling was used to predict the downwind dispersion of particulates from a solid propellant burn. The first ground-level exceedance of EPA air quality standards for suspended particulates occurs 8 kilometers (5 mi) from the mishap 90 minutes after the initiation of the burn. Particulate ground-level concentrations exceed federal standards in an area 8 km (5 mi) to 25 km (15 mi) from the mishap at various times after the burn initiation. People could be exposed to particulate concentrations exceeding federal standards for periods of time greater than one hour.

Concentrations at ground level exceeding EPA standards are likely to occur at distances exceeding 25 km (15 mi); however, model predictions beyond 25 km are less accurate because of terrain-induced turbulence and dispersion. Particulate concentrations at 2,000 meters altitude indicate that a substantial quantity of the total particulate mass is entrained in the plume at 25 km (15 mi). Therefore, the downwind deposition of the particulates would occur over a broad area. Measurable concentrations might occur as far as 80 km (50 mi) downwind.

The nonparticulate (gaseous) constituents of the cloud would be dispersed by the plume and would create no significant impacts. It is likely that acidic vapors generated during the burn would coat the particles and be transported downwind. If the mishap occurs during fog, rain, or when temperatures are near the dew point, gaseous hydrogen chloride and nitrogen oxides could become chemically associated with water vapor, forming acid rain.

Soil and Water Quality Impacts. Minor surface water quality impacts may occur from the settling of aluminum oxide particles coated with acid and the fallout of hydrogen chloride and nitrogen oxide vapors from the cloud. Surface water and soil quality impacts from the exposed solid propellant are not expected, since it is essentially insoluble in water.

Potential impacts on groundwater resulting from the mishap are highly dependent on local surface, subsurface, and deep groundwater system characteristics. Minor impacts could result from the movement of motor fuel, lubricants, and fire-extinguishing chemicals into surface water or from the surface into shallow aquifers.

Biological Impacts. Minor adverse impacts on natural vegetation and animals could occur. Localized impacts on biota resulting from fire, fire-extinguishing chemicals, and mechanical cleanup are anticipated. Local biota may be affected from deposition of aluminum-oxide-borne acid. This can result in a range of effects including spotting of vegetative growth, plant mortality, and in a burning sensation in the eyes, throat, and skin for some animals.

Aquatic biological systems near the mishap could be affected by the deposition of hydrochloric and nitrous acid. Such impacts would be insignificant because of the very low concentrations of the acid.

Human Health Effects. The downwind particulate plume could result in human health impacts, at various time intervals, at locations from 10 km to 80 km (6 mi to 50 mi) from the mishap. Should the mishap coincide with outdoor human activities, persons exposed to the particulate could expect health effects, the severity of which would depend on the particulate concentration at the specific location, the length of exposure time, and other factors. The most severe human health effects of acid-coated particles include respiratory impairment; burning of eyes, throat, or nose; and skin irritation. No life-threatening or long-term effects are anticipated.

5.4.2 Mishaps Involving Liquid Propellants

The Peacekeeper missile system carries approximately 245 kilograms (kg) (540 lb) of monomethylhydrazine (MMH) and 400 kg (880 lb) of nitrogen tetroxide (N_2O_4). In a severe mishap, one or both of the fuel tanks could be cracked or punctured allowing the release of liquid fuels and fuel vapors. The process of a liquid fuel spill resembles that which occurs when an egg is cracked. Like the liquid contents of an egg, the fuel could flow out in about 5 minutes and form a pool. Evaporation of the spilled fuel would begin immediately and continue until the pool was gone, unless remedial action to recover and properly store the fuel takes place.

5.4.2.1 Consequences of Monomethylhydrazine (MMH) Spill

Air Quality Impacts. Localized adverse environmental impacts on air quality would occur after an MMH spill. Depending on the conditions of the system after the mishap, MMH spilled from the tank may form a vapor or be ignited. If an ignition source such as a diesel fuel fire, a spark, or iron rust catalyst is present, the MMH would burn. The concentration and areal extent of the vapor are dependent on the size of the leak, the wind speed and direction, relative humidity, difference between the pool temperature and ambient temperature, and vertical mixing height. The concentration of MMH at ground level in the interior portion of the plume lessens with time because of the lateral and vertical diffusion of the plume.

If all of the MMH is spilled, the pool should totally evaporate in approximately 48 minutes. The resulting vapor plume would drift downwind. The shape of the plume at 5 minutes through 180 minutes after release was simulated by computer model. For this study, the 0.2-ppm (0.35 milligram per cubic meter) American Conference of

Governmental Industrial Hygienists (ACGIH) limit for MMH was chosen to define the outer limit of concern. Model simulations demonstrate that for this mishap scenario, a person located along the centerline of the plume could be exposed to concentrations of MMH exceeding the 0.2-ppm 8-hour ACGIH recommendations. This exposure would not exceed 10 minutes at one location. The ACGIH recommendation is used to define the boundaries in which emergency evacuation would be recommended. Those persons closer to the origin of the spill would be exposed to greater concentrations than those farther from the origin, as the concentration of MMH would be reduced by turbulence, dispersion, and reactivity. After 180 minutes, the plume dissipates quickly, however, 0.2-ppm concentrations could occur as far as 14 miles (2.2 km) downwind. The human health effects of exposure to MMH are described below in this section.

An MMH fire would produce nitrogen oxides, ammonia, carbon dioxide, water, and unburned MMH. Since it is likely that a fire would involve more than just MMH, the rising hot exhaust cloud would be expected to contain other chemicals, particulates, and dust from the mishap site. The resultant downwind plume would resemble the plume described for the solid propellant burn, but would be smaller and at lower altitude. Any unburned MMH in the plume initially would react with other compounds and effectively reduce to zero concentration.

Soil and Water Quality Impacts. Although aqueous solutions of MMH have been shown to be toxic to biological resources, the amount involved in this scenario is not likely to result in concentrations high enough to have any long-term toxic effects. Although MMH could be released into surface water resources near the mishap site, the results of computer modeling indicate that a liquid pool of the propellant evaporates rapidly. Liquid MMH flowing away from the mishap forms a pool that is not expected to exceed an area of 25 square meters (270 sq ft). MMH could reach surface water resources if diluted with water during an emergency response to the mishap. If it is mixed with water, the rate of evaporation decreases due to dilution and chemical reactions within the aqueous solution.

Percolation of MMH fuel into the soil following a spill would be limited by the quantity present and the rapid evaporation rate predicted in the spill modeling. The spill might result in a small amount of MMH movement into the soil. Organic material in the soil reacts with MMH, breaking it down and effectively reducing the concentration of MMH. In addition, MMH continues to evaporate from the surface of the soil once the pool of liquid existing above the soil has evaporated. Because the MMH that does not evaporate strongly adheres to soil components, cleanup following a spill would require only the removal of topsoil.

Biological Impacts. A spill of MMH can be expected to kill or seriously damage vegetation in the area of the spill. Any resulting fire would kill grasses, herbs, shrubs, and small trees, and burn the trunks and lower branches of large trees. Impacts on vegetation outside the immediate spill or fire area are unlikely due to the limited quantity of MMH involved and the soil-adhering characteristics of this chemical.

Animals exposed to MMH vapor concentrations greater than 30 ppm could experience burning of eyes, skin, and respiratory tract, and possibly systemic effects, as described for humans in the following section. These concentrations would be limited to an area within 2,000 meters (6,560 ft) of the spill.

Human Health Effects. MMH is a strong irritant and may cause eye damage and respiratory tract inflammation. It can be absorbed through the skin, ingested, or inhaled. The Air Force has adopted a value of 30 ppm of MMH as its 30-minute short-term public exposure guidance level (SPEGL), as established by the National Academy of Sciences Committee of Toxicology. The SPEGL is a standard index of human exposure tolerance. Under certain wind and atmospheric stability conditions, combined with a rapid MMH evaporation rate, the 30-ppm level might be experienced as far downwind as 2,000 meters (6,560 ft).

People exposed to 30 ppm of MMH vapor might experience irritation of eyes, nose, throat, or lungs, as well as dizziness and nausea. Systemic effects at 30 ppm involve the central nervous system and cause tremors. If liquid MMH contacts the skin or eyes, it can cause severe local burns and dermatitis. In addition, it can penetrate skin causing systemic effects similar to those produced when MMH is inhaled. If inhaled, the vapor causes local irritation of the respiratory tract, followed by systemic effects. No life-threatening or long-term effects are anticipated at 30-ppm concentrations.

Peak concentrations of 1,920 ppm could be experienced as far as 100 meters (330 ft) downwind. Persons within 100 meters of the spill during the 5 minutes immediately following the spill could be subject to eye, skin, and upper respiratory tract damage, and possibly systemic effects (including liver and kidney damage and pulmonary edema) that could cause a mortality rate as high as 50 percent. Table 5.4.2-1 summarizes the environmental effects of an MMH spill.

Table 5.4.2-1

Environmental Effects of a Monomethylhydrazine Release

Distance From Mishap	Environmental Effects
Less than 100 meters (330 ft)	Destruction of local vegetation and contamination of soil requiring clean up. Short-term contamination of surface water if runoff occurs. Possible human injury or death if deflagration occurs. Chance of severe burns, convulsion, and danger to life for first 48 minutes when high concentrations of MMH may be contacted. Chance of fuel, lubricants, or firefighting chemical runoff into surface water and migrating into groundwater.
100 meters to 1,600 meters (330 ft-1 mi)	30-ppm SPEGL limit exceeded for up to 30 minutes causing irritation of eyes, nose, throat, and lungs; dizziness; nausea; and tremors.
Greater than 1,600 meters (Greater than 1 mi)	0.2-ppm ACGIH hydrazine limit exceeded creating "areas of concern" requiring evacuation of personnel. Chance of susceptible personnel located along centerline of plume exhibiting irritation of eyes, nose, throat, and lungs.

5.4.2.2 Consequences of Monomethylhydrazine Explosion

The MMH vapor is detonatable in concentrations of 2.5 percent to 97 percent. At a temperature of 20°C (68°F), the MMH saturation point is reached at a concentration of 4.7 percent in ambient air. To reach a concentration of 2.5 percent to 4.7 percent, leaking MMH would have to be contained by an enclosed space such as the missile launch car or the train alert shelter. If an ignition source is present in this environment, the vapor could detonate. A detonation of the magnitude expected from this scenario would immediately involve the solid propellants in the missile and the expected environmental effects would be similar to those described in Section 5.4.1, Incidents Involving Solid Propellants. Ignition of the MMH could also cause the nitrogen tetroxide (N_2O_4) tank to break, resulting in a fire which would involve the solid stages.

5.4.2.3 Consequences of Nitrogen Tetroxide Spill

Air Quality Impacts. Short-term adverse impacts on local air quality would occur immediately following a N_2O_4 spill. Although N_2O_4 is nonflammable by itself, it is an extremely strong oxidizing agent and facilitates spontaneous combustion with many materials including paper, cloth, leather, and wood.

If all the N_2O_4 in Stage IV were spilled, the entire amount would evaporate very rapidly as it was spilled. The resulting vapor plume would drift downwind from the mishap site. The value of the ACGIH 8-hour weighted average threshold limit is 3.0 ppm (6 mg/m^3) of N_2O_4 at 2 meters (approximately 6 ft) above ground level. The model indicates that the 3.0-ppm plume concentration can extend as far as 6 km (3.7 mi) downwind. Within 60 minutes, the plume would have dispersed both laterally and vertically and no exposures above 3 ppm would exist. The 30-minute SPEGL limit of 20 ppm could occur as much as 2,000 meters (6,560 ft) downwind from the source.

A fire induced by the N_2O_4 gas would involve whatever combustible materials are available at the mishap site. The rising hot exhaust cloud would contain chemicals, particulates, and dust from the mishap site along with water vapor, carbon dioxide, and nitrogen oxides that are produced by the fire. The downwind plume would be similar to that of the MMH fire.

Soil and Water Quality Impacts. Liquid N_2O_4 flowing from the Stage IV storage tank would vaporize immediately. Because the N_2O_4 evaporates so rapidly, the potential for water quality impacts is very low.

N_2O_4 is highly soluble and reactive with water. If N_2O_4 is released directly into surface water or if diluted with water during an emergency response to the mishap, the rate of evaporation would decrease thereby reducing the concentrations in the plume. The N_2O_4 reacts with the water forming nitric acid, which is both toxic and corrosive; and nitric oxide, which further reacts with the minerals in the water to form ionic nitrate and nitrite compounds such as sodium nitrate. Bound metals could also be released from the acidified contaminated water, therefore increasing its toxicity.

Liquid N_2O_4 reaching the soil near a mishap site would oxidize any organic material in the soil. As much as 8 square meters (86 sq ft) of topsoil could be affected. The high evaporation rate of N_2O_4 and its high reactivity with organic soil matter would also minimize percolation into the soil and its associated impact on groundwater resources. The potential for contamination of even shallow aquifers is virtually nonexistent.

Biological Impacts. The effects of N_2O_4 on local biotic systems could range from local disruptions to the death of local flora and fauna depending on the amount of N_2O_4 released. Animals and plants in the immediate spill area would be destroyed. Any resulting fire would kill any vegetation exposed to the fire. Animals exposed to high concentrations of vapor close to the spill would experience severe burns to the skin, eyes, and respiratory tract, and systemic effects similar to those described for humans in the following section.

Human Health Effects. Due to its corrosivity and toxicity N_2O_4, as both a liquid and vapor, is very dangerous. The SPEGL for N_2O_4 is 20 ppm (40 mg/m^3). Twenty-ppm concentrations might be experienced as much as 2,000 meters (6,560 ft) downwind. Persons exposed to 20- to 100-ppm concentrations of N_2O_4 would experience headaches, nausea, vomiting, and fevers. Exposure in excess of 100 ppm may cause severe burns, ulcers, and damage to eyes and mucous membranes. Peak concentrations of 200 ppm to 320 ppm could occur as much as 600 meters (2,000 ft) downwind of the spill. A hidden hazard of N_2O_4 exposure above the 200-ppm level is that discomfort or serious effects

are not always felt until several hours after exposure. This exposure level may produce systemic effects via the respiratory and cardiovascular systems, leading to a mortality rate of up to 50 percent. All persons within 600 meters of the spill area during the first 10 minutes following the mishap would be at severe risk. Table 5.4.2-2 summarizes the environmental effects of an N_2O_4 spill.

Table 5.4.2-2

Environmental Effects of a Nitrogen Tetroxide Release

Distance From Mishap	Environmental Effects
Less than 600 meters (650 yd)	Destruction of local vegetation. Contamination of surface water if spilled directly. High chance of fire. Severe burns and danger to life for first 10 minutes when high concentrations may be encountered.
600 meters to 2,000 meters (650 yd-1.2 mi)	20 ppm SPEGL exceeded for up to 20 minutes causing burns, ulcers, and damage to eyes and mucous membranes.
2,000 to 6,000 meters (1.2-3.7 mi)	3 ppm ACGIH limit exceeded for up to 40 minutes. Personnel along the centerline of the plume would experience irritation of skin, eyes, nose, throat, and lungs.

5.4.2.4 Combined MMH and Nitrogen Tetroxide Release

MMH and N_2O_4 ignite spontaneously on contact with each other. Any spill involving both chemicals would result in immediate burning of all the available liquid propellants. The resulting heat could involve the adjacent solid propellants and cause them to ignite or explode as described in Section 5.5.1, Incidents Involving Solid Propellants. The environmental impacts would then be similar to those described in Section 5.5.3, Combined Solid and Liquid Fuels Release.

5.4.3 Combined Solid and Liquid Fuels Release

There is a possibility that both the liquid and solid propellants could be released simultaneously in a mishap. It was assumed in this case that fire and/or explosion accompanies the mishap and results in complete involvement of the missile. Debris and fire would then spread over the area immediately surrounding the site.

Because of the small amount of liquid fuels available compared to solid fuel, the environmental impacts resulting from such a combined burn would be equivalent to the impacts previously described for the solid propellant, except that the contribution of the MMH and N_2O_4 moderately increases the toxicity of the burning propellant cloud. There is little potential for additional environmental impacts resulting from the combined propellants, their reaction products, or combustion products.

5.4.4 Incidents Involving Nuclear Materials

In a very severe mishap, there is an extremely remote chance that the radioactive materials in the warhead could be released. There is virtually no possibility of a nuclear detonation in any potential mishap.

In the context of this discussion, release refers to the escape of nuclear material that has been converted to aerosol form by the very high temperatures in a propellant fire, or material that has been scattered by an explosion of the solid propellant.

The environmental effects of the nuclear release scenario are to be interpreted as additive to the effects of the solid propellant or combined release scenario.

The radioactive materials in a nuclear weapon are encased in several layers of substances which provide substantial insulation and containment. Release of these radioactive materials would require the coincidence of several events, each of very low probability. It is possible, however, to construct an extremely improbable mishap scenario in which a damaged warhead would end up in or near a propellant fire, with the result that a portion of the materials in the warhead would be burned and dispersed into the atmosphere. Based on the tests, only a very small fraction of the nuclear material in a fire could be dispersed in particles small enough to be inhaled and lodged in the lungs. The rest would settle out in a relatively short distance and constitute environmental surface contamination.

A propellant explosion could also disperse nuclear material. The amount of radioactive material aerosolized in an explosion and the area of contamination is much less than would result from a propellant fire. Radioactive materials dispersed by an explosion create no significant long-term impacts as they are easily located and removed.

For radioactive particles to be dispersed, they must be entrained in the plume from the propellant fire or explosion and carried downwind. The forces of a derailment or collision alone would not be sufficient to cause a release of nuclear materials.

