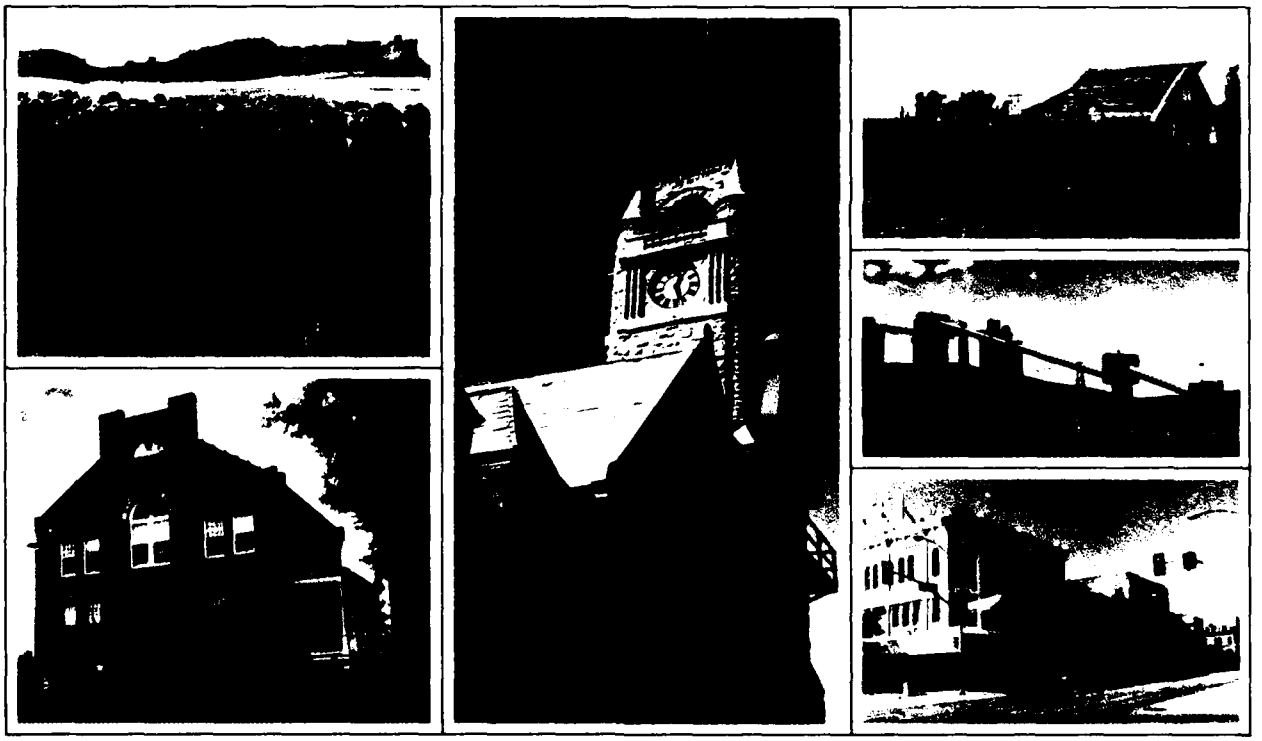
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Department of the Air Force

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DRAFT ENVIRONMENTAL IMPACT STATEMENT



PEACEKEEPER IN MINUTEMAN SILOS
90th Strategic Missile Wing
F.E. Warren Air Force Base

October 1983

93-17158

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PEACEKEEPER IN MINUTEMAN SILOS

DRAFT ENVIRONMENTAL IMPACT STATEMENT

OCTOBER 1983

Cover Sheet

(a) Responsible Agency: United States Air Force.

(b) Proposed Action: Deployment of the Peacekeeper System in Minuteman Silos in Wyoming and Nebraska.

(c) Written comments and inquiries on this draft environmental impact statement should be received by 28 November 1983 and directed to: Major Peter Walsh, Director, Environmental Planning Division (DEV), Dept. of Air Force, AFRCE-BMS, Norton Air Force Base, CA 92409, (714) 382-4891.

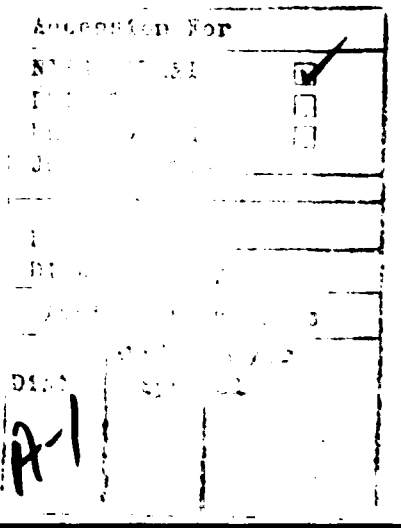
(d) Designation: Draft Environmental Impact Statement.

(e) Abstract: The President has directed that the Air Force deploy the Peacekeeper missile system at a location near F.E. Warren Air Force Base (hereafter F.E. Warren AFB), close to Cheyenne, Wyoming. The Peacekeeper system (formerly known as the M-X system) is an advanced, land-based intercontinental ballistic deterrent force. The plan calls for the replacement of 100 existing Minuteman III missiles with 100 Peacekeeper missiles. Existing missile silos will be used, and there will be very little structural modification needed. Missile replacement will occur within the two squadrons (of 50 missiles each) located nearest F.E. Warren AFB, the 319th and 400th Strategic Missile Squadrons. Peacekeeper deployment will occur between 1984 and 1989.

This environmental impact statement (EIS) is based on a special Congressional action (the Jackson Amendment described in Section 1.3) that has exempted the basing mode and location of the action from the National Environmental Policy Act (NEPA). No other system alternatives are analyzed in this EIS. This EIS analyzes impacts of the Proposed Action so that appropriate mitigation measures can be identified for the decisionmaker. The No Action Alternative serves as the baseline against which project impacts are judged. This EIS analyzes alternative features of the Proposed Action in Section 3.0. The types of alternatives compared include those having to do with new transportation roads and structures at and adjacent to F.E. Warren AFB, additional buried, hardened communication cables connecting the two missile squadrons, and construction staging areas.

This EIS describes potential environmental effects in relation to the following environmental resources: Employment Demand; Housing; Public Finance; Construction Resources; Social Well-Being; Public Services and Facilities; Utilities; Energy Resources; Transportation; Land Use; Recreation; Cultural Resources; Visual Resources; Water Resources; Biological Resources; Threatened and Endangered Species; Geologic Resources; Noise; and Air Quality. These environmental resources were derived from a preliminary analysis of the Proposed Action upon the study area. These environmental resources were utilized for the scoping process and for data collection and analysis.

DTIC QUALITY INSPECTED 3



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EXECUTIVE SUMMARY

PURPOSE AND ALTERNATIVES

Purpose

The Air Force plans to deploy the Peacekeeper Missile System within the 90th Strategic Missile Wing at F.E. Warren Air Force Base (AFB) near Cheyenne, Wyoming. The Peacekeeper system is an advanced, land-based intercontinental ballistic missile system designed to improve the nation's strategic deterrent force. Land-based strategic missiles are an integral part of the United States' nuclear deterrence strategy. Air, sea, and land-based weapons form a TRIAD of strategic forces, each with different capabilities and advantages to complicate Soviet offensive and defensive planning. The TRIAD also provides a hedge against technical problems that could temporarily disable a system and against technological breakthroughs or a rapid evolution of threats that might erode the survivability of one or more parts of our strategic forces.

The Scowcroft Commission was established by the President in January 1983 to study the nation's strategic modernization needs. The Commission concluded that the advantages of the land-based portion of the TRIAD (i.e., low maintenance costs, high reliability, rapid response, and great accuracy) in addition to its contribution to the effectiveness of the TRIAD, make it imperative that the land-based missile system be upgraded to address the challenges posed by the Soviet Union. As part of their recommendation on upgrading, the Commission urged deployment of 100 Peacekeeper missiles as an immediate measure to modernize the land-based missile system. The President, following review of the Scowcroft Commission report, decided on deployment of 100 Peacekeeper missiles in specific existing silos supported by F.E. Warren AFB and provided this decision in his report to Congress.

The 1983 Defense Appropriations Act exempted the President's report and proposals from the requirements of the National Environmental Policy Act. The purpose of this environmental impact statement is not to review those prior decisions, but to analyze the impacts of implementing actions and their alternatives, including development of mitigation measures.