Contours generated by a computer model of surface radiation concentrations for a representative radioactive materials release were used to determine the areas affected by cleanup activities following a mishap. A surface concentration of 0.2 microcuries per square meter ($\mu Ci/m^2$) represents the EPA maximum allowable dose following cleanup. This concentration was chosen as the outer limit for surface exposure levels of concern. This is the average naturally-occurring background radiation level in the United States.

Contours of airborne radiation concentrations for the same radioactive material release were used to determine the mishap-induced risks as a result of respirable aerosolized radioactive materials. A concentration of 0.0165 microcuries per cubic meter ($\mu Ci/m^3$) was chosen as the outer limit for airborne exposure levels of concern. For comparison, the naturally-occurring background radiation in the United States is approximately 0.01 to 0.003 $\mu Ci/m^3$ for airborne radiation.

5.4.4.1 Consequences of Radiation Exposure

Soil and Water Quality Impacts. After a mishap, the radioactive material settling on the ground in concentrations greater than 0.2 $\mu Ci/m^2$ would be removed. As much as 20 sq km (8 sq mi) could be affected in this manner. The remaining radioactive material is relatively insoluble and binds readily with soils to effectively limit its spread to groundwater. These remaining traces would pose no significant health risk. Surface water runoff from contaminated soil prior to cleanup and the settlement of airborne radioactive particles on surface waters may pose a limited health risk to biota, depending on the amount and concentration of radioactive material reaching the surface waters.

Biological Impacts. A small portion of the dispersed radioactive materials may settle out and accumulate where vegetables, fruits, grains, and livestock feed are grown, as well as in water supplies. The food affected in this area would have to be removed and destroyed. However, since the predominant radioactive material (plutonium) is relatively insoluble, and the contamination insoluble, and the materials would be cleaned up following a mishap, the amount of plutonium eventually reaching humans through the food chain would be extremely small. No measurable human health effects would occur as a result of such ingestion.

Human Health Effects. Because of the large amount of fuel available to aerosolize the radioactive materials in a rail mishap, a small but negligible risk of latent cancer fatalities would exist as a result of the strategic deployment of Peacekeeper missiles. Table 5.4.4-1 summarizes the maximum latent cancer fatalities of a Peacekeeper Rail Garrison mishap that aerosolizes radioactive materials. Genetic effects of a similar magnitude are also predicted as a result of radiation exposure at the levels listed in this table.

Table 5.4.4-1

Maximum Expected Latent Cancer Fatalities Due to Aerosolized Radioactive Materials

Exposure Level $\mu Ci\text{-}s/m^3$	Latent Cancer Fatalities (per million people exposed)
0.003	0.01
0.01	0.04
0.03	0.1
0.1	0.4
0.3	1.0

5.4.5 Incidents Involving Diesel Fuel

Standard diesel engine oil and other train lubricants would be present on the trains. The two locomotives and the launch control car fuel tanks have a total capacity of 13,000 gallons of diesel fuel. When exposed to heat or flame, the fire and explosion hazard of diesel fuel is considered moderate. Diesel fuel must be moderately heated (80°-225°F) before ignition will occur.

If 13,000 gallons (approximately 92,000 pounds) of diesel fuel were spilled, a maximum spill area of approximately 4,900 square meters (70 m x 70 m with a 1 cm depth) could result. If the spill occurred on land, soil contamination and clean-up would be compounded by the characteristics of diesel fuel. The lighter components of the fuels would evaporate first, leaving a heavy organic residue mixed with soil that would need to be cleaned up.

Diesel fuel is much lighter than crude oil and it emulsifies rapidly in water. It is not soluble in nor reactive with water. Diesel fuel is readily absorbed by marine species. Health effects to biota in the vicinity of the diesel fuel spill would be similar to that of humans. Human ingestion could result in rapid absorption from the gastrointestinal tract, systemic effects, and possible aspiration into the lungs. Systemic effects include gastrointestinal irritation, vomiting, and diarrhea. Skin contact could produce irritation, infection, or dermatitis. Diesel fuel is not sufficiently volatile to constitute an acute inhalation hazard, although mucous membrane irritation could occur and inhalation of

high concentrations could produce headache, depression, and stupor. No life-threatening concentrations of diesel fuel in air are expected.

5.4.6 Summary of Environmental and Human Health Effects

Table 5.4.6-1 provides a summary of the environmental and human health effects, described in Sections 5.4.1 through 5.4.5, that could occur in the unlikely event that a mishap occurs and the even more unlikely event that the most severe release of hazardous materials results.

5.5 Mishap Response and Cleanup

The DOD nuclear weapon safety record is exceptionally good. In the last 20 years, there has been only one mishap involving a DOD nuclear weapon and no release of nuclear materials resulted from that mishap. That mishap is not representative of the current risk because it involved a Titan II missile which was all-liquid-fueled and very sensitive to abnormal environments compared to the Peacekeeper missile. There are no longer any all-liquid-fueled missiles in the Air Force inventory.

Even the most severe credible mishap involving a Peacekeeper missile or component would pose only a very small risk of release of nuclear materials or other human exposure to harmful radiation. Damage expected to result from a mishap involving a Peacekeeper train, missile, or component include that normally associated with rail and other modes of transportation, for example, crashes, collisions, and fire. The missile stages do contain propellants which are classified as high explosives, but they are relatively insensitive high explosives that can withstand much higher temperature, shock, crush, and other abnormal environments without igniting than many other chemicals routinely transported on the national rail network and highways.

5.5.1 Emergency Response

In 1980, as part of the Comprehensive Emergency Response, Compensation and Liability Act, Congress gave the President responsibility for formulating a National Contingency Plan (NCP) for the response to and cleanup of releases or substantial threats of releases of hazardous substances into the environment, and releases or substantial treats of releases of pollutants or contaminants which may present an imminent and substantial danger to public health or welfare. The President delegated this responsibility to the EPA in Executive Order 12316. The EPA published its NCP in 1985 in 40 CFR §300. The NCP provides for an efficient, coordinated, and effective response among federal agencies and local authorities, to releases of hazardous substances, pollutants and contaminants. The NCP is currently being reissued by the EPA to reflect the amendments of the Superfund Amendment and Reauthorization Act of 1986 and Executive Order 12580 (delegating those requirements).

DOD has been delegated by the President the authority to coordinate removal and other remedial action with respect to releases from any facility or vessel under DOD jurisdiction, custody or control. This authority must be carried out in accordance with the NCP. In addition, DOD is the removal response authority with respect to incidents involving DOD military weapons and munitions wherever they occur. Mishaps involving the Peacekeeper missile or any of its components which result in the release or the threat of release of hazardous substances, pollutants or contaminants will be handled in accordance with the Nuclear Accident Response Procedures (NARP) Manual formulated by the Defense Nuclear Agency. This manual outlines the requirements for reporting of response to and removal of any hazardous substance, pollutant or contaminant that is related to a nuclear weapon mishap. These procedures are based on the requirements and recommendations contained in the NCP. This manual has been adopted by the Air Force as Air Force Regulation 355-2.

Table 5.4.6-1

Summary of Potential Environmental Effects of Peacekeeper Rail Garrison Mishaps

Environmental Factor	Scenario			
	Solid-Propellant Burn (Combined Solid/Liquid-Propellant Burn)	Solid-Propellant Explosion	Liquid-Propellant Releases	Nuclear Material Release
Air Quality	Possible acidic precipitation downwind. Federal particulate standard exceeded.	Local toxic concentrations of NO_2 and HCl	Local toxic concentrations of MMH and nitrogen tetroxide.	
Biology	Downwind vegetative spottings and irritation of dermal and respiratory tissue in animals. Local damage as a result of fire.	Possible local injury/mortality caused by flying debris or secondary fires.	Tissue irritation to animals resulting from contact or inhalation of vapor. Biota destroyed within 600 meters of spill. Fire damage to vegetation.	Limited risk to biota.
Human Health and Safety	Mild irritation of respiratory system of susceptible individuals.	Possible local injury/mortality caused by flying debris, secondary fires, and overpressure.	Tissue irritation resulting from contact or inhalation of vapor. Systemic effects and death possible close to source.	Very small added risk of latent cancer fatality from exposure-related health factors to people near the mishap.
Soil and Water Quality	Chance of motor fuel, lubricant, and firefighting chemicals running off into local surface water and migrating into groundwater.	Chance of motor fuel, lubricant, and firefighting chemicals running off into local surface water and migrating into groundwater.	Chance of motor fuel, lubricant, and firefighting chemicals running off into local surface water and migrating into groundwater. Contamination of surface water possible if release is direct to water. Possible contamination requiring treatment of up to 25 square meters of soil in vicinity of mishap.	Possible surface contamination requiring treatment of up to 20 sq km of soil in the vicinity of mishap. Possible local contamination of surface water as a result of runoff.

If a mishap involving a Peacekeeper missile would occur, notification to the National Military Command Center and the Joint Nuclear Accident Coordinating Center (JNACC) would be made. Military and other federal agency response would be coordinated through JNACC under established procedures.

The initial phase of mishap response to a mishap involving a nuclear weapon would be mishap notification and immediate emergency measures taken by the nearest DOD installation to provide humanitarian support and a federal on-scene commander to coordinate response and to provide security for the weapon and other government property. The immediate response activities in which DOD personnel would respond include fire suppression, reconnaissance, rescue, treatment of casualties, and assessment of hazards to public health and safety.

Whenever special hazards may be present, the on-scene commander will notify and request assistance, as necessary, from appropriate agencies. Appropriate agencies include the Federal Emergency Management Agency (FEMA) for large-scale or potentially large-scale mishaps or disasters, the DOE for radioactive material risks, other DOD components for expertise and equipment, and Chemtrec for chemical shipments, fires, or other emergencies. Chemtrec is a service of the National Association of Chemical Manufacturers that consists of 24-hour chemical emergency information and advice available by toll-free telephone number.

In the event of an offbase mishap involving a nuclear weapon, or other classified components or materials, DOD control would be established under federal statute authorization for the military to create a National Defense Area (NDA). The NDA perimeter would be drawn to enclose the area likely to contain any nuclear weapon or other sensitive DOD property. A larger security perimeter would be established by local authorities to protect the public from risks such as fire, explosion, and radiation and to protect the mishap site from disturbance until investigation and cleanup were complete. Any necessary evacuation of the civilian population threatened by fire, explosives, or radiation would be done by local authorities with federal agency (e.g., FEMA) assistance, as appropriate. All response activities would be coordinated with local officials and agencies.

Mishap response and coordination procedures are described in the NARP manual. For planning purposes, the manual estimates that within 1 hour of notification of a mishap, an advance contamination survey party would be dispatched to the site; the balance of an initial response team including an on-scene commander, explosive ordnance disposal experts, medical personnel, and others as appropriate, would be designated; an initial "worst case" nuclear material dispersal plot (Atmospheric Release Advisory Capability) would be requested from Lawrence Livermore National Laboratories; and the DOE Accident Response Group, which includes scientific, medical, and technical experts in nuclear technology and hazards, the U.S. Army Radiological Medical Team, and other specialized teams would be alerted.

Upon their arrival, the initial response team would establish the NDA perimeter, if appropriate, and consult with local authorities regarding the extent of contamination, if any, and the need to cordon off contaminated areas, evacuate any population in potentially contaminated areas, identify any immediate hazards at the mishap site, evacuate any remaining casualties, set up additional downwind contamination monitoring stations, and make an initial press release.

The initial press release may or may not disclose the presence (or absence) of a nuclear weapon at the mishap site. It is DOD policy neither to admit or deny the presence of nuclear weapons at any specific location. However, the on-scene commander is authorized to make an exception to that policy when confirmation of presence of a nuclear weapon is necessary for public safety or when confirmation or denial is necessary to allay public fear. In the event of a severe mishap involving a nuclear weapon, it is likely that the first press release will confirm the presence of the weapon.

5.5.2 Cleanup Operations

If a mishap caused the release of radioactive material, the most significant risk would be from plutonium inhalation or ingestion (Section 5.2.2.3). Inhalation or ingestion of plutonium would result in exposure to harmful radiation. Other contact, for example, by plutonium "dust" on clothing, or even skin, results in contamination, but contamination by itself does not result in biological harm. Mishap response and cleanup is therefore planned to control the spread of contamination and prevent exposure.

If a release occurred, the limits of the contaminated area would be determined and access to the areas controlled. Decontamination stations would be set up to prevent any spread of the contamination by those who need to enter the area to recover mishap casualties and remove contaminated materials, and casualties would be decontaminated, if necessary, at the receiving hospital.

Remaining nuclear weapons, components, and debris, and other contaminated items would be removed as soon as practicable. When those items were removed, the NDA would be disestablished and DOD control in the area would terminate. However, the DOD involvement in cleanup would continue. Cleanup would be by recognized means, depending on the circumstances, including removing vegetation, scraping and removal of topsoil, and plowing.

DOD has adopted the policy that contamination resulting from mishaps will be reduced to a minimum practical level, and at least to a level which recognized scientific practice and knowledge indicate is required for current and reasonably projected uses of the contamination site. A criterion which will be considered in determining what must be done to restore the site is based on a DOE radiation dose standard for plutonium which results in a maximum lung dose of 1.5 rem per year. The criterion is that level of surface contamination which results in a concentration of plutonium in the air of 1×10^{-6} $\mu Ci/m^3$.

5.6 Impacts of Alternative Action

Should the Alternative Action of deploying 100 missiles be implemented, the total risk of deployment is expected to be slightly less than twice the 50-missile level of risk. The 100-missile risk will be less than double the 50-missile option because some operations, such as flight testing, will not increase with the deployment of more missiles.

Table 5.7-1

Summary of Risk of Deploying Peacekeeper Rail Garrison Over 20-Year Life of System by Operational Phase[1]

Operational Phase	Proposed Action (50 missiles) Total Fatalities: Radiological Latent Cancer	Nonradiological	Inherent Rail[2] Transport Risk
Initial Deployment			
Rail	N/A	0.0134	0.0311
Air	0.0004	N/A[3]	N/A
Maintenance and Flight Test			
Rail	N/A	0.2593	1.2019
Air	0.0044	N/A	N/A
Training	N/A	N/A	1.4626
Strategic Dispersal[4]	0.0045	0.0531	0.1230

Operational Phase	Total Incapacitations and Genetic Effects: Radiological Genetic Effects	Nonradiological Incapacitations	Inherent Rail[2] Transport Risk
Initial Deployment			
Rail	N/A	0.0826	0.1745
Air	0.0004	N/A[3]	N/A
Maintenance and Flight Test			
Rail	N/A	1.5986	5.4510
Air	0.0044	N/A	N/A
Training	N/A	N/A	7.0633
Strategic Dispersal[4]	0.0045	0.3272	0.5940

Operational Phase	Alternative Action (100 missiles) Total Fatalities: Radiological Latent Cancer	Nonradiological	Inherent Rail[2] Transport Risk
Initial Deployment			
Rail	N/A	0.0268	0.0622
Air	0.0008	N/A[3]	N/A
Maintenance and Flight Test			
Rail	N/A	0.3447	2.4038
Air	0.0088	N/A	N/A
Training	N/A	N/A	2.9252
Strategic Dispersal[4]	0.0090	0.1062	0.2460

Operational Phase	Total Incapacitations and Genetic Effects: Radiological Genetic Effects	Nonradiological Incapacitations	Inherent Rail[2] Transport Risk
Initial Deployment			
Rail	N/A	0.1652	0.3490
Air	0.0008	N/A[3]	N/A
Maintenance and Flight Test			
Rail	N/A	2.1250	10.9020
Air	0.0088	N/A	N/A
Training	N/A	N/A	14.1266
Strategic Dispersal[4]	0.0090	0.6544	1.1880

Notes:
[1] These values are considered upper bound values because of conservative assumptions made in their calculation.
[2] The inherent rail transport risk is reported separately to allow comparison of the inherent risk with the additional risk from the hazardous materials.
[3] Data is insufficient and the rate is too low to calculate.
[4] Assumes 160,000 km (100,000 mi) of train dispersal for 50 missiles; 320,000 km (200,000 mi) of dispersal for 100 missiles.
N/A = Not applicable

5.7 Conclusions

The chance of a mishap during the life of the Peacekeeper Rail Garrison system is extremely remote. The chance that any mishap would be severe enough to cause any serious consequences is even more remote. The total risk of deploying 50 or 100 missiles on Peacekeeper trains is summarized in Table 5.7-1. It is clear from the small fractional values shown in Table 5.7-1 that the total risk of deploying Peacekeeper missiles in rail garrisons is negligible.

6.0 FEDERAL ACTIONS

Table 6.0-1 provides a list of federal actions that may be required for the Peacekeeper Rail Garrison program.

Table 6.0-1

Federal Actions, Peacekeeper Rail Garrison Program

Action	Typical Activity of Facility That May Require the Action	Regulatory Action	Authority
Free-Use Permit	Quarries or borrow pits on public lands.	U.S. Department of the Interior, Bureau of Land Management	Materials Act of 1947, 30 USC §601 et seq.
Section 106 Consultation and Comment	Program activities that affect properties with historic, architectural, or cultural value which are listed or eligible for listing in the National Register of Historic Places.	Advisory Council on Historic Preservation	National Historic Preservation Act of 1966, 16 USC §470 et seq.
Consultation	Program activities that affect Native American religious and/or heritage practices and sites.	Native American religious leaders	American Indian Religious Freedom Act 42 USC §1996
Permit to Survey, Excavate, Analyze, and Curate Archaeological Resources	Program activities that affect cultural resources.	U.S. Department of the Interior, National Park Service	Archaeological Resources Protection Act, 16 USC §470 aa et seq.
Cooperative Agreement for Construction and Operation on Historic Trails	Program actions that affect historic trails.	U.S. Department of the Interior, National Park Service	National Trails System Act, 16 USC §1241 et seq.
Section 7 Consultation on Threatened and Endangered Species	Activities and facilities that may affect threatened or endangered species or their critical habitat.	U.S. Department of the Interior, Fish and Wildlife Service	Endangered Species Act, 16 USC §1531 et seq.
Consultation on Effects on Fish and Wildlife	Modification, control, or impoundment of a surface water body over 4 hectares.	U.S. Department of the Interior, Fish and Wildlife Service	Fish and Wildlife Coordination Act, 16 USC §661 et seq.
Section 404 (Dredge and Fill) Permit, Consultation	Discharge of dredged or fill material into waters of the United States or new program facilities which would occur in streams and wetlands.	U.S. Army Corps of Engineers, in consultation with U.S. Environmental Protection Agency	Federal Water Pollution Control Act of 1972, 33 USC §1344
Section 10 Permit	Construction of structures such as impoundments, bridge improvements, and program facilities in or over any navigable water.	U.S. Army Corps of Engineers, in consultation with U.S. Environmental Protection Agency	Rivers and Harbors Act of 1899, 33 USC §403

7.0 LIST OF PREPARERS

Pedro Alvarez, Staff Engineer, Tetra Tech, Inc.
B.S., 1982, Civil Engineering, McGill University, Montreal, Canada
Years of Experience: 4

Aditi Angirasa, Senior Economist, Tetra Tech, Inc.
B.A., 1962, Economics, Punjab University, India
M.S., 1973, Economics, California State Polytechnic University, Pomona
M.S., 1975, Agricultural Economics, University of California, Davis
Ph.D., 1979 Agricultural Economics, Texas A&M University, College Station
Years of Experience: 10

Patrick Areffi, Information Services Group Manager, Tetra Tech, Inc.
B.A., 1964, History, University of Miami, Coral Gables, Florida
M.S., 1979, Management, Troy State University, Alabama
Years of Experience: 2

Randall Arnold, Staff Biologist, Tetra Tech, Inc.
B.S., 1974, Zoology, Texas Tech University, Lubbock
M.S., 1979, Biology, Western Washington University, Bellingham
Years of Experience: 9

Edward R. Bailey, Staff Planner, Tetra Tech, Inc.
B.S., 1980, Environmental Science, University of California, Riverside
M.A., 1983, Environmental Administration, University of California, Riverside
Years of Experience: 6

Mary Bryngelson, Senior Analyst, Tetra Tech, Inc.
B.A., 1970, Mathematics, University of North Dakota, Grand Forks
M.Ed., 1976, Educational Statistics and Research, University of North Dakota, Grand Forks
Ph.D., 1980, Institutional Research, Florida State University, Tallahassee
Years of Experience: 12

Gerald Budlong, Land Use Planner, Tetra Tech, Inc.
B.A., 1969, Geography, California State University, Northridge
M.A., 1971, Geography, California State University, Chico
Years of Experience: 15

Susan L. Bupp, Archaeologist, Tetra Tech, Inc.
B.A., 1977, Anthropology, Wichita State University, Kansas
M.A., 1981, Anthropology, University of Wyoming, Laramie
Years of Experience: 12

David Carmichael, Senior Archaeologist, Tetra Tech, Inc.
B.A., 1974, Anthropology, University of New Mexico, Albuquerque
M.A., 1976, Anthropology, University of Illinois, Urbana
Ph.D., 1983, Anthropology, University of Illinois, Urbana
Years of Experience: 14

Jenny Carson, Technical Editor, Tetra Tech, Inc.
B.A., 1978, History, California State University, Fullerton
Years of Experience: 3

Diana Christensen, Archaeologist, Tetra Tech, Inc.
B.S., 1978, Prehistoric Archaeology, Brigham Young University, Provo, Utah
M.A., 1980, Prehistoric Archaeology, Brigham Young University, Provo, Utah
Years of Experience: 13

Diane Concannon, Staff Biologist, Tetra Tech, Inc.
B.A., 1975, Biology, Humboldt State University, Arcata, California
M.S., 1978, Natural Resources, Humboldt State University, Arcata, California
Years of Experience: 9

David M. Dischner, Senior Utilities Planner, Tetra Tech, Inc.
B.A., 1974, Urban Affairs, Virginia Polytechnic Institute, Blacksburg
Years of Experience: 14

Thomas Fahy, Planner, U.S. Air Force, AFRCE BMS/DEVE
B.S., 1951, Geology, California Institute of Technology, Pasadena
Years of Experience: 37

Julie Fegley, Captain, Attorney, U.S. Air Force, AFRCE-BMS/DEVE
B.A., 1977, Psychology and English, University of Richmond, Virginia
J.D., 1982, Law, Emory University, Atlanta, Georgia
Years of Experience: 5

Matthew Gabriel, Scientist, Information Systems, Tetra Tech, Inc.
B.S., 1986, Geology, University of New Mexico, Albuquerque
Years of Experience: 3

Paul D. Garcia, Senior Transportation Planner, Tetra Tech, Inc.
B.S., 1967, Civil Engineering, New Mexico State University, Las Cruces
M.S., 1986, Management, Abilene Christian University, Texas
Years of Experience: 20

John A. Gill, Wildlife Biologist, U.S. Air Force, AFRCE-BMS/DEVE
B.S., 1967, Wildlife Management, Oregon State University, Corvallis
M.S., 1969, Wildlife Management, Oregon State University, Corvallis
Years of Experience: 16

Christine Gonzalez, Associate Geologist, Tetra Tech, Inc.
B.S., 1985, Geology, University of California, Riverside
Years of Experience: 1

Patricia Haldorsen, Senior Technical Editor, Tetra Tech, Inc.
B.A., 1982, English Literature, California State University, San Bernardino
Years of Experience: 5

Richard L. Harris, Senior Environmental Scientist, Tetra Tech, Inc.
B.S., 1971, Chemistry, State University of New York, Stony Brook
Ph.D., 1976, Environmental Chemistry, University of Maryland, College Park
Years of Experience: 12

Lydia Henry, Technical Editor, Tetra Tech, Inc.
B.S., 1983, Agronomy, Northeast Missouri State University, Kirksville
Years of Experience: 1

Frederick S. Hickman, Principal Social Scientist, Tetra Tech, Inc.
B.A., 1966, Economics, Drew University, Madison, New Jersey
M.S., 1974, Economics, Rutgers-the State University, New Brunswick, New Jersey
Years of Experience: 18

James L. Iken, Captain, U.S. Air Force, AFRCE-BMS/DEVE
B.Arch., 1978, Architecture, North Dakota State University, Fargo, North Dakota
M.BA., 1983, Operations Management, Boston University, Massachusetts
Years of Experience: 10

Dennis M. Iwata, Environmental Engineer, AFRCE-BMS/DEVE
B.S., 1972, Landscape Architecture, California State Polytechnic University, Pomona
Years of Experience: 15

Manuel C. Jabson III, Transportation Engineer, Tetra Tech, Inc.
B.S., 1973, Civil Engineering, University of the Philippines, Manila
M.S., 1976, Highway Engineering, Birmingham University, England
Years of Experience: 10

Jane King, Staff Archaeologist/Historian, Tetra Tech, Inc.
B.A., 1977, Anthropology, University of Colorado, Denver
M.A., 1980, Social Sciences (Archaeology, History, Geography), University of Colorado, Denver
Years of Experience: 14

Richard J. Kramer, Principal Physical Scientist, Tetra Tech, Inc.
B.A., 1960, Biology, St. John's University, Collegeville, Minnesota
M.S., 1962, Plant Ecology, Arizona State University, Tempe
Ph.D., 1968, Plant Ecology/Physical Environment, Rutgers-the State University, New Brunswick, New Jersey
Years of Experience: 27

Elizabeth L. Lanzer, Geographic Information System Operations Supervisor, Tetra Tech, Inc.
B.A., 1982, Political Science, University of California, Santa Barbara
M.A., 1984, Administration, University of California, Riverside
Years of Experience: 4

Erich R. Lathers, Economist, Tetra Tech, Inc.
B.A., 1984, Management Science, University of California, San Diego
Years of Experience: 6

William R. Livingstone, Principal Land Use Planner, Robert D. Niehaus, Inc.
B.A., 1950, Architecture, University of Southern California, Los Angeles
M.S., 1966, Urban and Regional Planning, University of Southern California, Los Angeles
Years of Experience: 30

Keith A. Lusk, Economist, Tetra Tech, Inc.
B.A., 1983, Economics, San Diego State University, California
M.A., 1985, Economics, State University of New York, Binghamton
Years of Experience: 2

William Magdych, Senior Biologist, Tetra Tech, Inc.
B.S., 1975, Biology, Youngstown State University, Ohio
M.S., 1978, Zoology, University of Oklahoma, Norman
Ph.D., 1982, Zoology, University of Oklahoma, Norman
Years of Experience: 11

David H. Maharrey, Jr., Lieutenant, U.S. Air Force, AFRCE-BMS/DEVE
B.S., 1986, Civil Engineering, U.S. Air Force Academy, Colorado Springs, Colorado
Years of Experience: 3

Roger D. Mason, Staff Archaeologist, Tetra Tech, Inc.
B.A., 1971, Anthropology, University of Washington, Seattle
Ph.D., 1980, Anthropology, University of Texas, Austin
Years of Experience: 15

Raj Mathur, Associate Director, Tetra Tech, Inc.
B.A., 1957, Geography, Punjab University, India
M.A., 1960, Economics, Punjab University, India
Ph.D., 1972, Geography, University of Minnesota, Minneapolis
Years of Experience: 27

Jay McCain, Attorney-Advisor, AFRCE-BMS/DES
B.A., 1965, Chemistry, University of Washington, Seattle
J.D., 1977, University of Puget Sound, Tacoma
Years of Experience: 11

David A. McPhee, Deputy Director, Environmental Planning Division, AFRCE-BMS/DEVE
B.S., 1970, Aeronautical Engineering, San Jose State College, California
Years of Experience: 16

Leo Montroy, Associate Director, Tetra Tech, Inc.
B.S., 1969, Biology/Chemistry, University of Windsor, Ontario, Canada
Ph.D., 1973, Ecology, University of Notre Dame, South Bend, Indiana
Years of Experience: 16

William B. Moreland, Senior Scientist, Air Quality, Tetra Tech, Inc.
B.A., 1948, Meteorology, University of California, Los Angeles
M.A., 1953, Meteorology, University of California, Los Angeles
Years of Experience: 40

Tony Morgan, Senior Geologist, Tetra Tech, Inc.
B.S., 1979, Geology, Indiana University, Indianapolis
M.A., 1984, Geology, Indiana University, Bloomington
Years of Experience: 9

Fred S. Nicoloff, Senior Systems Analyst/Programmer, Tetra Tech, Inc.
B.A., 1976, Psychology, University of Central Florida, Orlando
M.A., 1981, Experimental Psychology, University of South Florida, Tampa
A.A.S., 1983, Information Processing, Riverside City College, Riverside, California
Years of Experience: 12

Robert Niehaus, Principal Economist, Robert D. Niehaus, Inc.
B.A., 1972, Government, Oberlin College, Ohio
Ph.D., 1979, Economics, University of Maryland, College Park
Years of Experience: 15

Paul U. Pawlik, Economist, U.S. Air Force, AFRCE-BMS/DEVE
B.A., 1965, Business Administration, North Central College, Naperville, Illinois
M.A., 1967, Economics, Roosevelt University, Chicago, Illinois
Ph.D., 1972, Economics, University of Arizona, Tucson
Years of Experience: 19

Anantaramam Peddada, Staff Atmospheric Scientist, Tetra Tech, Inc.
B.S., 1961, Geology, Government Arts College, Rajahmundry, India
M.S., 1963, Geology, Andhra University, Waltair, India
M.S., 1972, Geology, State University of New York, Albany
M.S., 1979, Urban Environmental Studies, Rensselaer Polytechnic Institute, Troy, New York
Years of Experience: 15

Richard R. Reinecke, Staff Engineer, Honeywell Space and Strategic Avionics Division
B.S., 1951, Physics, Loyola University, New Orleans, Louisiana
M.S., 1952, Physics, Vanderbilt University, Nashville, Tennessee
Years of Experience: 24

Raymond Rodrigue, Vice President, Tetra Tech, Inc.
B.S., 1963, Engineering, University of Southern California, Los Angeles
M.S., 1965, Civil Engineering, University of Southern California, Los Angeles
Ph.D., 1969, Civil Engineering, University of Southern California, Los Angeles
Years of Experience: 26

Ken Rolf, Jr., Assistant Geographic Information Systems Specialist, Tetra Tech, Inc.
B.A., 1977, Geography/Business Administration, California State University, San Bernardino
M.A., 1985, Geography, California State University, Hayward
Years of Experience: 8

John R. Sabol, Civil Engineer, U.S. Air Force, AFRCE-BMS/DEVE
B.S., 1958, Civil Engineering, Lafayette College, Easton, Pennsylvania
J.D., 1972, Western State University, College of Law, Anaheim, California
Graduated 1982, Air War College, Air Force University, Maxwell Air Force Base, Alabama
Years of Experience: 34

Janet St. Amant, Quality Control Coordinator, Tetra Tech, Inc.
Years of Experience: 15

Scott Strathouse, Senior Geologist, Tetra Tech, Inc.
B.A., 1974, Geology, Sonoma State University, California
M.S., 1978, Soil Science, University of California, Riverside
Ph.D., 1982, Soil Science, University of California, Riverside
Years of Experience: 14

Peter Sturtevant, Senior Water Resources Scientist, Tetra Tech, Inc.
B.S., 1971, Biology, University of California, San Diego
M.S., 1974, Aquatic Ecology, University of Washington, Seattle
Years of Experience: 14

Carl R. Swartz, Principal Scientist, Tetra Tech, Inc.
B.A., 1942, Business Administration, Chico State College, California
M.A., 1947, Economics, University of Nevada, Reno
Sc.D., 1953, Economics, University of Paris, France
Years of Experience: 31

Sheryl Thierry, Word Processing Supervisor, Tetra Tech, Inc.
Years of Experience: 6

Patricia A. Turnham, Publications Manager, Tetra Tech, Inc.
A.A., 1974, Business Administration, Orange County Community College, Middletown, New York
Years of Experience: 14

James G. Van Ness, Major, U.S. Air Force, Attorney, AFRCE-BMS/DES
B.S., 1971, Distributed Studies, Iowa State University, Ames
J.D., 1974, University of Iowa School of Law, Iowa City
LL.M., 1984, Law and Marine Affairs, University of Washington School of Law, Seattle
Years of Experience: 13

Thomas J. Villeneuve, Utilities Planner, Tetra Tech, Inc.
B.S., 1987, Construction Management, Montana State University, Bozeman
Years of Experience: 1

Jeff Vitucci, Senior Economist, Robert D. Niehaus, Inc.
B.A., 1974, Environmental Studies, California State University, San Jose
M.A., 1979, Economics, University of California, Santa Barbara
Years of Experience: 9

Peter Walsh, Lieutenant Colonel, U.S. Air Force, Director of Environmental Planning, AFRCE-BMS/DEV
B.S., 1967, Engineering, San Diego State University, California
M.S., 1968, Civil Engineering, Texas A&M University, College Station, Texas
M.BA., 1981, Auburn University, Montgomery, Alabama
Years of Experience: 20

Lawrence J. Watson, Program Director, Tetra Tech, Inc.
B.Ed., 1960, Science Education, Chicago State University, Illinois
M.A., 1967, Physical Geography (Climatology), Chicago State University, Illinois
Ph.D., 1975, Biogeography and Remote Sensing, University of Oklahoma, Norman
Years of Experience: 19

Jeff Whitman, Staff Programmer, Tetra Tech, Inc.
A.A., 1980, General Education, Mount San Antonio College, Walnut, California
Years of Experience: 4

Wayne Wier, Senior Systems Analyst, Tetra Tech, Inc.
B.A., 1967, Mathematics, University of California, Los Angeles
Years of Experience: 20

Clyde Williams, Graphics Supervisor, Tetra Tech, Inc.
Years of Experience: 13

Diana M. Woods, Biologist, Tetra Tech, Inc.
B.A., 1980, Biology, University of New Orleans, Louisiana
M.S., 1987, Geology, Tulane University, New Orleans, Louisiana
Years of Experience: 6

8.0 LIST OF RECIPIENTS

8.1 Elected Officials

8.1.1 U.S. Senate

Honorable Brock Adams (Spokane, Washington)
Honorable Max Baucus (Great Falls, Montana)
Honorable Lloyd Bentsen (Austin, Texas)
Honorable Christopher Bond (Jefferson City, Missouri)
Honorable John B. Breaux (New Orleans, Louisiana)
Honorable Dale Bumpers (Little Rock, Arkansas)
Honorable Quentin Burdick (Fargo, North Dakota)
Honorable Kent Conrad (Bismarck, North Dakota)
Honorable John C. Danforth (Jefferson City, Missouri)
Honorable Daniel J. Evans (Spokane, Washington)
Honorable Phil Gramm (Dallas, Texas)
Honorable J. Bennett Johnson (Shreveport, Louisiana)
Honorable Carl M. Levin (Detroit, Michigan)
Honorable John Melcher (Great Falls, Montana)
Honorable David Pryor (Little Rock, Arkansas)
Honorable Donald W. Riegle, Jr. (Detroit, Michigan)
Honorable Alan K. Simpson (Cheyenne, Wyoming)
Honorable Malcolm Wallop (Cheyenne, Wyoming)

8.1.2 U.S. House of Representatives

Honorable William Alexander (Jonesboro, Arkansas)
Honorable Dick Cheney (Cheyenne, Wyoming)
Honorable Robert W. Davis (Alpena, Michigan)
Honorable Byron L. Dorgan (Bismarck, North Dakota)
Honorable Thomas S. Foley (Spokane, Washington)
Honorable Ron Marlenee (Great Falls, Montana)
Honorable John McCrery (Shreveport, Louisiana)
Honorable Tommy F. Robinson (Little Rock, Arkansas)
Honorable Ike Skelton (Sedalia, Missouri)
Honorable Charles W. Stenholm (Abilene, Texas)
Honorable Pat Williams (Helena, Montana)