Alternatives

Within this framework, alternatives are addressed for several system elements. These are: 1) three alternative road configurations for linking the new Stage Storage Area onbase with the existing base Weapons Storage Area, as well as achieving access offbase to the Deployment Area; 2) ten alternative communications cable paths from which five would be selected, linking the 319th and 400th Strategic Missile Squadrons; and 3) three alternative staging area combinations for providing temporary field storage and administrative centers during the project. This environmental impact statement provides environmental information for the decisionmaker in selecting from these alternatives.

SYSTEM DESCRIPTION

The Peacekeeper deployment plan calls for the replacement of 100 of the existing Minuteman III missiles with 100 Peacekeeper missiles. Existing missile Launch Facilities will be used with modifications (Figure S-1). Missile replacement will occur within the two squadrons located nearest F.E. Warren Air Force Base, the 319th and the 400th Strategic Missile Squadrons (Figure S-2). Additional buried hardened intersite cable systems will be laid to link Squadrons 319 and 400. In addition, a number of support buildings will be constructed or altered at F.E. Warren AFB which currently serves as the Strategic Missile Support Base (referred to in this document as the Operating Base) for the 90th Strategic Missile Wing. The Peacekeeper missile system is scheduled to achieve initial operational capability in December 1986 and to be fully operational by late 1989.

Operations of the Peacekeeper system will be similar to the Minuteman system. The major differences are in the transport of the missile. Peacekeeper stages will be transported separately to the Launch Facilities in a stage transporter that is about 100,000 pounds heavier, 12 feet longer, and 1 foot higher than the Minuteman transporter erector. Since the stage transporter will have twice as many wheels per axle, the single wheel load will be about 1,000 pounds less. The existing road network will be upgraded as required to accommodate the stage transporter.

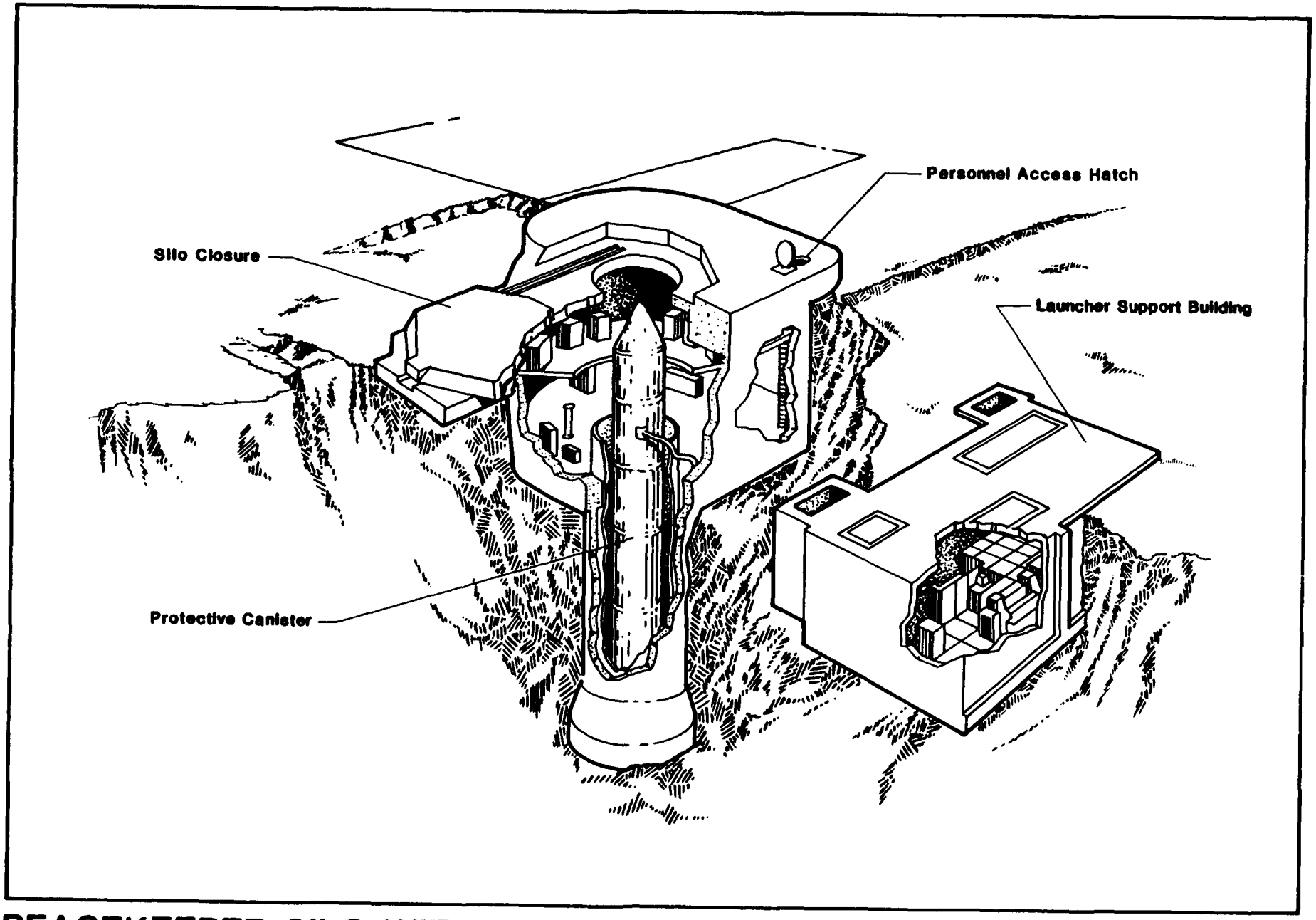
Security and maintenance operations in the Deployment Area will be similar to those now in effect for the Minuteman system.

SYSTEM DEPLOYMENT

Construction at F.E. Warren Air Force Base will occur between 1984 and 1986. Fifteen new buildings will be constructed and modifications or additions made to other various existing facilities. The area of new or renovated facilities exceeds 400,000 sq ft. A new road configuration, from among three alternatives, is proposed to link Peacekeeper facilities on the base and to provide improved access offbase and onbase.

Work in the Deployment Area will occur from 1985 to 1989. Many of the access roads to the Launch Facilities will be upgraded. Bridge clearance problems will be corrected, and some culverts and bridges may need to be upgraded. Above-ground modifications to the Launch Facilities will be minor. Most of the below-ground modifications will be related to removal of Minuteman support hardware, insertion of a protective canister to enclose the Peacekeeper, and installation of communications systems and support equipment.

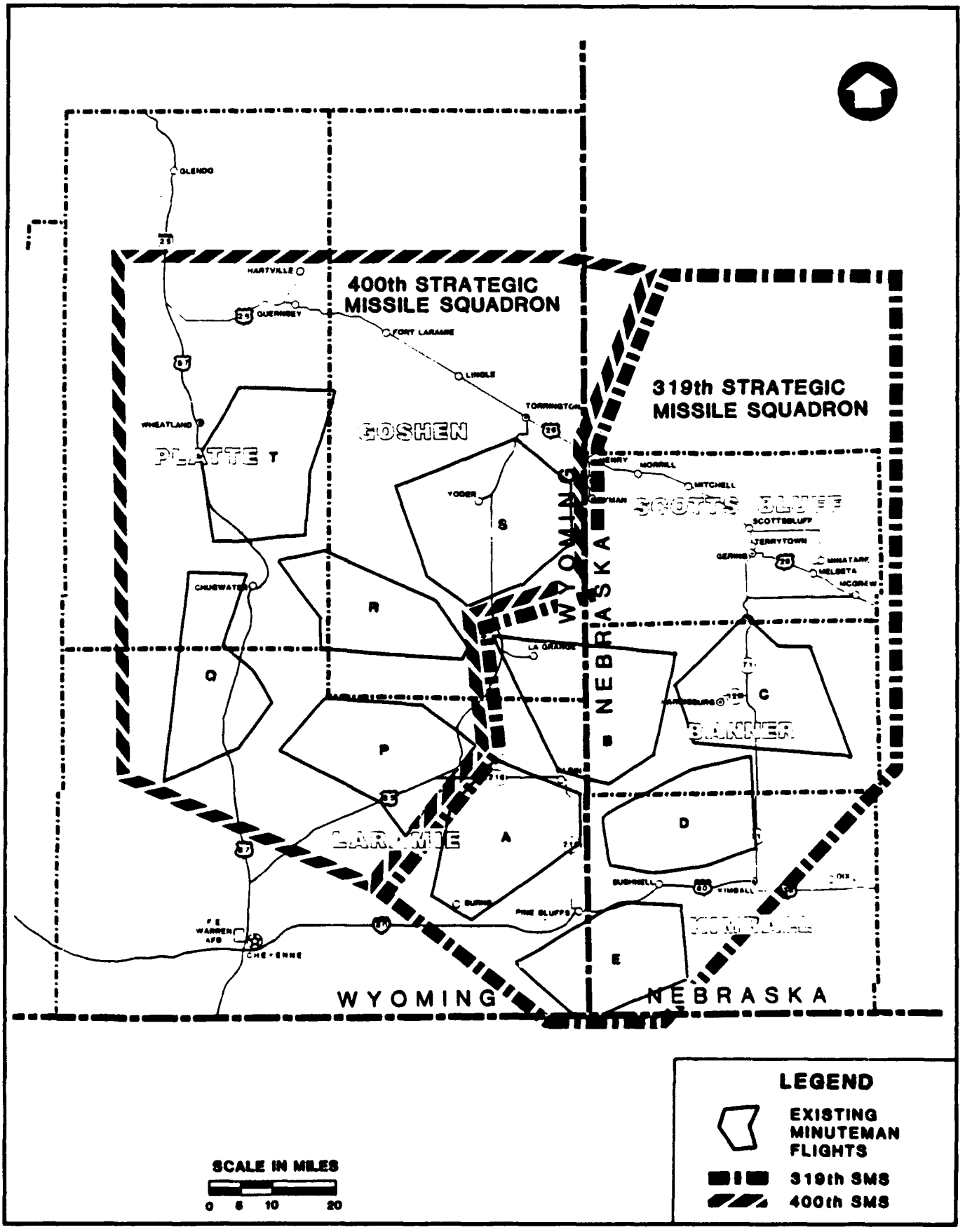
A total of ten alternative routes have been chosen as candidates for the laying of buried cables to link Squadrons 319 and 400. For each cable alternative a 1-mile wide corridor has been analyzed in which a specific 35-foot wide route would be chosen should that alternative be selected. A temporary easement width of 35 feet will be needed for trenching and cable placement. The permanent easement width will be 16.5 feet. The cable depth will be approximately 3 feet. Five routes will be selected for installation. Total buried length will range from approximately 60 to 130 miles, depending upon final route selections.