8.1.3 State Officials

Governors

Honorable John D. Ashcroft (Jefferson City, Missouri)
Honorable James J. Blanchard (Lansing, Michigan)
Honorable William P. Clements, Jr. (Austin, Texas)
Honorable Bill Clinton (Little Rock, Arkansas)
Honorable Booth Gardner (Olympia, Washington)
Honorable Charles Roemer III (Baton Rouge, Louisiana)
Honorable Ted Schwinden (Helena, Montana)
Honorable George A. Sinner (Bismarck, North Dakota)
Honorable Michael J. Sullivan (Cheyenne, Wyoming)

Senate

Honorable Michael R. Bearden (Osceola, Arkansas)
Honorable Connie Binsfield (Lansing, Michigan)
Honorable Foster L. Campbell (Bossier City, Louisiana)

Honorable Harold L. Caskey (Jefferson City, Missouri)
Honorable Win Hickey (Cheyenne, Wyoming)
Honorable Ray Holmberg (Grand Forks, North Dakota)
Honorable Max Howell (Little Rock, Arkansas)
Honorable Jack Ingstad (Grand Forks, North Dakota)
Honorable Grant Jones (Abilene, Texas)
Honorable James L. Mathewson (Jefferson City, Missouri)
Honorable James Maxson (Minot, North Dakota)
Honorable J.W. Norris (Cheyenne, Wyoming)
Honorable Rolland W. Redlin (Minot, North Dakota)
Honorable Chester Reiten (Minot, North Dakota)
Honorable Gerald L. Saling (Spokane, Washington)
Honorable L.W. Schoenwald (Minot, North Dakota)
Honorable Gene Thayer (Great Falls, Montana)
Honorable James E. West (Spokane, Washington)
Honorable Alvin Wiederspahn (Cheyenne, Wyoming)

House of Representatives

Honorable Robert Adley (Bossier City, Louisiana)
Honorable Tom Alley (Lansing, Michigan)
Honorable Lynn Birleffi (Cheyenne, Wyoming)
Honorable Harriet Bryd (Cheyenne, Wyoming)
Honorable Gary D. Bumgarner (Spokane, Washington)
Honorable Guy Cameron (Cheyenne, Wyoming)
Honorable Walter M. Day (Blytheville, Arkansas)
Honorable Judy L. DeMers (Grand Forks, North Dakota)
Honorable Lynn Dickey (Sheridan, Wyoming)
Honorable Steven F. Fruedenthal (Cheyenne, Wyoming)
Honorable Art Givens (Sherwood, Arkansas)
Honorable Brynhild Haugland (Minot, North Dakota)
Honorable Shirley J. Humphrey (Cheyenne, Wyoming)
Honorable Robert Hunter (Abilene, Texas)
Honorable Tom Kuchera (Grand Forks, North Dakota)
Honorable Gene Lang (Jefferson City, Missouri)
Honorable Thomas Lautenschlager (Minot, North Dakota)
Honorable Cynthia M. Lummis (Cheyenne, Wyoming)
Honorable Bill McIlvain (Cheyenne, Wyoming)
Honorable Billy Montgomery (Haughton, Louisiana)
Honorable John A. Moyer (Spokane, Washington)
Honorable Jim Peterson (Minot, North Dakota)
Honorable Paul Pistoria (Great Falls, Montana)
Honorable John Pridnia (Lansing, Michigan)
Honorable Mary Kay Schwape (Cheyenne, Wyoming)
Honorable Grant Shaft (Grand Forks, North Dakota)
Honorable Jean Silver (Spokane, Washington)
Honorable Todd Smith (Jefferson City, Missouri)
Honorable Duane Sommers (Spokane, Washington)
Honorable Art Sour (Shreveport, Louisiana)
Honorable Earl Strinden (Grand Forks, North Dakota)
Honorable Ben Tollefson (Minot, North Dakota)
Honorable Michael K. Wilson (Jacksonville, Arkansas)
Honorable Doug Wood (Sherwood, Arkansas)
Honorable Gary Yordy (Cheyenne, Wyoming)

8.1.4 Local Officials

Barksdale Air Force Base, Louisiana
Caddo Parish Commission
Mayor (Bossier City)
Mayor (Haughton)
Mayor (Mansfield)
Mayor (Plain Dealing)
Mayor (Shreveport)
Superintendent of Schools (Benton)

Dyess Air Force Base, Texas

Mayor (Abilene)
Superintendent of Schools (Abilene)

Eaker Air Force Base, Arkansas

Mayor (Blytheville)
Mayor (Burdette)
Mayor (Gosnell)
Mayor (Luxora)
Mayor (Osceola)
Mayor (Wilson)
City Administrator (Blytheville)
Superintendent of Schools (Blytheville)
Superintendent of Schools (Gosnell)

Fairchild Air Force Base, Washington

Spokane County Board of Commissioners
Mayor (Medical Lake)
Mayor (Spokane)
City Administrator (Medical Lake)
City Manager (Spokane)
Superintendent of Schools (Medical Lake)

Grand Forks Air Force Base, North Dakota

Grand Forks County Board of Commissioners
Mayor (Grand Forks)
Superintendent of Schools (Grand Forks)

Little Rock Air Force Base, Arkansas

Mayor (Jacksonville)
Mayor (Sherwood)
Superintendent of Schools (Little Rock)
Superintendent of Schools (North Little Rock)

Malmstrom Air Force Base, Montana

Cascade County Board of Commissioners
Mayor (Great Falls)
City Manager (Great Falls)
Superintendent of Schools (Great Falls)

Minot Air Force Base, North Dakota

Ward County Board of Commissioners
Mayor (Minot)
City Manager (Minot)
Superintendent of Schools (Minot)

F.E. Warren Air Force Base, Wyoming

Laramie County Board of Commissioners
Mayor (Cheyenne)
Superintendent of Schools (Cheyenne)

Whiteman Air Force Base, Missouri

Johnson County Board of Commissioners
Pettis County Board of Commissioners
Mayor (Concordia)
Mayor (Knob Noster)
Mayor (Sedalia)
Mayor (Steele)
Mayor (Warrensburg)
Mayor (Windsor)
City Administrator (Knob Noster)
City Administrator (Sedalia)
City Manager (Warrensburg)
Superintendent of Schools (Knob Noster)
Superintendent of Schools (Warrensburg)

Wurtsmith Air Force Base, Michigan

Alcona County Board of Commissioners
Iosco County Board of Commissioners
Mayor (East Tawas)
Mayor (Tawas City)
City Manager (East Tawas)
City Manager (Tawas City)
Township Supervisor (Oscoda)
Superintendent of Schools (East Tawas)
Superintendent of Schools (Oscoda)

8.2 Public Agencies

8.2.1 Federal Agencies

Advisory Council on Historic Preservation (Golden, Colorado)
U.S. Environmental Protection Agency (Chicago, Illinois)
U.S. Environmental Protection Agency (Dallas, Texas)
U.S. Environmental Protection Agency (Denver, Colorado)
U.S. Environmental Protection Agency (Helena, Montana)
U.S. Environmental Protection Agency (Kansas City, Kansas)
U.S. Environmental Protection Agency (Seattle, Washington)
U.S. Environmental Protection Agency (Washington, DC)
U.S. Department of the Interior, Office of Environmental Project Review (Washington, DC)

8.2.2 State Agencies

Department of Commerce (Lansing, Michigan)
Department of Community Development (Olympia, Washington)
Intergovernmental Review Clearinghouse (Helena, Montana)
Missouri Federal Assistance Clearinghouse (Jefferson City, Missouri)
Office of Intergovernmental Assistance (Bismarck, North Dakota)
State Building Coordinator (Cheyenne, Wyoming)
State Clearinghouse (Little Rock, Arkansas)
State Clearinghouse (Baton Rouge, Louisiana)
State Planning (Austin, Texas)

8.2.3 State Historic Preservation Offices

Arkansas State Historic Preservation Office (Little Rock, Arkansas)
Louisiana State Historic Preservation Office (Baton Rouge, Louisiana)
Michigan State Historic Preservation Office (Lansing, Michigan)
Missouri State Historic Preservation Office (Jefferson City, Missouri)
Montana State Historic Preservation Office (Helena, Montana)
North Dakota State Historic Preservation Office (Bismarck, North Dakota)
Texas State Historic Preservation Office (Austin, Texas)
Washington State Historic Preservation Office (Olympia, Washington)
Wyoming State Historic Preservation Office (Cheyenne, Wyoming)

8.2.4 Libraries

Abilene Public Library (Abilene, Texas)
Arkansas State Library (Little Rock, Arkansas)
Blytheville Public Library (Blytheville, Arkansas)
Bossier Parish Public Library (Bossier City, Louisiana)
East Tawas City Public Library (East Tawas City, Michigan)
Grand Forks Public Library (Grand Forks, North Dakota)
Great Falls Public Library (Great Falls, Montana)
Jacksonville Public Library (Jacksonville, Arkansas)
Laramie County Library System (Cheyenne, Wyoming)
Louisiana State Library (Baton Rouge, Louisiana)
Medical Lake Public Library (Medical Lake, Washington)
Michigan State Library (Lansing, Michigan)
Minot Public Library (Minot, North Dakota)
Missouri State Library (Jefferson City, Missouri)
Montana State Library (Helena, Montana)
North Dakota State Library (Bismarck, North Dakota)
Oscoda Township Library (Oscoda, Michigan)
Shreveport Memorial Library (Shreveport, Louisiana)
Spokane Public Library (Spokane, Washington)
Tawas City Public Library (Tawas City, Michigan)
Texas State Library (Austin, Texas)
Trails Regional Library (Knob Noster, Missouri)
Trails Regional Library (Warrensburg, Missouri)
Washington State Library (Olympia, Washington)
Wyoming State Library (Cheyenne, Wyoming)

8.3 Native American Groups

American Indian Center of Arkansas, Inc. (Little Rock, Arkansas)
American Indian Council (Kansas City, Missouri)
American Indians Against Desecration (Indianapolis, Indiana)

Blackfeet Cultural Committee (Browning, Montana)
Blackfeet Tribal Council (Browning, Montana)
Caddo Tribe (Binger, Oklahoma)
Cherokee Nation (Tahlequah, Oklahoma)
Chitimacha Tribal Council (Charenton, Louisiana)
Choctaw Nation of Oklahoma (Durant, Oklahoma)
Choctaw Tribal Council (Philadelphia, Mississippi)
Coeur D'Alene Tribal Council (Plummer, Idaho)
Colville Confederated Tribes (Nespelem, Washington)
Coushatta Tribal Council (Elton, Louisiana)
Devils Lake Sioux Tribal Council (Fort Totten, North Dakota)
Fort Berthold Tribal Council (New Town, North Dakota)
Heart of America Indian Center (Kansas City, Missouri)
Indian Law Support Center (Boulder, Colorado)
Jena Band of Louisiana Choctaw (Jena, Louisiana)
Kootenai Tribal Council (Bonners Ferry, Idaho)
National Congress of American Indians (Washington, DC)
Nez Perce Tribal Executive Council (Lapwai, Idaho)
North Dakota Indian Affairs Commission (Bismarck, North Dakota)
North Dakota State Historical Board (Bismarck, North Dakota)
Osage Tribal Council (Pawhuska, Oklahoma)
Saginaw-Chippewa Tribal Council (Mount Pleasant, Michigan)
Spokane City and County Preservation Office (Spokane, Washington)
Spokane Tribe (Wellpinit, Washington)
State of Michigan Department of State, History Division (Lansing, Michigan)
Texas Indian Commission (Austin, Texas)
Three Affiliated Tribes (New Town, North Dakota)
Turtle Mountain Tribal Council (Belcourt, North Dakota)

8.4 *Other Organizations*

Air Force Association (Minot, North Dakota)
Alexander Business Machines (Oscoda, Michigan)
American Legion (Minot, North Dakota)
Arkansas for Peace (Batesville, Arkansas)
Arkansas Social Workers for Peace and Justice (Little Rock, Arkansas)
AuSable Manistee Action Council (Grayling, Michigan)
Burger King (Oscoda, Michigan)
Butler Machinery Company (Grand Forks, North Dakota)
Dr. Cassagnol Foundation, Inc. (Bossier City, Louisiana)
Catholic Weekly, The (Saginaw, Michigan)
Central Missouri State University (Warrensburg, Missouri)
Chamber of Commerce (Blytheville, Arkansas)
Chamber of Commerce (Cabot, Arkansas)
Chamber of Commerce (Jacksonville, Arkansas)
Chamber of Commerce (North Little Rock, Arkansas)
Chamber of Commerce (Sherwood, Arkansas)
Chamber of Commerce (Bossier City, Louisiana)
Chamber of Commerce (Shreveport, Louisiana)
Chamber of Commerce (East Tawas, Michigan)
Chamber of Commerce (Oscoda, Michigan)
Chamber of Commerce (Knob Noster, Missouri)
Chamber of Commerce (Warrensburg, Missouri)
Chamber of Commerce (Great Falls, Montana)
Chamber of Commerce (Grand Forks, North Dakota)
Chamber of Commerce (Minot, North Dakota)
Chamber of Commerce (Abilene, Texas)
Chamber of Commerce (Spokane, Washington)

Chamber of Commerce (Cheyenne, Wyoming)
City-County Regional Planning Office (Cheyenne, Wyoming)
Columbia Daily Tribune (Columbia, Missouri)
Common Cause (Washington, DC)
Council for a Livable World (Washington, DC)
EDBI-FM Radio (Tawas City, Michigan)
Fabulous Westward Ho Motel (Grand Forks, North Dakota)
First Bank of Grand Forks (Grand Forks, North Dakota)
First Western Bank (Minot, North Dakota)
Govar VTOL Aircraft Research (North Little Rock, Arkansas)
Greater North Dakota Association (Minot, North Dakota)
Home For Peace and Justice (Burch Run, Michigan)
Johnson County Surveying, Inc. (Warrensburg, Missouri)
Little Rock Pax Christi (Little Rock, Arkansas)
Lutheran Campus Ministry (Minot, North Dakota)
Mid-Missouri Nuclear Weapons Freeze (Columbia, Missouri)
Mid-South Peace & Justice Center (Memphis, Tennessee)
Military Affairs Committee (Glenburn, North Dakota)
Minot Area Development Corporation (Minot, North Dakota)
Minot Association of Builders (Minot, North Dakota)
Minot Building and Trades Council (Minot, North Dakota)
Minot State University (Minot, North Dakota)
Montana-Dakota Utilities Company (Minot, North Dakota)
North Dakota United Church of Christ (Parshall, North Dakota)
Northeastern Michigan Board of Realtors (Tawas City, Michigan)
Nuclear Weapons Freeze Campaign (Seattle, Washington)
Office for Church in Society (Washington, DC)
Oscoda Baptist Church (Oscoda, Michigan)
Physicians for Social Responsibility (Grand Rapids, Michigan)
Physicians for Social Responsibility (Washington, DC)
Prewitt and Associates, Inc. (Austin, Texas)
Rural Coalition (Scottsbluff, Nebraska)
St. Paul's United Church of Christ (Laramie, Wyoming)
SCRAM-X (Rock Springs, Wyoming)
Snelling and Snelling (Minot, North Dakota)
Union of Concerned Scientists (Cambridge, Massachusetts)
Union of Concerned Scientists (Little Rock, Arkansas)
Union of Concerned Scientists (Washington, DC)
University of Missouri, Rolla (Columbia, Missouri)
Valley Young People's Clinic (Spokane, Washington)
Wyoming Flaggers (Cheyenne, Wyoming)

8.5 Individuals Receiving the Draft Environmental Impact Statement Not Including Public Officials

Mike Abdin
Stephen L. Abney
Larry Adams
Bill Akin
Bertha Albers
Alvin Aldrich
Joseph G. Alfonso
Earl Allen
Kay Allen
Ben Alley
Raymond Alley
Don Allison
Jeffery, John, and John Allison
Mary E. Allison
Michael D. Altom
Doyne Anderson
Frank Anderson
Theron Anderson
William and Maryann Anderson
Jack Andrade
Norman H. Andrews
James R. Antes
Ron A. Anthony
Judith Arent
Tommy Armstrong
Michael S. Arno

Phyllis Atchison
Wayne and Joyce Attwood
Keith Aubrey
Rodney Avery
Joseph Baccei
Stuart Bach
Stan P. Bader
James H. Bailey
Troy E. Bain
James G. Bair
Claire Baiz
Henry and Helen Baker
R.A. Baker
John Agee Ball
Everett Ballmann
James J. Balton
M.J. Bannerman
Daniel P. Baranick
David Barnaby
Jackie Barnett
Mark Barnhard
Barrry J. Barnhart
James R. Barr
Bruce D. Barry
Tad Bartimus
Van Bartles
Alvin F. Bastron
Charles A. Bates
Major James A. Bates
Leo V. Bauer
Terry Bawconi
Deborah Beadle
Steven E. Beaver
Millamae E. Beck
Beryl G. Becker
Steve Becker
Charles and Jane Beckham
Pete Begly
Steve Bell
Karen F. Bemis
J.R. Bennett
Wanda S. Bennett
Jack Benson
Lista Benson
Larry Berard
Sharon Berg
Jon L. Bergstad
Richard Berkeley
Lillie G. Bernard
Larry Bernbaum
John Bernier
Robin Bertsch
Rick Best
F. Richard and Kathleen Bettes
Francis Bickam
Leonard Bischoff
David J. Biviano
Jim C. Blagg
Carroll C. Blend
Jim Bogan
Don G. Boggie
Laura Bogue
Tom Boland
James D. Boling
Mr. and Mrs. Paul Bonney
John Boone
Enja Borgmann
Robert J. Boshaw
Cherie Boudreaux
Lynn M. Boughey
Tom Bougsty
Martha Boyd
Roger Brabandt
John Brabenec
Cary Bradburn
Jim Brady
Les Breeding
Lucia Johnson Breiner
Sharon Breitweiser
Charles R. Brevik
Ronald Brimberry, M.D.
Barbara Brinkley
Steve Brister
Tom Brod
Terry and Rosy Bromell
Daniel D. Brown
James C. and La Jean Brown, Jr.
Jerry E. Brown
Larry G. Brown
Paul Brown
Carolyn Brummond
Karla Bruner
Bill Brunner
Jack Bryant
Julie A. Buckles
Bill Buckley
Nanette Bulebosh
Col. Peter J. and Sandra Buley
Tom Bumgarner
Roy Burchim
Donald J. Burditt
Neil M. Burge
Liza Burgess
Leslie Burleson
Lon Burnam
Tom Burnham
Lois Burns
Robert A. Busch
Vera Byers
R.W. Bill Calbath
Lynda Calcote
Larry Caldwell
Kathy Callahan
Harold J. Camacho, Jr.
LaVonne N. Cameron
Susan Campion

Hjalmer O. Carlson, Jr.
Vernon and Estell Carmical
Russell Carollo
Warren Carpenter
Mark Carr
Rev. William D. Carr
David Carroll
Michael Carroll
Salvatore A. Cascio
Jackie Casper
Loyd Ann Caston
Tom Cave
Connie Cella
Louise Chadez
R.B. Chaffee
Carolyn Chalmers
Thomas Chatel
Brian Cheney
D.M. Chester, Sr.
Glenn Chicoine
Thomas A. Chovinard
Tim A. Christianson
Victor R. Ciccone
Amelia Cirlincione
Joan Clark
Kim Clarkin
Eric Clausen
Glenn and Sibyl Clay
Pam Cleary
Susan Clemons
Milton Clouse
Gordon D. Cocke
Earl F. Coggins
Mr. Kim E. Collie
David Colwell
Charles H. and Catherine G. Combs
Jean Conway
Andrea Cook
Pete Cook
Ernest Cooper
Mrs. Coy Cooper
Phil Cooper
Wainright Copass, Jr.
Kelly Corbin
Edna B. Core
John W. Cornelison
Charlotte Rae Cornelius
Marion L. Costello
Kelly Courtright
Charles F. Cox
Kevin Coyle
Linda Crabtree
K.J. and Dorothy Crace
J.M. Crane
James and Paula Crawford
Jim Creasey
Tuda Crews
Richard V. Crisera
Sister Eileen Croghan
Aljean Crook
Will Crough
Heidi Crye
Sheryl Cunha
Jean W. Cure
Earl Cutter
Janice Dahl
Andrew and Judy Dalpizzol
Madeline Dalrymple
Jerome L. Darby
Phil D. Darnell
Mr. and Mrs. Ray David
Charles A. Davis
Edward W. Davis
Ernest L. Davis
Howard E. Davis
Sondra L. Davis
William J. Davis
Ed Davison, Jr.
Mason F. Day
Sam Day
Ronnie L. Deller
Rhonda DeMalms
Tish Demmin
Chris Demopulos
Diana Denison
Steve DePyssler
Ralph Desmarais
Conrad and Elizabeth DeVeau
William B. DeVos
Clair A. Diamond
Sue Dickenson
W.A. Dick Dickenson
Rollie M. Dickinson
Dr. Stanley G. Dienst
Christine I. Diffie
Burt and Josie Dinnison
George Dixon
Rachel A. Dixon
Ed Dolezal
Willard G. Dollar
Al Donohue
Mary M. Donovan
Tracey M. Dooms
Mike Dorsher
Stacie Doublin
Noel Dougherty
Tom Dougherty
John Bennett Douglass
Shelley Douthit
Ben Downing
Bobby N. Downs
Mary Jo Draper
William H. Draper
Kurt R. Drawz
Perry Dray
Richard Drury

Loren Dudley
Chuck Duke
J.A. Dunnam, Jr.
Lawrence and Linda Dupree
S.J. Dust
Donald W. Dutherage
James Earl
Michael S. Ebel
A.G. Ebertz
Sylvester L. Echols
Marleen Eddlemon
Roy D. Edmiston
Gene Eggen
Ralph W. Ehlers
Sharyn Elander
Jim Elkins
Gene Eller
George W. Ellis
Lloyd M. Erickson
Steve Erickson
Norman R. Esh
Huey P. Evans
Robert Evans
Betty J. Evenson
Mitch Evenson
William L. Ezo
B.W. Fahrner
Eddie R. Faith
Clinton R. Falkenberry
Richard Falkoff
Philip Michael Falus
Louis A. Farardo
Jack Farmer
Marshall Farnell
Linda Farrar
Gene Michael Farrell
Scott Farris
Ron Fayard
John E. Fedkenheuer
Bonnie Fehrenbach
Leslie E. Feist
John Fenrich
Gregory Ferguson
Opal L. Ferrebee
Honorable Jim Finch
Kate Finley
Adam B. Fischer
Erica Fischer
Mike Fisher
Hal Flanders
Jerry D. Flood
Sandy Flowers
Curtis Foote
Gerald M. Ford
Oscar Ford
Glenn L. Fornes
P.A. Forrester
Judy Foster
Robert Foster
Virgil Lee Fox
Emmanuel J. Francisco, Jr.
Stephen R. Frank
George H. Frein
Codie French
Lyle Frost
Bob Fulkerson
James Furst
H. Douglas Gale
Julie Gallowary
Pat Galvin
Terry Ganey
Paul Andrew Garoutte
Jimmy Lee Garrison
Mr. & Mrs. Wilford D. Garton
Richard Gasvoda
J.C. George
Norma L. Gerbig
David Germein
M.P. Gertsch
Don Getty
Geraldine W. Getty
Wayland Gilbert
Al Gillmore
Anna Ginsburg
Eliot Glassheim
Donald L. Gleason
Robert Glenn
Thomas S. Glennon
Mary Glynn
Lawrence L. Goddard
Paul J. Goldschmidt
Fred Goodman
Russel D. Goodwin
Jack Gordon
Jean Gordon
Sarah Gorin
Johnnie Gorthy
Arthur N. Gosline
David Goza
E.L. and June Grable, Jr.
Ralph and Maryann Grafe
Doug and Frances Graham
Ronald J. Graham
Louis and Frances Grandgeorge
Charles L. Grant
Timothy P. Grant
John Grassel
Bart Gray, Jr.
Mike Gray
Thad Gray
Lee M. Green
David Greene
Ken Greene
Shirley Terry Greene
Charley Gregg
Dick Grieb

B. Stewart Griffin
Susan R. Griffin, M.D.
Nancy L. Grnya
Samantha Groppe
Gary L. Grunkemeyer
Ellen E. Gruver
Honorable Joe Gurley
Alfred C. Gust
Jack Guy
D.S. Guzzo
Harold and Bill Gwatney
Michael J. Gwopz
Dale Haakenson
Milt Haaland
James W. Haffner
Lindell Haggin
Margaret Haggin
John N. Hagowood, Jr.
Alan Hahn
Kathleen V. Hahn
Shirley Hahn
Wesley C. Halbert
Randall Hall
Stan Hall
Jenifer Hamel
James Hamilton
Wayne Hammack
Keith Hammis
Jeff Hancock
Paul F. Hand
Lloyd and Frances Handke
Dr. Hugh and Joann Hanna
William Hansbury
Gordon Hansen
Hugh Hansen
Kermit Hansen
Edwin W. Hanson
Jackie Hanson
John Hardwick
Frances Hardy
Lynn Harmon
Scott D. Harmsen
H.R. Harrell
James E. Harrell
Gary F. Harrington
Debo Harris
L.D. Harris
Charles Hartwig
David L. Harvey
Ray Hastings
Larry A. Hatchard
Oscar C. Hathaway III
Jim Hatlelid
Brad Hawks
J.A. Hayes
James Hazelip
George W. Head
Jim Heaney
Virginia D. Hedelund
Sister Rosella Hehn
William R. Heiar
Frank L. Heiling
Becky Heimgartner
Tim Heisler
Steve Heizman
Roger Helland
John M. Heller
Paul Hellinghausen
James Helmich
William L. Helms III
Mark Henderson
Jim Hendricks
Bill Henggeler
G.G. Henne
John E. Hennigar
Roy Hensley
Sonny Hermann
Al Hermodson
Robert Herring
Charles Herrmann
William Hewitt
John W. Higginbotham
Russel E. Higgins
Bruce Hight
Don E. Hill
John M. Hill
R.D. Hill
Emma G. Hilliard
Jerry and Nancy Hines
Charles Hinson
Dale Hinson
Lindsay D. Hitt
Colleen Hodenfield
Art and Clara Hodum
Christopher S. Hoefly
William Hoefly
Charles A.F. Hoffman
Lorraine Holcomb
Trusten Holder
M. Michelle Holland
Honorable Jesse A. Holloway
Shireen Holloway
Nancy Holmes
Jim Honley
M.M. Hopcroft
Albert Horton
Donald and Donna House
Holly Houston
James and Ann Houx
Valdemar Hovde
Beth Howard
Mary L. Howard
Milton W. Howard
Alexis Howell
Jill M. Hubbard
Mark Hubbert

George E. Huddleston
Stephen F. Huddleston
Dana and Lora Huestis
Dan Huffman
A.G. Hughes, Jr.
Fred Lee Hughes
Jane A. Hull
Vic Hummert
Jack Humphrey
James Humphrey, Jr.
Dale and Wilma Humphreys
King Hunn
David Hunt
James P. Hunt
Mr. and Mrs. Russel D. Huntley
Helen E. Hurly
Ardis Huss
Mary Hussmann
Ronald Hutchison
R.E. Hyatt
Scott Hyde
Paul Hyder
Pete Illoway
Honorable Roy Ilvedson
Fred C. Ingold
Don Irwin
Tim Irwin
Ron Isaacon
Malcolm Jaap
Robert Jackson
Stan Jackson
Zarina Jackson
C.T. Jacobson
Joseph Jacobson
Randy Jacobson
Jon F. Jacquot
Lester M. James
Marinell James
Julia Jasenska-Brabenec
Gerald Jasinski
Mr. and Mrs. Douglas A. Jasmer
Mylas C. Jeffers, Jr.
Van Jeffery, Jr.
Conny Jenkins
James Jenkins
Bruce H. Jensen
Ray Jergeson
Gary Jewell
Irene Johnigan
Robert A. Johnigan
Ed Johns
Deborah Anne Johnson
James B. Johnson
Janet Johnson
Jerry Johnson
Larry D. Johnson
Lorna Johnson
Peter Johnson
V. Alton Johnson
Gary D. Joiner
Al Jones
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Sheila Maybanks
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Walter Moser
Ursula P. Moul
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Barry C. Musgrove
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Bob Napora
Jim Neavill
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Jim Nichols
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Susan Niederstadt
William Niggemeyer
Roussoe Nikolaosi
Enoch T. Nix
Harold D. Nixon
Lance Nixon
Herman Noe
John L. Nold
Diana Nomad
Dennis Nordquist
Linda Norman
James C. Norris
Keith E. Norwood
Donald and Marjorie Nothdurft
Terry Novak
Mr. and Mrs. Jerry D. Nowak
Patricia O'Brien
Daniel O'Connell
R.T. O'Gara
James O'Sullivan
Paul M. Oetting
Eloise Ogden
Wanda Oldham
Gene Olson
Karen Olson
Marian L. Olson
Marv Olson
Don Opozda
Roy Stanley Orr
Scott Ostrander
John W. Pachankis
Pete C. Palasota, M.D.
Do Palma
George Palmer
Susan Pander
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Pete Pederson
Charles Pelkey
Rev. Jack L. Pepple
Jeffery R. Perciful

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Gary F. Perry
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Maclyn D. Pettengill
Harold C. Pettys
John Pfeffer
Tomas J. Pfeiffer
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Mike Phillips
Ronald Pick
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Glenn Pieper
Holly Pieper
Joe Pierce
Steve Pinnon
Felix Pino
Johnny and Una Piver
JoAnn Platt
Sister Ardeth Platte
Tony D. Ply
Joseph J. Polite
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Karen Prins
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Anne Radford
Robert Rajewski
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Jim Reed
Mrs. Lou Reed
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Vern Reiter
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Melda Rice
William B. Rich
Carolyn Richesin
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Bud W. Rick
M. Riddell
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Leona Riebling
Dwight Rieman
John Risch
Don W. Riske
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Mark Ritchie
Gloria Ann River
Ellen Robbins
Jennifer Robbins
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P.M. Rockwell
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Stanley and Martha Sawyer
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Gretchen Severson
Margie Sewell
Mary J. Shackleton
R.C. Shafer
Kenneth Shampo
Margaret Shaw
Mr. and Mrs. Erroll Shaw
Tom Shea
Mary Margaret Shelton
Dardanella Shenefelt
William F. Sherman
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Elizabeth F. Shores
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Mike Silva
Paul Simonson
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Karen Skrobot
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Donald G. Smith
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Thompson Smith
Albert M. Smoak
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Martha Snider
Mark W. Snow
William M. Snow, Jr.
Ardis E. Snuggs
Debra A. Snyder
Walt Snyder
Daryl Somerville
Dean A. Somerville
Kristin Sorenson
Clyde Soucie
Marie Soveroski
Larry E. Sparks
Christina Spear
Larry Spears
Don C. Spence
Sydney Spiegel
Bob Springer
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Katherine Stanick
Frank A. Stanley
Donald L. State
Brad and Ralph Stearns
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Carl Steinaway
Leon Steinberg
Grace Steinmetz
Lloyd Steinmetz
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Jo Stewart
Diane Stinger
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Don Stoen
Curtis W. Stofferahn
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Walter Strauch
Billy D. Stuart
Patrick Linday Stuart
Goodloe Stuck
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Harold Sudbury
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Dorothy Sullivan
Jim Sullivan
Vanessa Summerfield
Chesley Summerville
Thomas H. Summons, M.D.
Larry Sundbakken
Ed Syrader
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Dr. J. Dudley Talbot
Diana S. Talcott
Debbie Talley
Janie Talley-Woodard
Charles K. Tama
John W. Tarleton
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Joseph B. Taylor
Ronald E. Taylor
Virgil B. Teaford, Jr.

Robert Temanson
L. Michael Terrill
Leo M. Terrill
Leo M. Terrill
Jack Terzian
Irl Tessendorf
Dan Therrien
Michael Thibodeaux
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James P. Thomas
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Gerald and Virginia Thomason
Michael Thomason
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Mr. and Mrs. Robert J. Tiffany
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Virginia Lee Titus
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Emanuele and Darlene Tortorello
Douglas John Toska
Dr. Christoph Touche
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R. Keith Vaughn
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Honorable Don R. Venhaus
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Hellen Waller
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Sylvia L. Warsaw
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Linda Werner
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R. Jerry White, Jr.
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Catherine Wilkerson, M.D.
A.V. Williams
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C.A. Wojecki
Dallas Wolf
Rodney Wolfard
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10.0 GLOSSARY OF TERMS AND ACRONYMS

10.1 Terms

Acquisition area. Offbase land to be acquired for the proposed program.

Acre-foot. The volume of the water that covers one acre to a depth of one foot; approximately 326,000 gallons.

Active fault. A fault on which movement has occurred during the past 10,000 years and which may be subject to recurring movement usually indicated by small, periodic displacement or seismic activity.

Advisory Council on Historic Preservation. A 19-member body appointed, in part, by the President of the United States to advise the President and Congress and to coordinate the actions of federal agencies on matters relating to historic preservation, to comment on the effects of such actions on historic and archaeological cultural resources, and to perform other duties as required by law (Public Law 89-655; 16 USC §470).

Air Installation Compatible Use Zone. A concept developed by the Air Force to promote land use development near its airfields in a manner that protects adjacent communities from noise and safety hazards associated with aircraft operations, and to preserve the operational integrity of the airfields.

Air Quality Control Region. An area designated by Section 107 of the Clean Air Act which is based on jurisdictional boundaries, urban-industrial concentrations, and other factors including atmospheric areas, that is necessary to provide adequate implementation of air quality standards.

Alluvium. A general term applied to sediments deposited by a stream or running water.

Alpha particle. A product of the radioactive decay process which consists of a helium nucleus (two protons and two neutrons).

Ambient air. That portion of the atmosphere, external to buildings, to which the general public has access.

Ambient air quality standards. Standards established on a state or federal level that define the limits for airborne concentrations of designated "criteria" pollutants (e.g., nitrogen dioxide, sulfur dioxide, carbon monoxide, total suspended particulates, ozone, lead, and hydrocarbons) to protect public health with an adequate margin of safety (primary standards) and to protect public welfare, including plant and animal life, visibility, and materials (secondary standards).

Aquifer. The water-bearing portion of subsurface earth material that yields or is capable of yielding useful quantities of water to wells.

Archaeology. A scientific approach to the study of human ecology, cultural history, and cultural process, emphasizing systematic interpretation of material remains.

Archaic. A stage of prehistoric cultural development, recognized throughout North America, characterized by broad spectrum hunting and gathering economies and seasonal mobility. The material remains are recognized by the development of barbed and stemmed spear points, the extensive use of groundstone tools, and the lack of ceramics. The Archaic is also commonly used to designate a prehistoric period (generally 6000 B.C. to A.D. 500), but the dates vary from one region to another.