(15-11)

PEACEKEEPER SILO WITH ITS PROTECTIVE CANISTER

FIGURE NO. S-1



PEACEKEEPER DEPLOYMENT AREA

(16-2)

FIGURE NO. S-2

DEPARTMENT OF THE AIR FORCE
WASHINGTON 20330

OFFICE OF THE ASSISTANT SECRETARY

September 22, 1983

TO: GOVERNMENT AGENCIES AND INTERESTED ORGANIZATIONS AND INDIVIDUALS

We are pleased to provide you a copy of the Draft Environmental Impact Statement for Peacekeeper in Minuteman Silos. Comments are requested by November 28, 1983, and should be forwarded to AFRCE-BMS/DEV, Norton AFB, CA 92409. The Air Force will not extend the comment period deadline. Thank you for your interest in our environmental impact statement process.

Sincerely,

JAMES F. BOATRIGHT
Deputy Assistant Secretary of the Air Force
(Installations, Environment and Safety)

1 Atch
Draft Environmental
Impact Statement

Contractors may be expected to establish up to three construction staging areas consisting of sites for temporary, open storage of equipment and material. One small portable building will also be present at each site for contractor use.

Three staging area location alternatives are available:

- o One each at F.E. Warren AFB; Cheyenne, Wyoming; and Kimball, Nebraska;
- o One each at F.E. Warren AFB; and Cheyenne, Wyoming; and
- o No staging areas.

Direct manpower for construction, assembly and checkout, and operation of the system will peak during 1986 when an average of nearly 1,800 persons will be required. In 1991, following deployment, the increase in operational work force at F.E. Warren AFB will consist of about 500 persons.

ENVIRONMENTAL CONSEQUENCES OF THE PROJECT

General Approach to Impact Assessment

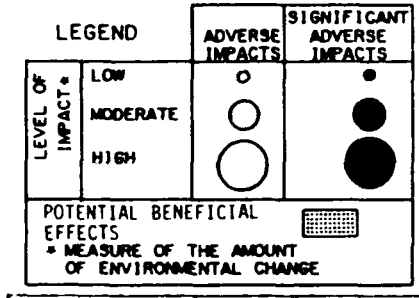
The impacts analyzed in this document have two characteristics: level of impact and significance at the site, local, and regional geographic areas. Level of impact is a measure of environmental change resulting from the project. Four impact levels are used throughout the impact analysis: negligible, low, moderate, and high. Specific definitions of these levels of impact vary by resource (environmental discipline) and can be found at the beginning of each resource evaluation in Section 3.0. A summary of impacts by resource is provided in Figure S-3 for alternatives evaluated and a summary of project impacts is provided as Figure S-4. The adverse impacts are identified with various sized circles and are shaded if significant. If there are also beneficial effects, a dot pattern is included. In some cases, there are both adverse impacts and beneficial effects for the same resource.

The term significant is used as a measure of the importance of the impact, and does not necessarily imply a separate judgment on the overall severity of the impact. Rather, it may indicate a judgment regarding which impacts warrant heightened attention, by the Air Force or others, during project planning; or it may reflect a judgment as to the extent of the action necessary to avoid that impact. The criteria used to evaluate significance are found at the beginning of each resource evaluation in Section 3.0.

To the extent practicable, standard construction practices that reduce or eliminate environmental impacts were assumed in assessing impacts. Additionally, other potential mitigation measures could reduce impacts. The Department of Defense (DoD) and the Wyoming-Nebraska Intergovernmental Executive Impact Council (IEIC) have agreed to enter into a cooperative mitigation agreement which will set forth specific measures to be undertaken by DoD which will mitigate adverse impacts resulting from the project.

Figure S-3

ALTERNATIVES COMPARISON MATRIX

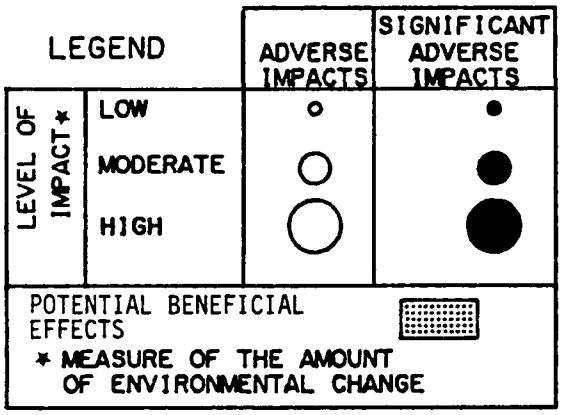


	CABLE PATHS[1]										ROADS[2]			STAGING[3]		
	PROPOSED ACTION					ALTERNATIVES										
	PA1	SB1	RB1	PA4	PD1	SB2	PB1	SC2	PA2	PA3	R1	R2[4]	R3	PROPOSED	ALT.	NONE
BIOLOGY			●	•	●	•	●	•		●	●	●	●			
LAND USE	o	o	o	o	o	o	o	o		o			o			
CULTURAL	o	◯	o	o	◯	◯	◯	◯	o	◯	o	o	o	o	o	
TRANSPORTATION													o	o		

Notes: 1 Denotes specific cable paths. For location of cable paths see Section 1.6.3.3 and Figure 1.6.3-1.
2 For location of alternative routes see Section 1.6.2.
3 For location of staging areas see Section 1.6.6.
4 Proposed Action for Roads.

FIGURE S-4

SHORT AND LONG TERM IMPACTS



	PROJECT IMPACTS					
	SHORT TERM			LONG TERM		
	SITE	LOCAL	REGIONAL	SITE	LOCAL	REGIONAL
Employment Demand						
Housing		●			o	
Public Finance		○			o	
Construction Resources			o			
Social Well-Being		●				
Public Services and Facilities		●			○	
Utilities	o	•				
Energy Resources		○	o		o	o
Transportation	•	●	o			
Land Use	o	o		o	o	
Recreation		●	●		o	o
Cultural Resources	○			o		
Visual Resources	o					
Water Resources	o	●	o	o	o	
Biological Resources	●		●	●		•
Threatened and Endangered Species	●		•	●		•
Geologic Resources	o	o			o	
Noise						
Air Quality		o				

Note: See General Approach to Impact Assessment.

This environmental impact statement is based upon data and detailed analysis contained in 12 companion environmental planning technical reports. The volumes are available for review at local libraries identified in Section 4.0.

IMPACT OF PROJECT ALTERNATIVES

Feasible alternatives for road configurations, cable routes, and staging areas have been identified. The impacts associated with these alternatives have been analyzed. The analysis has demonstrated that for most of the resource areas the level of impact is either negligible or low and not significant, and does not vary within each of the three sets of project element alternatives. For four resource areas (Transportation, Land Use, Cultural, and Biological Resources) there are variations in the level of impact among alternatives and these are summarized below and in Figure S-3.

For Transportation, all ten cable route alternatives will have a negligible impact. Two of the three road alternatives at F.E. Warren AFB will have negligible impacts. The third alternative involves a longer length of road upgrade, particularly roads offbase, plus new on/offramps at Interstate 80. It was found to have a low level of impact. Of the three staging area alternatives, the one involving a staging area at Kimball was found to have a low transportation impact due to the smaller size of the town of Kimball and its associated road network. The impact of the remaining two alternatives will be negligible. No impacts arising from the alternatives were found to be significant.

For Land Use, one cable path follows an existing road over its full length. Its impact will be negligible. All or portions of the remaining nine cable routes will result in temporary land disturbance, with a resulting low level of impact. Two of the road alternatives at F.E. Warren AFB will have negligible impact. The third alternative will have a low impact. This is because the new interchange constructed at Interstate 80 and Round Top Road may tend to stimulate urban development west of F.E. Warren AFB. Such an effect would be contrary to the current land use policies of the City of Cheyenne and Laramie County, which show this area in agricultural preservation. Impacts from the staging area alternative were found to be negligible. None of the alternatives' impacts will be significant.

For Cultural Resources, six of the ten buried cable alternatives have the potential for high impact. This is due to the documented presence of archaeological sites in the area which the cable will traverse and the high probability that these routes would destroy additional, presently unrecorded sites. The remaining four routes have been assigned a low or moderate impact.

All road alternatives at F.E. Warren AFB will have a moderate impact upon cultural resources located at the base. Two of these staging area alternatives will result in low impact due to limited ground disturbance. The alternative with no staging areas will have negligible impact. The Air Force plans to develop and implement a cultural resource management plan to provide for mitigation of potentially adverse impacts to National Register-eligible cultural resources. Consequently all such impacts resulting from the alternatives will not be significant.

For Biological Resources, four buried cable routes were found to have moderate and significant impact while three additional routes were noted as having a low, significant impact. These impacts generally stem from the likelihood of disturbance of unique or unusual habitat in the project area, particularly riparian, raptor, or aquatic habitat. All three road alternatives at F.E Warren AFB will have a high and significant impact upon a Category One plant species found on the base, the Colorado butterfly plant. All of the construction staging area alternatives will have a negligible and not significant biological impact.

Further details regarding the impact of the proposed project and its alternatives can be found in Section 3.0. Summary impact matrices are located at the conclusion of each resource assessment.

PROJECT IMPACTS

This section summarizes, by resource category, the impacts of the overall project and the proposed cable paths, roads, and staging areas presented in Figure S-3.

Employment Demand

Employment Demand describes the available regional labor force which may be used by the project, and the demand for nonlocal labor which may result in the inmigration of workers and their families.

Employment Demand analysis indicates a short and long-term beneficial effect on the City of Cheyenne and the Region of Influence because of increases in employment and income.

The peak inmigration into Cheyenne has been estimated to occur in 1987 and will involve approximately 3,800 persons. In addition, it will cause approximately 1,600 persons to inmigrate in 1987 associated with indirect employment requirements. An additional 900 persons have been estimated for the remainder of the region. The project will employ an average of approximately 1,800 persons during the 1986 peak year.

Approximately 500 additional persons, above the existing level of employment at F.E. Warren AFB, will be required from 1991 onward to operate and maintain the Peacekeeper system.

Housing

Housing includes the existing housing stock (single-family, multifamily, mobile homes, and temporary housing accommodations) and the capability of the private housing industry to respond to changes in housing demand.

A beneficial effect is presumed because of potential increase in sales value and rental income due to increased demand, although there is an opposite effect on the consumer, particularly those on fixed income and the first-time home buyer.

The Housing analysis indicates moderate and significant short-term and low but not significant long-term impacts for the Cheyenne Urban Area, and low, but not significant short-term impacts for the City of Kimball. These ratings are primarily the result of increases and decreases in mobile home demand during the construction period.

The overall impact of the project on Housing will be moderate and locally significant in the short term and low and not significant in the long term.

A number of potential mitigation measures could be implemented. Two of the more important ones listed are: 1) to provide housing demand forecast data to officials to assist in local planning efforts; and 2) to consider the provision of temporary, full service worker living accommodations. For additional details regarding potential mitigation measures see Section 3.1.2.6.

Public Finance

Public Finance describes the budgets, fiscal resources and obligations of all major governmental entities, including school districts and urban service areas.

The Public Finance analysis indicates a local, short and long term beneficial effect because of additional revenue to governmental entities due to increased sales and property taxes, and other taxes and fees. The analysis further indicates expenditures will also increase, creating some revenue/expenditure imbalances.

For most of the governmental entities examined, increased programmatic operating expenditures caused by the proposed project would be offset by comparable increases in revenue sources. However, construction of several capital facilities, which will be required even under the baseline conditions, may be advanced due to the project and related population increases.

The Public Finance analysis indicates the City of Cheyenne will experience low and not significant short-term impacts and high and not significant long-term impacts requiring the city to increase revenues in order to meet projected revenue/expenditure imbalance. Laramie County will experience low and not significant short-term impacts as a result of an expenditure imbalance. Long-term impacts will be moderate and not significant because most expenditure changes will be offset by revenues attributable to the project. The City of Cheyenne Board of Public Utilities will experience short-term moderate and not significant impacts resulting from an expenditure imbalance and low, long-term not significant impacts due to expenditures which will be offset by project-attributable revenue changes. Laramie County School District No. 1 will experience low, short-term not significant impacts and moderate, long-term not significant impacts because surpluses (carryovers) are reduced. The City of Kimball will experience moderate but not significant short-term impacts resulting in decreases in surplus revenue and carryover funds. Long-term impacts are low and not significant because a change in operating expenditures is expected to be offset by project-attributable revenues. Kimball County, South Cheyenne Water and Sewer District, and Kimball County School District (K to 12) will experience low short and long-term but not significant impacts because of a change in operating expenditures which is expected to be offset by project-attributable revenues.

The overall impact of the project on Public Finance will be locally moderate and not significant in the short term, and low and not significant in the long term.

A number of potential mitigation measures could be implemented. Two of the more important ones listed are: 1) to request funding through the Federal Impact Aid to School Districts for Laramie County School District No. 1; and 2) require all contractors and subcontractors to obtain a Wyoming sales tax license. For additional details regarding potential mitigation measures see Section 3.1.3.6.

Construction Resources

Construction Resources describes the construction materials market for cement, coarse and fine aggregate, ballast, asphalt, roofing, lumber, wood ties, structural steel, reinforcing steel, and steel rail.

Some regional beneficial effects may occur in the Region of Influence as a result of the project which causes a greater utilization of existing plant capacities and further employment needed to meet increased demand. Further employment could cause a regional rise in personal income.

The Construction Resources analysis indicates a low and not significant impact in the short term because of minor project demands (less than 1 percent of regional production capacity) for cement, coarse and fine aggregate, ballast, asphalt, roofing and wood ties, and negligible impacts in the long term.

The overall impact of the project on Construction Resources in the short term is low only at the regional level and not significant. All impacts are negligible in the long term.

Social Well-Being

Social Well-Being includes an assessment of the social well-being of area residents by identifying information on local issues, opinions and selected indicators of behavior.

A short-term beneficial effect is anticipated due to the improved local economy.

The Social Well-Being analysis indicates that Laramie and Kimball counties will experience significant moderate short-term and negligible long-term impacts at the local level. Moderate impacts are a result of inadequate local public and private resources available to deal with the inmigration of population and the associated social adjustment and social integration problems. In the long run these impacts will lessen and available public and private resources will adequately deal with the social changes.

The overall impacts of the project on Social Well-Being are locally significant and moderate in the short term and locally not significant and negligible in the long term.

A number of potential mitigation measures could be implemented. Two of the more important ones listed are: 1) development of a media program discouraging surplus job-seekers; and 2) establishment of various educational, job referral, and related social services programs. For additional details regarding potential mitigation measures see Section 3.1.5.6.

Public Services

Public Services are those services provided by governmental and other authorized agencies to meet the health and welfare needs of citizens. Included in this category are general government, education, law enforcement, criminal justice, fire protection, health care, human services, and libraries.