Arterial. Signalized streets with signal spacings of two miles or less and turning movements at intersections that usually do not exceed 20 percent of total traffic. Urban arterials primarily serve through-traffic, and, as a secondary function, provide access to abutting properties (urban); roadways that provide large traffic volume capacity between major traffic generators, designed to facilitate traffic movement and discourage land access when feasible. Includes primary state roads (functional).

Artifact. Anything that owes its shape, form, or placement to human activity. In archaeological studies, the term is applied to portable objects (e.g., tools and the by-products of their manufacture).

Assembly and checkout. The process of final assembly and verification of a weapon system.

Attainment area. An area that has been designated by the U.S. Environmental Protection Agency and the appropriate state air quality agency as having ambient air quality levels below the ceiling levels defined under the National Ambient Air Quality Standards.

Available vacancy. A vacant housing unit that is either for sale or for rent.

Average annual daily traffic. For a 1-year period, the total volume passing a point or segment of a highway facility in both directions, divided by the number of days in the year.

Basalt. A dark colored fine-grained volcanic rock formed at the surface of the earth.

Baseline. The existing and future-growth characterization of an area without the proposed program.

Basin. A drainage or catchment area of a stream or lake.

Bayou. A secondary watercourse or minor river frequently characterized by a slow or imperceptible current that follows a course through alluvial lowlands or swamps.

Beachstrands. Linear areas of low topographic relief representing shorelines corresponding to progressively lower water levels around former glacial lakes.

Bedrock. Geologic formation or unit which underlies soil or other unconsolidated surficial deposits.

Beta particle. A product of the radioactive decay process that is physically identical to a high-velocity electron.

Biological diversity. Refers to the number of species and their relative abundance in an area or habitat.

Biome. Major regional ecological community of plants and animals extending over large natural areas.

Bonds. Financial instruments used by government agencies to fund major capital improvement projects; typically either a general obligation bond or revenue bond.

Bottomland. Land topographically low and typically found along a stream course.

Brachiopods. A phylum of invertebrates that has persisted from the Lower Cambrian to the present and consists of a marine animal with a calcareous bivalve shell with unequal valves.

Breaks. Terrain characterized by abrupt changes in surface slope (e.g., a line of cliffs and associated spurs and small ravines).

Bryozoans. A small phylum of aquatic animals that reproduce by budding, usually forming branching, mosslike colonies that are enclosed by a calcareous or ridged shell.

Budget. Document prepared by a government unit which estimates future revenues expected to be collected and the expenditure needs of the jurisdiction in a forthcoming fiscal year or years; includes estimates of potential revenues and expected expenditures by major fund groups (governmental funds, proprietary funds, and fiduciary fund types).

Cairn. A distinctly artificial pile of rocks that may mark or enclose burials, vision quests, caches, or geodetic locales.

Campsite. A short-term habitation site containing evidence of daily living activities, as opposed to specialized activities (e.g., quarry site). Campsites are generally open-air occupations of perhaps weeks to months in duration.

Capacity (Transportation). The traffic-carrying ability of a facility while maintaining prescribed operational qualities (e.g., a specific level of service); the maximum amount of traffic that can be accommodated by a given facility. (Note: Traffic facilities generally operate poorly at or near capacity, and facilities are rarely designed or planned to operate within this range.)

Capacity (Utilities). The maximum load a system is capable of carrying under existing service conditions.

Capehart housing. A design of onbase family housing which was generally built in the 1950s.

Capital costs. Expenditures by local governments on physical infrastructure.

Capital projects fund. One of the governmental fund types used to account for capital improvement projects other than those financed by proprietary funds or special assessment funds.

Carbonaceous. Pertaining to a sedimentary rock containing carbon as the major constituent.

Cenozoic. An era in geologic history extending from 66 million years ago to the present time which is characterized by the rapid evolution of mammals, birds, grasses, shrubs, and higher flowering plants.

Cephalopods. The highest class of mollusca containing the squids, cuttlefishes, octopuses, nautiluses, ammonites, and related forms all having muscular arms usually furnished with prehensile suckers or hooks.

Ceramic scatter. A spatially limited distribution of pot sherds on the ground surface.

Ceramic sherd. Broken fragment of a clay vessel.

Ceremonial center. The central portion of a prehistoric village site containing large civic and ceremonial structures.

Chronology. The science of arranging time in periods and ascertaining the dates and historical order of past events.

Civilian labor force. The sum of the number of persons who are unemployed but able, willing, and actively seeking work and the number of nonmilitary persons who are working. The number of unemployed divided by the civilian labor force defines the unemployment rate. Military personnel are not considered in the unemployment rate calculations because, by definition, persons working in the military are fully employed and inclusion would tend to skew rates downward.

Climate. The prevalent or characteristic meteorological conditions (and their extremes) of any given location or region.

Collector streets. Surface streets that provide land access and traffic circulation service within residential, commercial, and industrial areas (urban); secondary roads that provide access to higher-type roads, connect small communities and nearby areas, and serve adjacent property (functional).

Component. One location or element within a settlement/subsistence system. Archaeological sites may contain several components that reflect the use of the locality by different groups in different time periods.

Comprehensive plan. A public document, usually consisting of maps, text, and supporting materials, adopted and approved by a local government legislative body, which describes future land uses, goals, and policies.

Confined aquifer. An aquifer that is overlain by an impermeable stratum and within which water pressure may build up so that penetration by a well will result in a static water level that is considerably higher than the top of the aquifer.

Corridor. A strip of land of various widths on both sides of a particular linear facility such as a highway or rail line.

Coulee. A deep gulch or ravine; usually dry in summer.

Crinoids. A large class of fossil echinoderms that has a cup-shaped body, feathery arms, and a long, jointed stalk fixed to the base of the body to anchor the animal to the sea bottom.

Cultural complex. A distinctive group of artifacts and sites that is distinct from other groups.

Culture. The system of behavior, beliefs, institutions, and objects human beings use to relate to each other and to the environment.

Cumulative impacts. The combined impacts resulting from all programs occurring concurrently at a given location, e.g., the deployment of the Peacekeeper Rail Garrison system and other military projects at any of the candidate military bases planned.

Curie. A unit of radioactivity equal to 3.7×10^{10} disintegrations per second.

Debitage. Waste flakes resulting from stone tool manufacture.

Debt service. The scheduled repayment of a loan made to a local government, usually resulting from the sale of bonds.

Debt service funds. One of the governmental funds used to account for annual payments required to pay back money which is borrowed by a governmental unit; generally limited to account for long-term debt from issuance of bonds.

Decibel. The unit of measurement of sound level calculated by taking ten times the common logarithm of the ratio of the magnitude of the particular sound pressure to the standard reference sound pressure of 20 micropascals and its derivitives.

Decommissioning. The process of removing a weapon system from service.

Delay. Additional travel time experienced by a driver, passenger, or pedestrian beyond what would reasonably be desired for a given trip.

Deployment. Strategic emplacement of a weapon system.

Developed. Said of land, a lot, a parcel, or an area that has been built upon, or where public services have been installed prior to residential or commercial construction.

Direct effects. Effects that are immediate consequences of program activities. In economics, the initial increase in employment and income resulting from program employment and material purchases before the indirect effects of these changes are measured.

Direct employment. Military and civilian personnel who are employed by the Department of Defense and its contractors, and who are working onsite on the program.

Direct expenditure. Expenditures of local governments directly related to the provision of goods or services.

Direct impact. Effects resulting solely from program implementation.

District. National Register of Historic Places designation of a geographically defined area (urban or rural) possessing a significant concentration, linkage, or continuity of sites, structures, or objects united by past events (theme) or aesthetically by plan or physical development.

Disturbed area. Land that has had its surface altered by grading, digging, or other construction-related activities.

Dolomite. A general term applied to sedimentary rocks composed of calcium and magnesium carbonate.

Drawdown. The distance between the static water level and the temporarily depressed water level caused by well pumpage.

Earthquake. A sudden motion or trembling in the earth caused by the displacement of rocks below the earth's surface due to a release of strain.

Econometrics. The application of economic theory and statistical procedures to observed data in order to (1) estimate the degree of influence of one variable on another and (2) forecast endogenous variables from equations that quantify the interrelationships among the variables.

Economies of scale. The decreases in an entity's long-run average costs that occur when it moves toward a specialization of resources, efficient utilization of equipment and manpower, and a lowering of average production costs.

Ecotone. Transitional zone between two distinct ecological communities (e.g., grasslands to forest). Important because of the greater diversity provided by the presence of species from both communities.

Effect. A change in an attribute. Effects can be caused by a variety of events, including those that result from program attributes acting on the resource attribute (direct effect); those that do not result directly from the action or from the attributes of other resources acting on the attribute being studied (indirect effect); those that result from attributes of other programs or other attributes that change because of other programs (cumulative effects); and those that result from natural causes (e.g., seasonal change).

Effluent. Wastewater discharge from a wastewater treatment facility.

Employment. The total number of persons working (includes all wage and salary workers), both civilian and military, and proprietors.

Endangered species. A species that is threatened with extinction throughout all or a significant portion of its range.

Energy. The capacity for doing work; taking a number of forms which may be transformed from one into another, such as thermal, mechanical, electrical, and chemical; in customary units, measured in kilowatt-hours or British thermal units.

Enterprise activity. Services provided or goods produced by a local government agency, generally self-supporting in terms of generating revenues that cover operating costs.

Enterprise funds. In government finance, one of the proprietary fund types used to account for activities which are financed primarily through user charges.

Environmental impact analysis process. The process of conducting environmental studies as outlined in Air Force Regulation 19-2.

Eocene. An epoch of the Tertiary period extending from about 58 million to 36 million years ago.

Ephemeral. Lasting or existing briefly or temporarily.

Epicenter. The point on the earth's surface directly above the focus of an earthquake.

Escarpment. A long cliff or steep slope separating two comparatively level or more gently sloping surfaces; results from erosion or faulting.

Ethnography. The description of human groups and their behavior by direct observation and/or by transcription of statements by living persons.

Eutrophication. The enrichment of a body of water with nutrients which in the presence of sunlight can stimulate the growth of algae and other aquatic plants to the point that undesirable effects may result, such as highly turbid water or a depletion of dissolved oxygen.

Expenditure. A disbursement of funds by a government entity; includes operation and maintenance costs, as well as capital costs.

Explosive safety zone. An established distance from an area where military explosive materials are stored or located, within which military authorities assure that gatherings of 25 persons or more do not occur or human habitations are not maintained.

Farmstead. Horticultural community consisting of one house and associated structures or features.

Fault. A fracture or zone of fractures along which there has been movement of the sides relative to one another and parallel to the fracture.

Fault zone. An area or region that is expressed as a zone of numerous fractures or faults.

Fauna. Animals; organisms of the animal kingdom of a given area taken collectively.

Feature. Nonportable portion of an archaeological site. These include facilities such as fire pits, storage pits, or foundations.

Federal-candidate species. Taxa placed in Federal Categories 1 and 2 by the U.S. Fish and Wildlife Service, which are candidates for possible addition to the List of Endangered and Threatened Species.

Fee simple. Title to real property belonging to a person or government where full and unconditional ownership exists. Such ownership does not necessarily include mineral rights.

Fiduciary funds. One of the major fund groups, used to account for assets held by a jurisdiction in a trustee capacity, for example, pension funds.

Financial statement. Document prepared by a government unit which presents actual revenues received and expenditures made in the previous fiscal year; organized to present data along major fund groups (governmental, proprietary, and fiduciary fund types).

Fiscal year. In government finance, the 12-month period which corresponds to the jurisdiction's accounting period, typically beginning July 1st and ending June 30th.

Flake. A small stone fragment produced as a by-product of stone tool manufacturing; may also be used unmodified as a tool itself.

Floodplain. The relatively flat land lying adjacent to a river channel that is covered by water when the river overflows its banks.

Flora. Plants; organisms of the plant kingdom taken collectively.

Fluvial (Fluviatile). Pertaining to a river or stream.

Forage. Food for animals (e.g., deer), especially when taken by browsing or grazing.

Foraminifera. Marine protozoans enclosed in a typically calcareous shell consisting of several successively formed communicating chambers, each larger than the preceding.

Formation. A sequence of naturally created rock layers with distinctive upper and lower boundaries.

Freeway. A multilane, divided highway with a minimum of two lanes for exclusive use of traffic in each direction, allowing full control of access and egress.

French Colonial Revival. A twentieth-century architectural style characterized by tall, rectangular structures with symmetrical facades. Windows with decorative shutters occur on both sides of an arched porch with a Mansard roof.

Frictional unemployment. Unemployment attributable to time lost in changing jobs rather than to a lack of job opportunities.

Fugitive dust. Particulate matter composed of soil which is uncontaminated by pollutants resulting from industrial activity. Fugitive dust may include emissions from haul roads, wind erosion of exposed soil surfaces, and other activities in which soil is either removed or redistributed.

Fugitive emissions. Emissions released directly into the atmosphere that could not reasonably pass through a stack, chimney, vent, or other functionally equivalent opening.

Full-scale development. The stage of development of a weapon system when all components are built and tested at full scale.

Full-time equivalent. Employment based on a 40-hour work week (i.e., one person working 40 hours would equal 1 Full-Time Equivalent; one person working 20 hours would equal 0.5 Full-Time Equivalent).

Fund balance. In government finance, the resultant cash balance of an account or group of accounts after actual expenditures made and revenues received have been debited or credited.

Gamma radiation. A product of the radioactive decay process which includes very high-frequency electromagnetic waves.

Gamma ray. A high energy photon or radiation quantum emitted by radioactive substances.

Gastropods. A type of mollusk with a univalve shell (e.g., snail).

General fund. One of the governmental fund types, used to account for all financial transactions and resources except those required to be accounted for in other funds. Typically supports governmental activities supported by local taxes; for example, public safety, public health, and general administration functions. In school districts, accounts for all direct instructional costs.

General obligation bond. Financial instrument used by government agencies to fund major capital improvements; backed by full faith and credit of the issuing agency. Total amount of general obligation bond indebtedness is subject to statutory limitations, measured as a percentage of the jurisdiction's tax base. Used primarily for general purpose projects (e.g., administrative facility construction, parkland acquisition, and law enforcement and fire protection facility construction) which do not lend themselves to revenue bond financing.

Geologic hazard. A naturally occurring or manmade geologic condition or phenomenon that presents a risk or is a potential danger to life and/or property.

Geologic time scale. Scale of time ranging from Precambrian (approximately 3.8 billion years ago) to the present.

Geologic unit. A geologic formation, group, or member.

Geothermal. Pertaining to heat in the earth's interior.

Glacial. Of or relating to the movement of continental or alpine ice sheets formed by the compaction and recrystallization of snow.

Glacial lake. Lake derived from meltwater off a glacier commonly formed when an ice sheet dams a natural drainageway.

Glacial till. Unsorted, generally unconsolidated and nonstratified coarse sediments deposited beneath a glacier which were not reworked by meltwater.

Glacio. Of or relating to glaciers or glaciation.

Gorget. A bone, shell, or stone artifact which is perforated so that it can be suspended. A gorget is also a piece of throat armor, a collar, or a neck ornament.

Governmental funds. One of the major fund groups, consisting of t general fund, special revenue funds, capital projects funds, debt service funds, and sp cial assessment funds, as differentiated from proprietary funds (enterprise and internal service funds) and fiduciary funds (trust and pension fund accounts); accounts for almost all of the financial transactions of a jurisdiction.

Granite. A broadly used term for a quartz-bearing, coarse, crystalline igneous rock formed deep beneath the earth's surface.

Ground surface rupture. Surface expression of fractures that are usually a result of seismic activity.

Groundstone artifacts. Stone artifacts made by grinding rather than flaking (e.g., milling stones and mortar and pestle).

Group. A stratigraphic unit consisting of two or more contiguous or associated geologic formations.

Hamlet. A small village usually consisting of several houses.

Hazardous waste. A waste, or combination of wastes, which, because of its quantity, concentration, or physical, chemical, or infectious characteristics, may either cause, or significantly contribute to an increase in mortality or an increase in serious irreversible illness; or pose a substantial present or potential hazard to human health or the environment when improperly treated, stored, transported, disposed of, or otherwise managed.

Hearth/firepit. A feature used for the placement of fires; may be lined with clay or stones.

Herptiles. Referring to amphibians and reptiles.

Historic. A period of time after the advent of written history dating to the time of first Euro-American contact in an area. It also refers to items primarily of Euro-American manufacture.

Holocene. The time since the end of the Pleistocene epoch, characterized by the absence of large continental or Cordilleran ice sheets and the extinction of large mammalian life-forms. Generally considered to be the last 10,000 years.

Horizontal ground acceleration. An engineering measure of the severity of earthquake-induced ground motion. Units are expressed as a fractional measure of the gravitational acceleration (g) relating to the rate of change in horizontal ground displacement.

Horticulturalist. Group or individual who plants, cultivates, and harvests domesticated plants on a part-time basis.

Household size. The average number of individuals residing in a single dwelling unit.

Hydrology. The science dealing with the properties, distribution, and circulation of water on the surface of the land and in the soil and underlying rocks.

Impact. An assessment of the meaning of changes in all attributes being studied for a given resource; an aggregation of all the adverse effects, usually measured using a qualitative and nominally subjective technique.

Inactive fault. A fault with no historic activity; not recognized as a source of earthquakes.

Indirect employment. Employment resulting from the purchases of workers who are directly working on a specified program. Also includes any subsequent employment arising from the increase in purchases in the area.

Indirect impacts. Program-related impacts (usually population changes and resulting impacts) not directly attributable to the program itself. For example, direct program employees will spend some of their income locally. As a result, local industries will tend to hire more workers as they expand in response to the increased demand. This additional employment is termed an "indirect impact."

Inhabited building. Any building currently being used for the purposes of a dwelling or residence, workplace, place of business or industry, or an institutional function. Agricultural buildings such as barns do not generally meet the definition of an inhabited structure.