Public Services analysis indicates a high, short-term significant impact on education in Laramie County School District No. 1 due to increased enrollments for all primary and secondary grade levels from 1985 through 1992. Peak year increase in student enrollment is projected to be 7 percent over baseline forecasts. Mitigations to alleviate these impacts could consist of remodeling existing facilities, hiring additional teachers, and utilizing modular units, among others.

High, short-term not significant impacts are indicated for fire protection in the City of Cheyenne due to the need for additional firefighters, vehicles, and space. Mitigations, such as additional funding to the Fire Department to aid in the accelerated purchase of equipment and space, could be utilized to alleviate these high impacts.

Impacts for law enforcement are projected to be moderate due to the need for an increase in staffing and significant because of potential effects on public safety. Mitigations could include special training for local law enforcement personnel. General government, library, and criminal justice impacts are projected to be moderate because of additional staffing requirements, but not significant.

Health care impacts are low and not significant in that the inmigrant population can be absorbed with the existing local and regional health care and services system. Impacts on Human Services are projected to be low and significant due to the potential for controversy surrounding project-induced unmet needs in the city of Cheyenne.

The overall impacts on Public Services at the local level are rated for the short term as moderate and significant, and for the long term as moderate and not significant.

Utilities

Utilities describes water treatment and distribution systems, wastewater systems, solid waste systems, stormwater facilities, and telephone service. Water resources follows in a separate section.

Utilities analysis indicates that the water treatment and distribution system impacts for all communities will be negligible and not significant because current systems are adequate to serve all foreseeable baseline and project-induced water demands through 1990.

Wastewater systems in the Cheyenne Urban Area and in Torrington will receive low but significant local impacts from the project. In both these instances, increased wastewater flow induced by the proposed project will aggravate the problem of presently overloaded waste treatment facilities, some of which are not currently meeting their discharge requirements. In the Cheyenne Urban Area, planned improvements will mitigate the impacts. In Torrington, the project-induced population will slightly exacerbate the overloaded condition of the existing plant for several years, which can be mitigated by the acceleration of needed wastewater facility treatment improvements.

Solid waste facility impacts were identified in Cheyenne. Some additional equipment will be needed and the impact is rated as low and not significant. Negligible, not significant impacts will occur on solid waste facilities.

Stormwater facilities will have to be added in the Cheyenne Urban Area as a result of new land development in the area. The equivalent of two 60-inch storm sewers will be required over baseline needs. These additions result in low and not significant impacts. Stormwater facilities impacts in all other communities will be negligible and not significant.

The overall impact of the project on Utilities in the Cheyenne Urban Area will be low and significant in the short term. For all other communities, the Utilities impacts will be negligible and not significant.

Energy Resources

Energy Resources includes the supply and distribution systems for electrical power, natural gas, petroleum fuel, and coal.

The Energy Resources analysis indicates moderate, short-term, local impacts that are not significant. This is due to the need for added facilities to expand the capacity of the electrical substation serving F.E. Warren AFB by at least 40 percent. All other impacts to Energy Resources will be low or negligible and not significant because regional supplies of energy will be adequate; the local energy distribution systems can readily accommodate the needed expansion, and there will be no significant rise in energy costs to the consumer due to the project.

The overall impact of the project on Energy Resources is low except for the short-term, moderate, local impact. None of the impacts will be significant.

Transportation

Transportation describes the various modes of travel used for the safe and efficient movement of persons and goods, and includes transportation planning, design and operation of roads, railroads, aviation facilities, public transit, pedestrian and bicycle facilities, and the interrelationships between these travel modes.

There will be long-term beneficial effects because of improvements to roads and bridges resulting from the project.

Short-term reductions in level of service will occur at 13 of the 26 impacted intersections and interchanges in Cheyenne and the Randall entrance to F.E. Warren AFB. On the local level, these conditions represent a short-term, moderate, and significant traffic impact. Impacts are rated significant because level of service will be reduced below minimum desirable design standards. The physical condition of other Peacekeeper-related roads may be impacted by construction vehicles and other project usage. Needed repairs to deteriorated roadways will result in moderate and significant short-term adverse impacts upon traffic due to delays resulting from construction activities. Such delays may extend to the adjacent Randall Avenue at the Interstate 25 interchange and are, therefore, rated significant. The implementation of mitigation measures for roads, such as improved traffic signalization and interchange design modifications, will reduce impacts on level of service and roadway deterioration. Other mitigation measures, in addition to standard assumed mitigations, are identified in Section 3.1.9.6.

At the Cheyenne Airport, land-side facilities may require expansion due to existing capacity constraints and increased demand associated with the project's construction phase. This represents a short-term, low, and not significant impact. Impacts on other airports, railroads, public transit, and pedestrian and bicycle facilities will be negligible and not significant.

The overall transportation impact was judged to be moderate and locally significant and low and significant at the site level over the short term. Short-term regional impacts will be low and not significant.

Land Use

Land use comprises both urban land uses in developed communities where population inmigration is expected and rural land use in the Deployment Area where direct impacts from project development would occur.

Because of increased demand for housing, a potential beneficial effect may occur from the infill of vacant lots within city boundaries.

Population-induced impacts on urban land use are expected to be low because sufficient vacant land exists to absorb project-related growth projected for the Cheyenne Urban Area and th city of Kimball. However, some land developed primarily for mobile homes could become underutilized during the project's population decline cycle. Impacts are not significant in the short or long term.

Impacts on rural land use will include temporary interruption of agricultural land use during cable trenching and restrictions on residential land use within the explosives safety zones surrounding each Launch Facility. There are 9 inhabited structures within the 100 explosives safety zones which could be affected. Impacts would be low and not significant at the site level in both the short and long term since interruptions and restrictions of land use could occur without changing the character of the area. Impacts from modifications to Launch Facilities and their access roads would be negligible since upgrading would occur within existing rights-of-way and Air Force property lines.

Overall, the project may have both a beneficial effect and an adverse impact on urban land use. In the former instance, infill of vacant lots within urbanized areas may occur as a result of inmigration and housing demand; in the latter, underutilization of developed land, which usually places a financial burden on local government, may occur during the project decline cycle. The impacts on land use are low and not significant at the site and local level for both the short and long term. The project creates no significant impacts on urban or rural land use.

Recreation

Recreation includes regional (resource-based) recreation which is related to federal, state, and other lands offering rural outdoor recreation opportunities and local (user-based) recreation which is related to municipal and county-owned parks and facilities within urbanized areas.

Recreation analysis indicates moderate, short-term impacts on Glendo, Guernsey, and Curt Gowdy state parks due to overcrowding, and moderate short-term impacts on local facilities due to an increased demand for parkland, facilities, and staffing. A high, short-term impact on some neighborhoods is indicated due to inmigration and the absence of developed parkland in these neighborhoods.

The overall impacts on Recreation are moderate and significant in the short term due to the need to seek funding outside of the normal budgetary process in order to provide additional parkland and recreational facilities. Impacts are low but not significant in the long term.

Cultural Resources

Cultural Resources include three separate elements: prehistoric cultural, historic cultural, and American Indian resources.

Analysis of available documentary evidence, interviews with knowledgeable professionals and responsible tribal members, and limited-scale resource inventory of potential direct impact areas indicate moderate to high, short-term impacts to historic and prehistoric sites at F.E. Warren AFB and along proposed communication cable paths as a consequence of ground-disturbing activities associated with Peacekeeper deployment. Negligible to low, short and long-term impacts are anticipated as a result of landscape modifications generated by the selection of any staging alternative. Low to moderate, long-term impacts to these same resource elements are indicated as a result of altered regional land use and recreation patterns. Negligible to low, short and long-term impacts are indicated to American Indian resources due to the lack of reported resources in the project area and the low probability of their occurrence.

The Air Force plans to inventory and evaluate cultural resources potentially subject to direct project effects prior to any construction activities and implement a monitoring program during the construction period. Further, the Air Force plans to develop and implement a cultural resources management plan that will provide for mitigation of potential adverse effects to National Register-eligible sites in accordance with applicable federal statutes and regulatory guidelines.

Based on the adoption of the mitigation measures noted above, the overall impact of the action on Cultural Resources will be moderate and not significant in the short term and low and not significant in the long term at the site level only.

Visual Resources

Visual Resources include scenic resources and the visual environment, as well as evaluation of the visual quality of the region.

The Visual Resources analysis indicates moderate to negligible, short-term impacts due to clearing of vegetation and grading activities during construction. Long-term impacts are negligible and not significant once revegetation and regrading have been completed.

The overall impact of the project on Visual Resources is low and not significant at the site level in the short term and negligible in the long term.

Water Resources

Water Resources includes groundwater hydrology and quality, surface water hydrology and quality, water use and demand, and constraints on water use.

The Water Resources analysis indicates a significant, moderate, short-term impact on the Crow Creek watershed because of the ratings of three of its elements. Water use and demand will increase by about 4,000 acre-ft in the 1984 to 1989 construction period and about 210 acre-ft/yr from 1990 on as a result of the project. About 80 percent of the construction period demand and all of the operating demand will occur in the Cheyenne Urban Area. The impacts will result from induced water demand which could interfere with existing users. Potential mitigation measures to reduce this short-term water supply impact could be, among others, the implementation of water conservation measures and the lease or purchase of water rights in the Crow Creek watershed to provide additional water to the Cheyenne Urban Area.

Increased development in the Cheyenne Urban Area will increase stormwater runoff and flood flows, although mitigation measures such as stormwater detention facilities will reduce the impact. The impacts also result from increased erosion and sedimentation due to project construction and development resulting from the induced population.

Development of water for construction in the Deployment Area may cause moderate, but not significant impacts locally. All other water resource impacts for both the short and long term are rated negligible or low and not significant.

All other project impacts in the Crow Creek watershed and in the rest of the region are rated not significant.

The overall impact of the project on the Water Resources will be moderate and significant at the local level for the short term, and low and not significant for the long term.

Biological Resources

Biological Resources include vegetation, wildlife, fisheries, and unique and sensitive habitats.

The Biological Resources analysis indicates the presence of unique vegetation types which require long recovery periods and have limited range such as riparian and wetland areas. However, implementation of assumed mitigations, such as revegetation and wildlife habitat avoidance, in planning and construction of the project will reduce the impacts to a negligible to low level on vegetation. Riparian vegetation impacts remain moderate outside of F.E. Warren AFB due to the frequency of disruption resulting from communication cable pathways. Although the quantities of vegetation disturbed are low, the impacts are moderate because of the unique character of the vegetation on a regional basis and the value of riparian/wetland vegetation as wildlife habitat. The impacts are considered to be significant because of the potential to disturb unique vegetation types.

Random shooting and short-term construction disturbance will produce significant, short-term moderate impacts on wildlife at the site-specific and regional levels. These impacts are low and significant in the long term. Generally, whenever population increases, random shooting incidents increase. Construction-related disturbances due to noise and vehicle and human movements can be mitigated through scheduling of construction around raptor nesting periods. Additional mitigation cannot be applied to random shooting. These impacts are considered to be significant because of management agency concerns over the declining population of some raptors and the potential for change in reproductive success.

Fisheries resources will experience significant, short-term, low level impacts, due to increased fishing pressure, while the long-term impact will be negligible. Construction activites in the Deployment Areas with resultant habitat disturbances will yield significant, low short-term impacts, with negligible long-term impacts. These impacts are considered significant due to the management agency concerns and the potential for cumulative impacts on the fisheries due to increased fishing pressures.

The overall impact level of the proposed project on Biological Resources will be moderate over the short and long term, although the biological impacts on F.E. Warren AFB will be significant and high. The impact levels in the rest of the Area of Concentrated Study range from negligible to moderate with impacts on most wildlife species and vegetation types negligible to low following implementation of planned mitigation measures.

Threatened and Endangered Species

This category includes plants, wildlife, and aquatic species which are protected by federal law as threatened or endangered. Also included in this category are state-protected rare, threatened, or endangered species. Although state species are not afforded the same protection as federally listed species, they are included here because of special state concern.

Within the project area, there are three federally listed species on the threatened and endangered list: the black-footed ferret (in prairie dog towns), the greenback cutthroat trout, and the bald eagle. With implementation of appropriate assumed mitigations, impacts on the habitat of the black-footed ferret located in the project area, will be negligible. Increased fishing pressure will increase the accidental catching of the greenback cutthroat trout, which will result in a low level, significant, short-term impact on the region. The bald eagle will have some habitat loss due to general construction activities which will result in a low-level, short-term, and significant impact.

The Colorado butterfly plant, although not formally federally listed, is categorized by the U.S. Fish and Wildlife Service as a Category One species, which means that it meets the criteria for listing as a threatened or endangered species. Although not afforded federal protection as threatened or endangered species, the U.S. Fish and Wildlife Service has a Memorandum of Agreement with F.E. Warren AFB for protection and management of this species until it is listed. Disturbance to this plant's habitat during construction will result in a high, significant, long-term impact.

The woolly milkvetch is listed as rare by the Wyoming Natural Heritage Program and will have a high, significant, long-term impact to its habitat during construction.

The overall impact of the project on federally-listed threatened and endangered species will be low-level, significant, short and long-term impact on the region. However, the impact will be high and significant in the long and short-term at the site level due to the butterfly plant, which is undergoing a review process to be federally listed, and the state-listed woolly milkvetch.

Geologic Resources

Geologic Resources include geological hazards, energy and mineral resources (aggregate), and soil resources.

The Geologic Resources analysis indicates the project does not impact geologic hazards. Analysis also shows a low and not significant impact at the local level for aggregate resources, because there are adequate reserves within the region to satisfy project demands, making the impact negligible at the regional level. Project impacts on soil resources will be low and not significant as erosion which could occur during construction activities, will be minimal if assumed construction practices are observed.

The overall impact of the proposed project on Geologic Resources will be low and not significant at the site and local level in the short term, while the impact in the long term will be locally low and not significant.

Noise

Sources of noise, defined as any undesirable sound, include vehicular, air and railroad transportation, and construction activity.

Overall, the Noise analysis indicates short-term, negligible, local impacts from vehicular traffic noise. Increased air traffic due to project activities will result in a negligible impact. Impacts from railroad and construction activity will be negligible and not significant. In the long term, the overall impact of project noise will be negligible and not significant.

Air Quality

Air Quality addresses the condition of the atmosphere due to emission from natural and human sources, and is typically measured with respect to health and visibility implications. The analysis evaluates the effects of project construction, operation, and related transportation activities upon the future air quality environment.

The Air Quality analysis indicates low, short-term, not significant impacts from carbon monoxide at several intersections and road segments in Cheyenne. Fugitive dust from construction activities will result in low impacts locally and negligible impacts regionally. Regional visibility will experience negligible impacts. All long-term impacts for the three Air Quality elements were predicted to be negligible.

The overall impact of the proposed project on Air Quality will be locally low and not significant in the short term and negligible in the long term.

Conclusion

High and significant, short and long-term impacts are projected for only threatened and endangered species. While significant impacts are projected in several other resources (see Figure S-4), these impacts are generally moderate to low and, with the exceptions of recreation and biological, local.

A 45 day public comment period will be held to solicit input on the methods, assumptions and criteria used to generate these results. Response to public comments and appropriate modifications to this document will be included in the final environmental impact statement.