Inmigrants. All persons relocating to a defined geographic area as a result of the proposed program, usually calculated on an annual basis.

Input-output model. Method of estimating the interrelationship and the flow of goods and services among industrial sectors of the economy. Used to estimate the secondary (indirect and induced) economic effects of an initial change in a specific economic sector.

Intercontinental Ballistic Missile. A large missile capable of accurate weapon delivery over intercontinental ranges (usually greater than 5,000 miles).

Intermittent stream. A stream that does not flow continuously during all periods of the year.

Internal service funds. One of the proprietary funds, used to account for the financing of goods or services provided by one department or agency to other departments or agencies of the jurisdiction on a cost reimbursement basis; for example, photocopying, typing, and publishing services.

Interstate. The designated National System of Interstate and Defense Highways located in both rural and urban areas; they connect the East and West coasts and extend from Canadian border points to various points on the Mexican border.

Isolated artifact. An artifact, or a small, disarticulated group of artifacts, that cannot be associated with, or is situated outside of, a cultural resource site.

K-factor. The soil erodibility factor (K) used in the Universal Soil Loss Equation. The index is a measure of the susceptibility of a soil to erode as related to physical and chemical properties of the soil.

Kettles. Steep-sided closed depressions in glacial deposits often containing a lake or marsh.

Kill site. An archaeological site indicated by the presence or association of faunal remains, butchering tools, and hunting equipment (e.g., projectile points).

Kilowatt. A unit of power equivalent to 1,000 watts.

Known Geological Structure. An area containing oil and gas leases in which an accumulation of hydrocarbons has been discovered by drilling and determined to be productive. The limits include all acreage that is hypothetically proven productive (43 CFR §3100.0-5[a]).

Known Geothermal Resource Area. An area in which the geology, nearby discoveries, competitive interests, and other indicators would, in the opinion of the Department of the Interior, engender a belief in the men who are experienced in the subject matter that the prospects for the extraction of geothermal resources are good enough to warrant expenditures of money for that purpose (43 CFR §3200.0-5).

Lacustrine. Pertaining to, produced by, or formed in a lake environment.

Land use plans and policies. Guidelines adopted by governments to direct future land use within their jurisdictions.

Landslide. The downslope movement of soil and/or rock material under gravitational influence.

L_{dn} noise level. The 24-hour average-energy sound level expressed in decibels, with a 10-decibel penalty added to sound levels between 10:00 P.M. and 7:00 A.M.

L_{eq} noise level. A constant amount of acoustic energy equivalent to the energy contained in the time-varying noise measured from a given source for a given time.

Level of impact. The measure of the magnitude or degree of impact expressed as negligible, low, moderate, or high for each environmental resource.

Level of service. In transportation analyses, a qualitative measure describing operational conditions within a traffic stream and how they are perceived by motorists and/or passengers. In public services, a measure describing the amount of public services (e.g., fire protection and law enforcement services) available to community residents, generally expressed as the number of personnel providing the services per 1,000 population.

Limestone. A sedimentary rock composed of calcium carbonate.

Liquefaction. The transformation of unconsolidated sediment into a fluid form resulting from a loss of strength associated with seismic vibrations.

Lithic scatter. An archaeological site consisting only of stone artifacts.

Lithology. The physical character of a rock such as its color, hardness, mineral composition, and grain size.

Loamy. A general term applied to soils with a texture intermediated between fine-textured and coarse-textured soils.

Locality. A particular spot within a geologic unit from which a specimen is obtained or may be found; usually a location of dense or well-preserved fossils.

Loess. A typically buff-colored, windblown silt directly attributable to glacial outwash.

Long duration. Impacts that would occur over an extended period of time, whether they start during the construction or operations phase. Most impacts from the operations phase are expected to be of long duration since program operations essentially represent a steady-state condition (i.e., impacts resulting from actions that occur repeatedly over a long period of time). However, long-duration impacts could also be caused by

construction activities if a resource is destroyed or irreparably damaged or if the recovery rate of the resource is very slow.

Magnitude (earthquake). A measure of strength of an earthquake or the energy it releases.

Mammoth/mastodon. Extinct elephants from the Pleistocene epoch.

Maximum credible earthquake. The largest earthquake capable of being produced from a source, structure, or region under the currently known tectonic framework.

Maximum tolerable soil loss. Represents the maximum amount of soil that can be removed by wind and/or sheet erosion without reducing the productivity of the land or altering the natural ecosystem of an area. The value conceptually represents a balance between the rate of soil formation and soil erosion of a given area.

Medicine wheel. Large stone circle with rock alignments radiating from the center to the circle edge; most likely ceremonial feature.

Megafauna. Various species of large mammals that became extinct in North America sometime before 6,000 years before present. These mammals include the mammoth, giant bison, camel, and giant sloth.

Megawatt. One thousand kilowatts or one million watts.

Mesoamerica. The region extending from the middle of northern Mexico to Panama, particularly southern and central Mexico, Guatemala, Nicaragua, Belize, Honduras, and El Salvador.

Mesotrophic. A body of water with moderate amounts of plant nutrients which result in a medium level of primary productivity, and which usually has a moderate level of dissolved oxygen.

Mesozoic. A era in geological history, ranging from about 245 million to 66 million years ago, characterized by the development of reptiles.

Microcurie. One-millionth of a curie.

Microgram. One-millionth of a gram.

Midden. Soil horizon resulting from the accumulation of human living debris containing artifacts and cultural refuse (e.g., bone and shell fragments, fire-cracked rocks, charcoal, chipping detritus, stone tools, or organic residues).

Millirad. One one-thousandth of a rad (a unit of radiation, see Rad).

Miocene. An epoch of the Tertiary period, 24 million to 5 million years ago, marked by the development of apes and the appearance of ancestral gibbons.

Mississippian. A period of the Paleozoic era extending from about 360 million to 320 million years ago.

Mitigation. A method or action to reduce or eliminate program impacts.

Mixed open space. A land use type that includes range and pasture land, noncommercial forests, riparian areas, water bodies, and vacant land.

Mobile home. A single-family dwelling unit that is transportable in one or more sections, built on a permanent chassis, and designed to be used with or without a permanent foundation. Does not include travel trailers or recreational vehicles.

Multifamily housing. Townhouse or apartment units that accommodate more than one family though each dwelling unit is only occupied by one household.

Multilane highway. A highway with at least two lanes for the exclusive use of traffic in each direction, with no or partial control of access, that may have periodic interruptions to flow at signalized intersections.

Multiplier. In economics, used to determine the indirect and induced effects (in terms of increased employment, income, or output) resulting from program activities.

National Landmark (Historic). A site, building, or object in private or public ownership that possesses national significance in American history, archaeology, or culture. In order to achieve landmark status, a property must be, or have the clear potential to be, recognized, understood, and appreciated publicly and professionally for the strength and clarity of its historical association, its architectural or design excellence, or its extraordinary information content on a national scale.

National Register of Historic Places. A register of districts, sites, buildings, structures, and objects important in American history, architecture, archaeology, and culture, maintained by the Secretary of the Interior under authority of Section 2(b) of the Historic Sites Act of 1935 and Section 101(a)(1) of the National Historic Preservation Act of 1966, as amended.

Native Americans. Used in a collective sense to refer to natives of North America.

Native vegetation. Plant life that occurs naturally in an area without agricultural or cultivational efforts.

Nonattainment area. An area that has been designated by the U.S. Environmental Protection Agency and the appropriate state air quality agency as exceeding one or more National Ambient Air Quality Standards.

Ostracods. A subclass of crustaceans comprising small active mostly freshwater forms having the body enclosed in a bivalve shell.

Overall vacancy. Total number of single-family, multifamily, or mobile homes that are not occupied at any given time.

Oxbow lake. A crescent-shaped lake formed when a stream abandons a semicircular curve in its channel and takes a new course.

P.L. 81-874 programs. Federal law which authorizes financial assistance to local school districts when federal actions place fiscal burdens on the districts.

Paleo-. Prefix meaning "old" or "ancient."

Paleontological resources. Fossilized organic remains from past geological periods.

Paleozoic. An era in geological history occurring between 570 million and 245 million years ago, marked by the culmination of almost all invertebrates except the insects; in its later periods, marked by the first appearance of land plants, amphibians, and reptiles.

Parish. A civil division of the state corresponding to a county.

Peak demand. The highest instantaneous amount of electrical power (in kilowatts) that an electrical system is required to supply over a given time frame, usually one year.

Peak hour. The hour of highest traffic volume on a given section of roadway between 7 A.M. and 9 A.M. or between 4 P.M. and 6 P.M.

Peak year. The year when a particular program-related effect is greatest.

Pelecypods. A class of bivalve mollusks with bilaterally symmetrical shells.

Pennsylvanian. A period of the Paleozoic era extending from about 320 million to 286 million years ago.

Perennial stream. A stream that flows continuously throughout the year.

Permanent housing. Units intended for year-round use.

Permanently disturbed land. Surfaces that will be covered by impervious materials or kept in a cleared condition to accommodate buildings, parking lots, roads, and security zones.

Permian. A period of the Paleozoic era extending from about 286 million to 245 million years ago.

Personal income. Current income received by persons from all sources; includes transfer payments from governments or businesses.

Petroglyph. Schematic or representational art incised or pecked into a rock surface.

Physiographic province. A region with similar geologic structure and climate which has a unified geomorphic history.

Pictograph. Schematic or representational art painted or drawn onto a rock surface.

Pleistocene. The last 1.6 million years of geological history, marked by repeated glaciation and the first indication of social life in human beings.

Pliocene. An epoch of the Tertiary period extending from about 5 million to 1.6 million years ago.

Post boost vehicle. The portion of the missile containing the reentry vehicle and the guidance and attitude control system.

Potentiometric level. The level to which groundwater would rise under unconfined conditions; it may assume values higher than the local topography.

Precambrian. All geologic time before the Paleozoic era, equivalent to about 90 percent of geologic time.

Prehistoric. The period of time before the written record, and before Europeans entered an area.

Prevention of Significant Deterioration Area. A requirement of the Clean Air Act (§160 et seq) that limits the increases in ambient air pollutant concentrations in clean air areas to certain increments even though ambient air quality standards are met.

Primary contact recreation. Refers to the beneficial use of water involving recreation which results in full body contact with the water, such as swimming and diving.

Primary road. A consolidated system of connected main roads important to regional, interstate, and statewide travel; they consist of rural arterial routes and their extensions into and through urban areas of 5,000 or more population.

Prime farmland. Land that has the best combination of physical and chemical characteristics for producing food, feed, fiber, forage, oilseed, and other agricultural crops with minimum inputs of fuel, fertilizer, pesticides, and labor, and without intolerable soil erosion, as determined by the Secretary of Agriculture (Farmland Protection Policy Act, 7 CFR §658).

Principal aquifer. The particular aquifer that supplies the majority of the groundwater used in a given region.

Projectile point. Implement that probably served as the tip of a dart, lance, spear, or arrow.

Property tax. Tax imposed by local governments based on the value of property within their jurisdiction.

Proprietary funds. One of the major fund groups, consisting of enterprise fund accounts and internal service fund accounts.

Protohistory. The period when nonliterate American Indian cultures were affected by Euro-Americans without direct contact. For instance, inland Indian tribes received trade goods and reports of European cultures from coastal tribes before the arrival of European explorers in the interior.

Public finance. Finances of, or relating to, a government entity.

Quarry. A locality where lithic material was extracted and initially prepared for the manufacture of stone implements. In the narrow sense, the term refers to places where raw materials were actually excavated, but its use is commonly extended to localities where materials are collected at the surface (e.g., gravel deposits).

Quaternary. A geologic period representing the last 1.6 million years of earth history which includes the Pleistocene and Holocene (Recent) epochs.

Rad. A unit of absorbed dose of radiation that represents the absorption of 100 ergs of ionizing radiation per gram of absorbing material (e.g., body tissue).

Recent. A geologic epoch of the Quaternary period representing the last 10,000 years of geologic time.

Recharge. The process by which water is absorbed and added to the zone of saturation, either directly into a formation or indirectly by way of another formation.

Region of Influence. That area where program-induced effects of any magnitude may be expected to occur.

Relief. The vertical difference in elevation between the hilltops or mountain summits and the lowlands or valleys of a given region.

Regular "A" district. For purposes of qualifying for federal educational aid through P.L. 81-874 programs, a regular "A" district is one where the school-age children of persons who live and work on federal property account for less than 20 percent of the district's enrollment.

Regular "B" district. A school district where the school-age children of persons who work on federal property but live in the community account for less than 20 percent of the district's enrollment.

Rem. The dose of ionizing radiation that will cause the same effect as one roentgen of X-ray or gamma-ray dosage.

Reserve bonding capacity. Statutory limit of long-term debt of a jurisdiction minus current outstanding debt.

Restrictive easement. The right to restrict the erection of habitable buildings, the congregation of people, or other activities within a specified safety clearance distance of munitions storage areas, armed aircraft, and explosives-related facilities.

Revegetation. Regrowth or replacement of a plant community on a disturbed site. Revegetation may be assisted by site preparation, planting, and treatment, or it may occur naturally.

Revenue. Money that a government entity collects or receives.

Revenue bond. Financial instrument used by government agencies to fund major capital improvements. Used for projects which generate revenue from user charges or similar fees or charges which are applied toward both project operation and debt retirement (e.g., water and sewer plant operations).

Riparian. Of or relating to land lying immediately adjacent to a water body, and having specific characteristics of that transitional area (e.g., riparian vegetation).

Rockshelter. A naturally formed sheltered overhang that was commonly inhabited by prehistoric groups; it is generally found on a vertical rock face and is not as deep as a cave.

Roentgen. The international unit of radiation equal to the amount of radiation that produces ionization equal to one electrostatic unit of charge per cubic centimeter of air.

Runoff. The noninfiltrating water entering a stream or other conveyance channel shortly after a rainfall event.

Rural area. The area outside towns, cities, or communities that is characterized by very low-density housing concentrations, agricultural land uses, and a general lack of most public services.

Safe yield. The pumpage from a groundwater basin or aquifer that can be permanently maintained without substantially lowering the groundwater below a predetermined level.

Sampling. The selection of a portion of a study area or population, the analysis of which is intended to permit generalization about the entire population. In archaeology, samples are often used to reduce the amount of land area covered in a survey or the number of artifacts analyzed from a site. Statistical sampling is generally preferred since it is possible to specify the bias or probability of error in the results, but judgmental or intuitive samples are sometimes used.

Sandstone. A sedimentary rock composed of detrital materials generally composed of quartz and deposited by physical processes.

Scabland. An elevated tract of bare or shallow-soiled rocky land caused by denudation of the soil mantle.

Seasonality. Phenomena that show cyclic or repeated behavior according to the season.

Secondary contact recreation. Refers to the beneficial use of water involving recreation that results in limited body contact with the water, such as fishing and boating.

Secondary employment. In economics, the additional employment and income generated by the economic activity required to produce the inputs to meet the initial material requirements. The term often is used to include induced effects.

Secondary highways. Rural major collector routes that carry extensive local traffic.

Seismic. Pertains to the characteristics of an earthquake or earth vibrations including those that are artificially induced.

Seismic zone. An area of intense local seismicity.

Seismotectonic province. A region characterized by similar tectonic and seismic characteristics.

Shale. A fine-grained sedimentary rock formed by the consolidation of clay, silt, and mud.

Sheet erosion. Erosion caused by a layer of water moving downward on a surface that has not yet developed channels, rills, or gullys. Uneven sheet erosion leads to the formation of rills and eventually gullys.

Short duration. Transitory effects of the proposed program that are of limited duration and are generally caused by construction activities or operations start-up.

Significance. The importance of a given impact on a specific resource as defined under the Council on Environmental Quality regulations.

Siltstone. A fine-grained sedimentary rock composed of silt-sized detritus.

Single-family housing. A conventionally built house consisting of a single dwelling unit occupied by one household.

Site. Any location where humans have altered the terrain or discarded artifacts.

Slough. A water-filled channel with little flow; often a former river channel.

Soil. A natural body consisting of layers or horizons of mineral and/or organic constituents of variable thickness and differing from the parent material in their morphological, physical, chemical, and mineralogical properties, and biological characteristics.

Soil association. A collection of soils found to geographically occur together.

Soil series. The lowest category used for differentiating groups of soils based on similar properties and characteristics. Soils are homogenous with respect to profile characteristics except for the A or surface horizon which may vary in texture.

Soil types. A category or detailed mapping unit used for soil surveys based on phases or changes within a series (e.g., slope, salinity).

Sole source aquifer. An aquifer which provides all or most of the potable water in an area and which has been specifically designated by the U.S. Environmental Protection Agency as provided for in the Safe Drinking Water Act. Projects which might affect a sole source aquifer are subject to special review procedures.

Special assessment funds. One of the governmental fund types, used to account for financing of public improvements or services deemed to benefit the properties against which special assessments are levied (e.g., a charge for sidewalk construction, based on the linear footage of property frontage and a cost per linear foot for sidewalk construction).

Special district. Local government unit charged with provision of a specific service. Examples include water supply districts, lighting districts, and flood control districts. Generally, funding is from property taxes levied on the property benefiting from the service.

Special revenue funds. Used to account for the proceeds of special revenue sources (redistributed state-shared revenues such as gasoline taxes) that are legally restricted to expenditures for specific purposes (e.g., road construction); also supported in part by local property taxes.

Standard Industrial Classification. A federal scheme classifying industries by major lines of business grouped into categories of similar activity.

State Historic Preservation Officer. The official within each state, authorized by the state at the request of the Secretary of the Interior, to act as liaison for purposes of implementing the National Historic Preservation Act.