SYSTEM DESCRIPTION, PURPOSE, AND NEED FOR THE ACTION

1.0 SYSTEM DESCRIPTION, PURPOSE, AND NEED FOR THE ACTION

1.1 Introduction

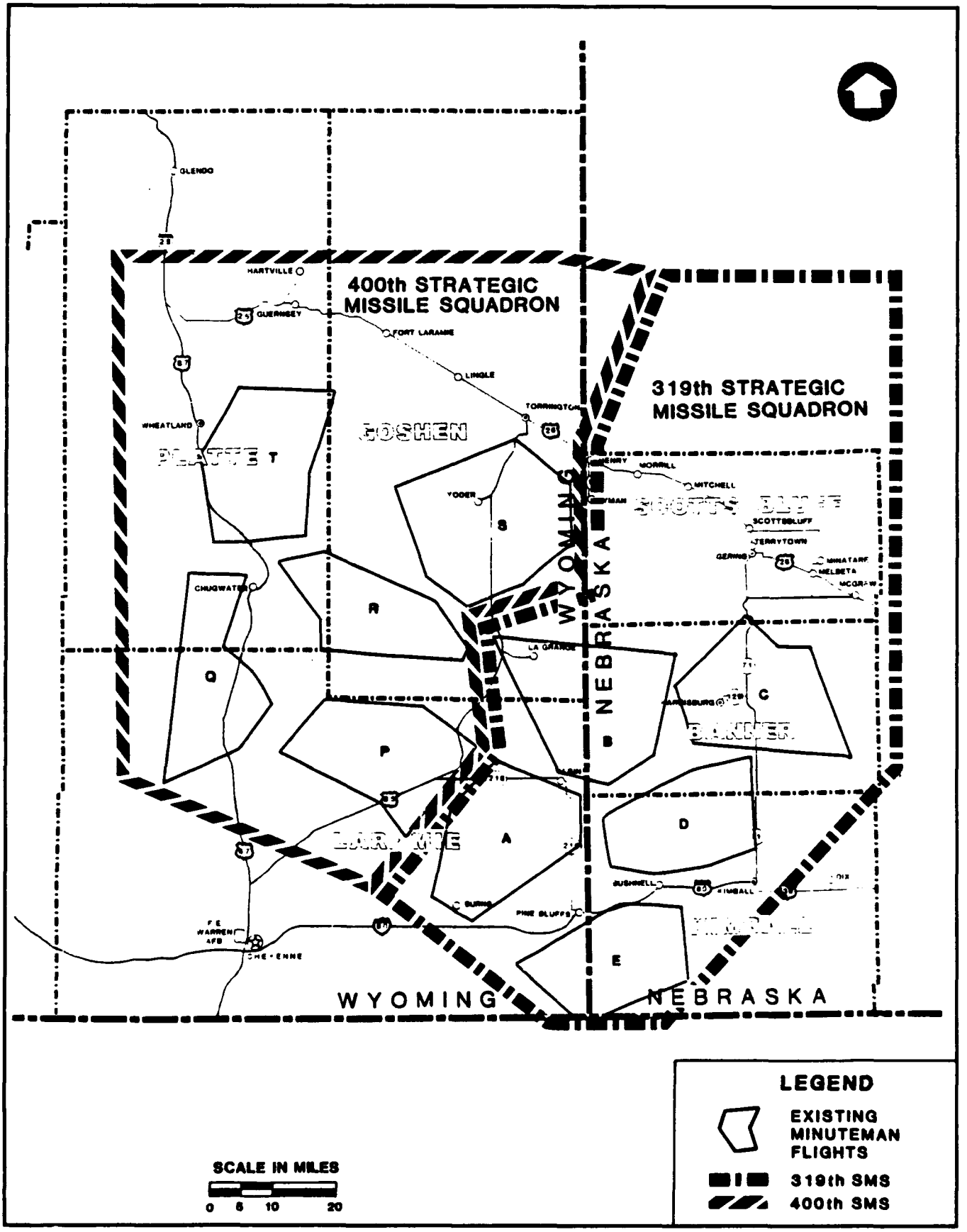
In accordance with Presidential direction on April 19, 1983, the Air Force plans to deploy the Peacekeeper missile system within the 90th Strategic Missile Wing at F.E. Warren Air Force Base (AFB) near Cheyenne, Wyoming. In giving this direction, the President was adopting the recommendation of the Scowcroft Commission which he had established in January 1983 to study strategic modernization needs.

The Peacekeeper system is an advanced, land-based intercontinental ballistic missile system designed to improve the nation's strategic deterrent force. The plan calls for the replacement of 100 existing Minuteman III missiles with 100 Peacekeeper missiles. Existing missile Launch Facilities will be used with modifications. Missile replacement will occur within the two squadrons located nearest F.E. Warren AFB, the 319th and the 400th Strategic Missile Squadrons (Figure 1.1-1). In addition, a number of support buildings will be constructed or altered at F.E. Warren AFB which currently serves as the Strategic Missile Support Base (referred to in this document as an Operating Base) for the 90th Strategic Missile Wing. The Peacekeeper missile system is scheduled to achieve initial operational capability in late 1986 and to be fully operational by late 1989. Table 1.1-1 summarizes the Proposed Action and Alternatives for this project. The operation and maintenance of the 100 Peacekeeper missiles will generally be carried out in a manner similar to the remaining 100 Minuteman III missiles. This allows for combining many of the communications, security, and other functional operations associated with the two weapon systems. A complete discussion of the Proposed Action and alternatives appears in Section 1.4.

This environmental impact statement (EIS) for the Peacekeeper system has been prepared to meet the requirements of the National Environmental Policy Act of 1969 and the Council on Environmental Quality's regulations. This EIS assesses the impacts of the deployment and peacetime operation of the Peacekeeper system, the No Action Alternative of retaining the existing Minuteman III missiles and alternative project elements to accomplish Peacekeeper deployment. Section 1.0 describes the purpose and need for the Proposed Action and alternatives. Section 2.0 describes the affected environment, while environmental consequences along with a comparison of project impacts are discussed in Section 3.0. Section 4.0 describes a three-phased scoping process for identifying issues associated with the Proposed Action.

1.2 Purpose and Need

Land-based strategic missiles are an integral part of the United States nuclear deterrence strategy. Air, sea, and land-based weapons form a TRIAD of strategic forces, each with different capabilities and advantages to complicate Soviet offensive and defensive planning. The TRIAD also provides a hedge against technical



PEACEKEEPER DEPLOYMENT AREA

(15-2)

FIGURE NO. 1.1-1

Table 1.1-1

SUMMARY OF PROPOSED ACTION AND ALTERNATIVES

Refer to Section:	Proposed Action	Alternatives[1]
1.4	Deploy 100 Peacekeeper Missiles in Existing Minuteman Launch Facilities in Squadrons 319 and 400; 10 missiles operational in late 1986, full system operation in late 1988.	
1.6.1	Use new stage transporter for Peacekeeper stage transport.	
1.6.2	Modify several existing buildings at F.E. Warren Air Force Base; construct additional buildings in support of Peacekeeper operations.	
1.6.2	Construct a new base road between Peacekeeper Stage Storage Area and Gate 5; construct a new road and upgrade existing road between Weapons Storage Area and Gate 2 by realigning Happy Jack Road; construct new base road connecting Peacekeeper Stage Storage Area and Weapons Storage Area; remove Happy Jack overpass (Alternative R2).	Alternative R1: New road between Stage Storage Area and Gate 5; Lower the road bed or raise the bridge at Country Club Road and Interstate 25 and at Happy Jack Road and Interstate 25; upgrade between Weapons Storage Area and Gate 2. Alternative R3: New onbase road between Stage Storage Area provided by upgrading of Round Top Road, south to Interstate 80; new access ramps constructed at Interstate 80 and Round Top Road.
1.6.3.1	Perform required grading work at the Launch Facilities.	
1.6.3.1	Modify existing Launch Facilities to accommodate the Peacekeeper.	

Table 1.1-1 Continued
SUMMARY OF PROPOSED ACTION
AND ALTERNATIVES

Refer to Section:	Proposed Action	Alternatives[1]
1.6.3.3	Establish five additional cable paths including the acquisition of real estate interests connecting Squadrons 319 and 400: PA1, SB1 RB1, PA4 and PD1.	Other identified buried cable paths: SB2, PB1, SC2, PA2, and PA3.
1.6.3.4	Upgrade several Deployment Area road access routes to make them compatible with Peacekeeper vehicle requirements. Upgrade Launch Facility-access road staying within existing right-of-way; upgrade water drainage culverts and bridges as necessary.	
1.6.6	Construct staging areas at F.E. Warren Air Force Base, Cheyenne, and Kimball.	Staging areas at F.E. Warren Air Force Base and Cheyenne only. No staging areas.
1.6.8	Operate and maintain Peacekeeper Weapon System at 90th Strategic Missile Wing at F.E. Warren Air Force Base.	
1.6.10.1	Acquire real estate interests for the safety requirements.	

Note: 1 The No Action Alternative is nondeployment of the Peacekeeper System at F.E. Warren Air Force Base. It serves as the baseline against which project impacts are judged.

problems that could temporarily disable a system and against technological breakthroughs or a rapid evolution of threats that might erode the survivability of one or more parts of our strategic forces.

The Scowcroft Commission's report outlined a number of conclusions and recommendations relevant to the proposed project. The report stated that the Soviets have a commanding lead in the number of land-based, highly accurate, missile-launched nuclear warheads and show no signs of reducing their current rate of deployment. The Commission concluded that the advantages of the land-based portion of the TRIAD (i.e., low maintenance costs, high reliability, rapid response, and great accuracy) in addition to its contribution to the effectiveness of the TRIAD, make it imperative that the land-based missile system be upgraded to address the challenges posed by the Soviet Union. The Commission recommended the development and deployment of small mobile intercontinental ballistic missiles (ICBMs) each capable of carrying a single warhead, as a long-term solution to upgrading the land-based missile system. However, it also urged deployment of 100 Peacekeeper missiles as an immediate measure to modernize the land-based missile system.