State-sensitive/State-recognized species. Plant and wildlife species in each state that are monitored and listed for purposes of protection.

Stratified site. An archaeological site exhibiting various strata or layers of occupation; usually implies a large site with a long occupation. The interpretation and analysis of strata are concerned with the original succession and age relations of layered materials and their individual properties (i.e., cultural materials are dated relative to each other by their position in stratigraphic layers).

Subsistence economy. The method of producing the food or goods necessary to provide a minimal standard of living, as opposed to a market economy in which a surplus is produced for redistribution.

Subsistence/settlement pattern. The distributional patterns of site types in relation to the environment that reflect a particular adaptation. Aspects of land use include the function, duration, and seasonality of individual sites.

Super "A" district. For purposes of qualifying for federal educational aid through P.L. 81-874 programs, a super "A" district is one where the school-age children of persons who live and work on federal property account for more than 20 percent of the district's enrollment.

Super "B" district. A school district where the school-age children of persons who work on federal property but live in the community account for more than 20 percent of the district's enrollment.

Surface collection. Systematic mapping and removal of artifacts from a site by means not involving excavation.

Survey. A systematic search for cultural resources; may include literature review and records search, but an on-ground field investigation is usually implied. Surveys may be conducted at different levels of intensity, ranging from a reconnaissance or spot check to an intensive inventory study.

Tax revenue. Revenue of local governments, generally based on the valuation of goods or services; includes property, sales, excise, and other miscellaneous taxes.

Taxon (pl.) Taxa. A taxonomic entity (species, subspecies, or variety) or a group of such entities.

Tectonic. Dealing with the regional assembling of structural or deformational features, and includes a study of their mutual relations, origin, and historical evolution.

Temporarily disturbed land. Surfaces disturbed during construction, but later regraded and/or revegetated; or those able to return to a natural state during the operational life of the program.

Temporary housing. Dwellings meant for occupancy on a temporary basis (generally for less than a month), such as rooms in hotels and motels.

Terrace. A flat portion of land created when a stream or river cuts farther into its channel and migrates laterally to a different location. In river valleys, they typically represent former levels of the valley floodplain.

Terrain failure. A generalized term for any number of mechanisms by which soil or rock is transported downslope under the effect of gravity.

Terrestrial. Living on or in, or growing from the land.

Tertiary. The first period of the Cenozoic era extending between 66 million and 1.6 million years ago.

Then-year dollars. Current dollars unadjusted for inflation.

Threatened species. Taxa likely to become endangered in the foreseeable future.

Thrust fault. A fault with a low angle of dip on which the hanging wall has moved upward relative to the footwall.

Tipi ring/Stone circle. A circle of stones generally measuring from 3.5 meters to 7 meters in diameter that is thought to represent the remains of various types of structures or to have served a religious or ceremonial function.

Ton. A unit of weight equal to 2,000 pounds.

Topsoil. The upper or productive layer(s) of a soil.

Total dissolved solids. The concentration of solid materials which are dissolved in a sample of water; determined as the weight of the residue of a water sample upon filtration and evaporation divided by the volume of the sample.

Total water use. The amount of water withdrawn from the natural resource base for a beneficial purpose, excluding water used for hydroelectric power generation, and certain nonconsumptive uses such as once-through cooling water for thermoelectric power generation, wildlife habitat, and fish farming.

Triassic. A period of the Mesozoic era extending from about 245 million to 208 million years ago.

Trilobite. Extinct Paleozoic marine arthopod; an invertebrate animal (e.g., insects, arachnids, and crustaceans).

Two-lane highway. A roadway having a two-lane cross section, with one lane for each direction of flow, and where passing maneuvers must be made in the opposing lane.

Unconfined aquifer. An aquifer where the water table is exposed to the atmosphere through openings (pores) in the overlying materials.

Unemployment rate. The number of civilians, as a percentage of the total civilian labor force, without jobs but actively seeking employment.

Unique farmland. Land other than prime farmland that is used for production of specific high-value food and fiber crops as determined by the Secretary of Agriculture. It has the special combination of soil quality, location, growing season, and moisture supply needed to economically produce sustained high quality or high yields of specific crops when treated and managed according to acceptable farming methods. Examples of such crops include citrus, tree nuts, olives, cranberries, fruits, and vegetables.

Unique and sensitive habitats. Areas that are especially important to regional wildlife populations or protected species or which have other important biological characteristics (e.g., severe wintering habitats, nesting areas, and wetlands).

Universal Soil Loss Equation. An equation that estimates the amount of soil lost to rainfall erosion, commonly measured in tons per acre per year, based on factors such as rainfall intensity, K-factor, slope, and management practices.

Unsuccessful job seekers. Persons seeking employment in a given area in excess of employment demand.

Upland. Land that is topographically high.

Vision quest site. A sacred area used by American Plains Indians to seek supernatural guidance through fasting and prayer, usually located on a prominence (e.g., butte, mesa, or ridgetop).

Visual attributes. The arrangement of a particular landscape as formed by the variety and intensity of the landscape features and the four basic elements of form, line, color, and texture. These factors give an area the distinctive quality which distinguishs it from other areas.

Volume (Transportation). The total number of vehicles that pass over a given point or section of a roadway during a given time interval. Volumes may be expressed in terms of annual, daily, hourly, or subhourly periods.

Warhead. The nuclear device contained within a reentry vehicle. Does not include the detonating mechanism and associated equipment.

Water table. The upper surface of an unconfined body of groundwater.

Waterfowl. Bird species (e.g., ducks, geese, cranes) that live on or near water bodies.

Watershed. See Basin.

Watt. A unit of electrical power equal to 1/756th horsepower.

Well yield. The sustainable volume of water discharged from a well per unit of time, often expressed in gallons per minute.

Wetlands. Areas that are inundated or saturated with surface or groundwater at a frequency and duration sufficient to support a prevalence of vegetation typically adapted for life in saturated soil, including swamps, marshes, bogs, and similar areas.

Wherry housing. A design of onbase family housing which was generally built before World War II.

Wind erodibility group. An assemblage of soils grouped by their similar properties which affect their resistance to soil blowing.

Wind erosion. Detachment, transportation, and deposition of loose topsoil by wind action.

Wind Erosion Equation. An equation that estimates the amount of soil lost as a result of wind erosion based on factors such as soil erodibility, climate, and vegetative cover.

Wye. Railroad intersection resembling the letter "y."

X-ray. Electromagnetic radiations similar to visible light but of extremely short wavelength (less than 100 angstroms).

Year-round housing. Dwellings meant for occupancy throughout the year as distinguished from temporary housing (e.g., hotels and motels). Includes single-family structures, multifamily structures, and mobile homes.

Zoning. The division of a municipality (or county) into districts for the purpose of regulating land use, bulk of building, required yards, necessary off-street parking, and other prerequisites to development. Zones are generally shown on a map and the text of the zoning ordinance specifies requirements for each zoning category.

10-Year, 7-day low flow. Based on a statistical analysis of historical flow records, the lowest average flow over a period of seven successive days that would be expected to occur once during any 10-year period.

10.2 Acronyms

AADT	Average Annual Daily Traffic
AAR	American Association of Railroads
ACGIH	American Conference of Governmental Industrial Hygienists
ACHP	Advisory Council on Historic Preservation
A&CO	Assembly and Checkout
AFB	Air Force Base
AICUZ	Air Installation Compatible Use Zone
ALG	Arkansas/Louisiana Gas Company
ANG	Associated Natural Gas Company
AP&L	Arkansas Power and Light Company
AQCR	Air Quality Control Region
AREFS	Air Refueling Squadron
AREFW	Air Refueling Wing
ASCS	U.S. Agricultural Stabilization and Conservation Service
ATC	Air Training Command
BN	Burlington Northern Railroad
CBD	Central Business District
CBPU	Cheyenne Board of Public Utilities
CDP	Census Designated Place

CEQ	Council on Environmental Quality
CFR	Code of Federal Regulations
CLFP	Cheyenne Light, Fuel and Power Company
COE	U.S. Army Corps of Engineers
DEIS	Draft Environmental Impact Statement
DFSC	Defense Fuels Supply Center
D&M	Detroit and Mackinac
DNS	Director of Nuclear Security
DOD	U.S. Department of Defense
DOE	U.S. Department of Energy
DRMO	Defense Reutilization and Marketing Office
EIS	Environmental Impact Statement
EOD	Explosive Ordnance Disposal
EPA	U.S. Environmental Protection Agency
FEIS	Final Environmental Impact Statement
FEMA	Federal Emergency Management Agency
FRA	Federal Railroad Administration
FY	Fiscal Year
GFGC	Great Falls Gas Company
GFPS	Great Falls Public School
HML	Hard Mobile Launcher
ICBM	Intercontinental Ballistic Missile
JNACC	Joint Nuclear Accident Coordinating Center
LEGG	Launch Eject Gas Generator
LOI	Level of Impact
LOS	Level of Service
MAB	Missile Assembly Building
MOB	Main Operating Base
MoPub	Missouri Public Service Company
MPC	Montana Power Company
NAAQS	National Ambient Air Quality Standards
NARP	Nuclear Weapons Accident Response Procedures
NCA	National Command Authority
NCO	Noncommissioned Officer
NCP	National Contingency Plan
NDA	National Defense Area
NEDS	National Emission Data System
NRHP	National Register of Historic Places
NSP	Northern States Power
NWSSG	Nuclear Weapons System Safety Group
PSD	Prevention of Significant Deterioration
ROI	Region of Influence
ROW	Right-of-Way
RV	Reentry Vehicle
SAC	Strategic Air Command
SATAF	Site Activation Task Force
SCS	U.S. Soil Conservation Service
SHPO	State Historic Preservation Officer
SPEGL	Short-Term Public Exposure Guidance Level
SSWG	System Safety Working Group
TAS	Train Alert Shelter
TSP	Total Suspended Particulates
TTS	Training Train Shelter
U.R.F.	Unit Risk Factor
USDA	U.S. Department of Agriculture
USFS	U.S. Forest Service
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey

WAPA	Western Area Power Administration
WSA	Weapons Storage Area
WWP	Washington Water Power

10.3 Units of Measurement

acre-ft	acre-foot
acre-ft/yr	acre-foot per year
Bcf	billion cubic feet
°C	degrees Celsius
dB	decibel
dBA	decibel on the A-weighted scale
ft	foot
kg	kilogram
km	kilometer
kV	kilovolt
kWh	kilowatt-hour
L_{dn}	day/night equivalent noise level
L_{eq}	energy-equivalent continuous noise level
MBtu	million British thermal units
Mcf	thousand cubic feet
MG	million gallons
MGD	million gallons per day
mi	mile
MMcf	million cubic feet
mph	miles per hour
MVA	megavolt-ampere
MW	megawatt
PM_{10}	particulate matter
ppm	*parts per million*
rem	roentgen equivalent man
sq ft	square foot
sq km	square kilometer
sq mi	square mile
T/ac	ton per acre
T/ac/yr	ton per acre per year
T/day	ton per day
$\mu Ci/m^2$	microcuries per square meter
$\mu Ci/m^3$	microcuries per cubic meter
$\mu g/m^3$	microgram per cubic meter

10.4 Chemical Abbreviations

CO	Carbon Monoxide
HCl	Hydrogen Chloride
MMH	Monomethylhydrazine
NO_x	Nitrogen Oxides
NO_2	Nitrogen Dioxide
N_2O_4	Nitrogen Tetroxide
SO_x	Sulfur Oxides
SO_2	Sulfur Dioxide
VOC	Volatile Organic Compounds

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Appendix A
MITIGATIONS

A.1 Introduction

The proposed construction and operation of the Peacekeeper Rail Garrison system would cause significant impacts on some elements of both the physical and human environment. It is the policy of the Air Force to make every effort practicable to avoid environmental impacts through careful design, siting, and construction of the Peacekeeper Rail Garrison system, as well as in activating the system for operation. This appendix summarizes the mitigation measures presented in Chapter 4.0, Affected Environments and Environmental Consequences.

A.2 Approach

Mitigation measures are the means by which environmental impacts can be reduced or eliminated. These may include any of the following: (1) avoiding the impact altogether by not taking an action or part of an action or changing the design; (2) minimizing impacts by limiting the degree or magnitude of the action and its implementation; (3) rectifying the impact by repairing, rehabilitating, or restoring the affected environment; (4) reducing or eliminating the impact over time by preservation and maintenance operations during the life of the program; and (5) compensating for the impact by replacing or providing substitute resources.

It is important to distinguish among mitigation measures according to the federal, state, or local agencies required to implement them. Such agencies are identified in parentheses at the end of each mitigation measure described in this appendix. It must be understood that, like any other federal agency, the Air Force can accomplish only those measures for which it receives legal authority and for which funds are appropriated. It can advocate, but cannot implement, actions that are the responsibility of other agencies. Therefore, determination as to which measures will ultimately be undertaken must await future developments.

In general, the Air Force, through its construction agent, the U.S. Army Corps of Engineers (COE), will implement those mitigation measures directly under the control of the COE. Measures more appropriately developed and implemented by other institutions will be supported to the extent possible.

For the Peacekeeper Rail Garrison program, mitigation planning will be done in two phases: (1) preoperational planning and (2) operational planning. Preoperational planning includes close coordination with responsible federal, state, and local agencies on impact identification and mitigation alternatives. In some instances, memorandums of agreement between the Air Force and the participating agencies will describe the procedures to be followed. Preparation planning also includes the design stage and the construction/deployment stage. In the design stage, mitigation by avoidance is implemented to the extent practicable. In the construction and deployment stage, the mitigation measures adopted in earlier stages are implemented and monitored. The operational planning phase incorporates those planning and environmental mitigations normal to an Air Force base. These ensure wise protection, provision, use, and management of human, financial, natural, and manmade resources; and promotion of public health, safety, welfare, and overall quality of life for the Air Force personnel as well as the local community that supports the Air Force base.

A.3 Impact Mitigations

A discussion of mitigation measures and their effectiveness in eliminating or reducing the impacts on resources which are significantly impacted follows:

Socioeconomics

- As appropriate, award multiple small contracts to enable local firms with limited bonding capacities the opportunity to bid. Contract awards to local firms would reduce population inmigration during the construction phase and consequently lower demand for temporary housing units (COE).

- Monitor socioeconomic changes in the host communities of the candidate installations chosen for deployment, to provide up-to-date projections of key indicators and identify deviations from projected impact levels. This measure would allow the U.S. Air Force, in conjunction with state agencies, to develop new mitigation measures or revise existing measures, as required (U.S. Air Force).

- Provide information to local job service agencies about the availability of jobs (by type) and the skills needed for them. This information could help reduce the number of job seekers inmigrating into the area and reduce demand for local housing (U.S. Air Force contractors).

- Maximize participation in P.L. 81-874 entitlement programs by encouraging parents who live or work on federal facilities to respond to school district requests for information. This federal program provides aid to local school districts which have had substantial increases in school enrollments as a result of new or expanded federal activities (U.S. Air Force).

Transportation

- Encourage the use of additional gates at bases where congestion at the main gates is identified as a problem. This mitigation would be effective in reducing such congestion (U.S. Air Force).

- Schedule work hours for program-related employees to avoid commuting during normal traffic peak hours, and encourage ride sharing. This mitigation would reduce peak-hour traffic flow increases and therefore reduce congestion and delay without additional cost to the Air Force and its contractors (U.S. Air Force and its contractors).

- Provide additional manpower for registration and card checks at the entrance gate during the peak hour. This mitigation would be effective in reducing the queuing and waiting times at the base entrance and prevents the queue from backing up into a major thoroughfare (U.S. Air Force).

- Improve congested roads, use other existing routes, or construct bypasses to reduce traffic congestion and delays (U.S. Air Force, Federal Highway Administration, state highway departments, and affected cities).

Cultural Resources

- Follow the guidelines for maintaining architectural integrity to mitigate program alteration or modification to any historic structure within a National Register District or National Historic Landmark. Some standing structures may require additional archival research and documentation according to the Historic American Building Survey or the Historic American Engineering Record standards for historic structures. Ground-disturbing construction activities would be monitored by a qualified archaeologist, where surveys indicate a need, to ensure identification and documentation of newly uncovered resources (COE).

- Avoid known cultural resources to the extent possible. However, if avoidance is not possible, implement data-recovery plans and various architectural treatments. Surface collection, mapping, and excavation may be acceptable data-recovery techniques for prehistoric resources and historic archaeological properties (COE).

- Plant a ground cover on a previously disturbed site to reduce erosion and improve the preservation of a site (COE).

- Consult with Native American representatives if resources are encountered during construction. Appropriate treatment for burials encountered during construction may include reburial according to the local Native American traditions (U.S. Air Force).

Biological Resources

- Limit the areal extent of construction disturbance in wetlands and other sensitive habitats to the minimum possible. Operate construction equipment only on roads or within designated disturbance areas (U.S. Air Force and COE).

- Create new wetlands or enhance existing wetlands to substantially reduce impacts on wetlands onbase. A mitigation plan will be developed which will discuss the methods (e.g., grading, revegetation) to be used in creating new wetlands or enhancing existing wetlands. Development of the mitigation plan will be coordinated with the U.S. Army Corps of Engineers and the U.S. Environmental Protection Agency (U.S. Air Force).

- Implement habitat restoration (other than wetlands) or increase protection of sensitive species or important habitats if offsite mitigation is considered the only feasible means to compensate for site-level impacts on important habitats (U.S. Air Force and COE).

- Build sediment traps where appropriate on drainages flowing away from construction sites to control impacts from increased erosion in the area. A sediment retention basin constructed at the garrison could prevent offsite movement of large amounts of eroded soil (U.S. Air Force and COE).

- Build railroad and road embankments at less than the normal angle of repose for the soil type involved. This would minimize long-term erosion and sedimentation (COE and participating railroad companies).