1.3 Scoping Issues

During the scoping process the public raised several issues relating to missile research projects. These issues include superhardening of protective structures, deep basing, and the use of ballistic missile defense as potential measures to increase the survivability of the United States land-based strategic missiles, including Peacekeeper. Analysis of the potential impacts of possible deployment of these protective measures was not included in this EIS for the following reasons:

- The Peacekeeper deployment directed by the President does not include superhardening, deep basing, or ballistic missile defense. The Air Force does not intend to propose in the reasonably foreseeable future that the Peacekeeper be superhardened or protected with ballistic missile defense.

- The Peacekeeper deployment is not connected to superhardening, deep basing, or ballistic missile defense, in that Peacekeeper does not trigger any of the other three, is not an interdependent part of a larger action involving the other three, and is scheduled to proceed regardless of their status.

Also, the scoping process generated requests that the Air Force analyze alternate basing modes and deployment locations for the Peacekeeper missile. The project analyzed in this EIS was selected by the President pursuant to provisions of the "Jackson Amendment" to the Department of Defense Appropriations Act, 1983 (Public Law No. 97-377, 96 Stat. 1833, 1846-48 [1982]). The President's report discussed alternate missiles, basing modes, siting locations, and other system alternatives. The Jackson Amendment exempted the President's report and proposals from the requirements of the National Environmental Policy Act. The purpose of the EIS is not to review those prior decisions, but to analyze the impacts of implementing actions and their alternatives, including development of mitigation measures.

Another general issue to emerge from the scoping meetings was the concern that deployment of the Peacekeeper missile might induce a nuclear strike from an enemy in time of international tension. Some felt that the environmental impacts of a nuclear attack, particularly in the Deployment Area, ought to be included in this EIS. The effects of war are speculative and lie beyond the scope of Peacekeeper deployment and peacetime operations. They are therefore not dealt with in this document. Further discussion of other issues raised during scoping meetings but not analyzed within this EIS may be found in Appendix D.

1.4 Summary of Proposed Action

The Proposed Action consists of the deployment of 100 Peacekeeper missiles into 100 of the existing Minuteman III missile Launch Facilities currently operated by F.E. Warren AFB. The missile replacements will occur in Strategic Missile Squadrons 319 and 400 (Figure 1.1-1), located in southeastern Wyoming and western Nebraska. F.E. Warren AFB will be the Operating Base for the Peacekeeper system and will retain that function for the remaining 100 Minuteman silos. A number of new buildings will be constructed at the base, and several existing buildings will be added to, altered, or modified. The major operational change in the Deployment Area will be the need for a larger missile stage transporter vehicle which makes a greater number of round trips between the Operating Base and the Launch Facilities. Some additional grading work will be required at each Launch Facility. However, no further hardening, deepening, or similar structural modifications will occur at the Launch Facilities. The underground work at these facilities will be limited to the physical and electronic modifications needed to adapt each Launch Facility for deployment of a Peacekeeper missile.

The Launch Facilities are monitored and controlled by centers called Launch Control Facilities. No surface modifications to the Launch Control Facilities will be necessary. Subsurface changes will involve communications equipment and software modifications necessary for communication with the Peacekeeper missiles.

To allow access of the Peacekeeper missile stage transporter to each of the 100 modified Launch Facilities and 10 Launch Control Facilities, about 350 miles of roads will have to be upgraded. Upgrading may require the replacement or modification of some culverts and bridges.

Connectivity between the two Peacekeeper missile squadrons will be provided by the addition of five buried cable systems.

1.5 Summary of Alternatives

Alternatives exist for several of the Peacekeeper system elements. First, at F.E. Warren AFB three new road configurations are under study for linking the new Stage Storage Area and Weapons Storage Area and for achieving access offbase to the Deployment Area. Factors involved in the formation of these alternatives include potential onbase traffic and land use conflicts, efficient access offbase, existing bridge clearance problems along nearby Interstate 25 and the proposed realignment of an existing County road (Happy Jack Road).

Second, a total of ten alternative communication cable paths have been identified for linkage of Squadrons 319 and 400. Of the ten alternatives, five will be selected. In forming these alternatives, existing easements have been used where practical. However, a number of the paths cross private property. These alternatives are discussed in more detail in Section 1.6.3.3.

Finally, staging areas may be established during deployment. A staging area would be a temporary field storage and administration center. Alternative staging area options are as follows:

Alternative 1: Staging area at F.E. Warren AFB and in the vicinities of Cheyenne, Wyoming, and Kimball, Nebraska;

Alternative 2: Alternative 1 without the Kimball staging area;

Alternative 3: No construction staging areas.

Staging areas are discussed in Section 1.6.6.

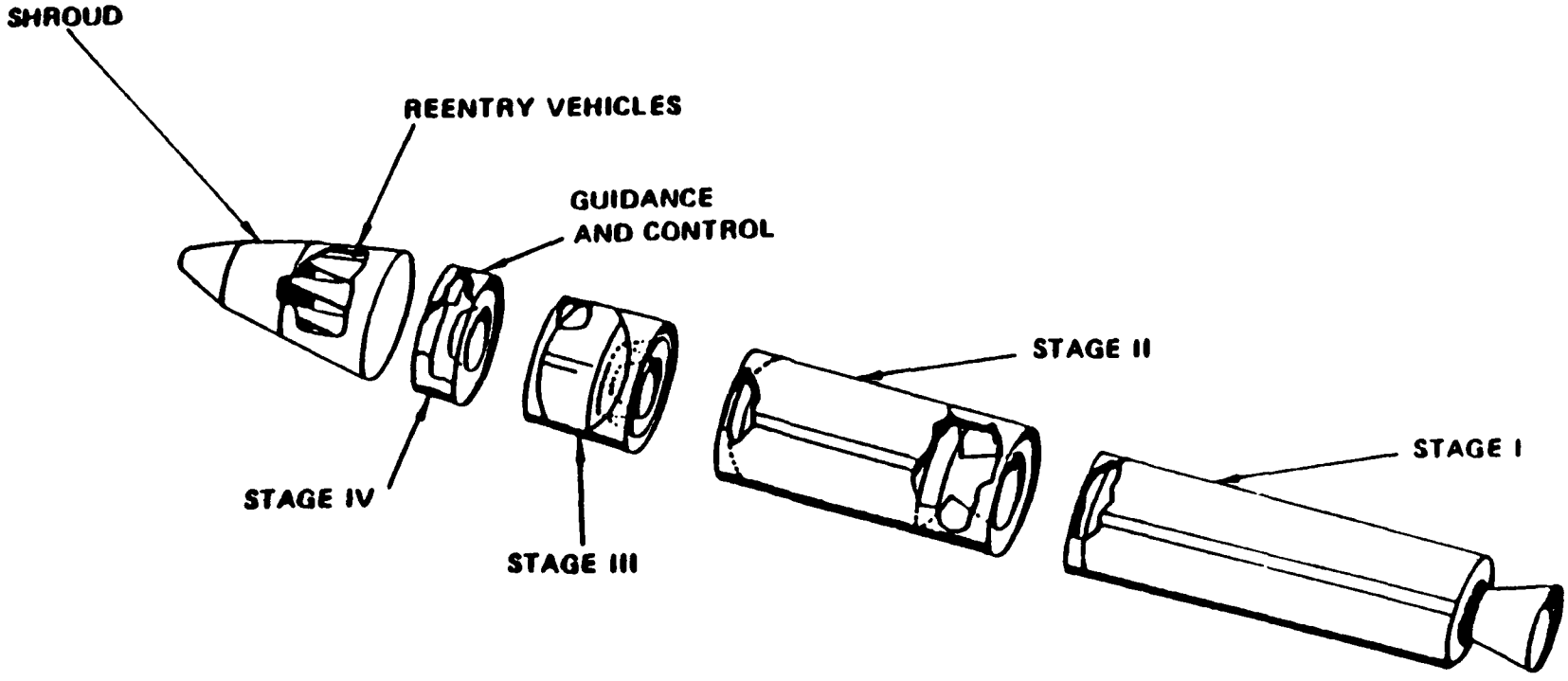
1.6 System Description

1.6.1 Peacekeeper Missile and Its Transport Vehicle

The Peacekeeper is a four-stage intercontinental ballistic missile capable of delivering up to ten independently targeted and highly accurate nuclear warheads. The missile is approximately 71 feet long, 92 inches in diameter, and weighs 195,000 pounds. It is shown in Figure 1.6.1-1. In contrast, the Minuteman III missile is 60 feet long with a first stage diameter of 66 inches and weighs 78,000 pounds. The first three stages of Peacekeeper use solid fuel propellant. The fourth stage is liquid fueled and contains propellants which ignite spontaneously when mixed. The fourth stage also contains the Missile Guidance Control Set which controls all the missile system functions.

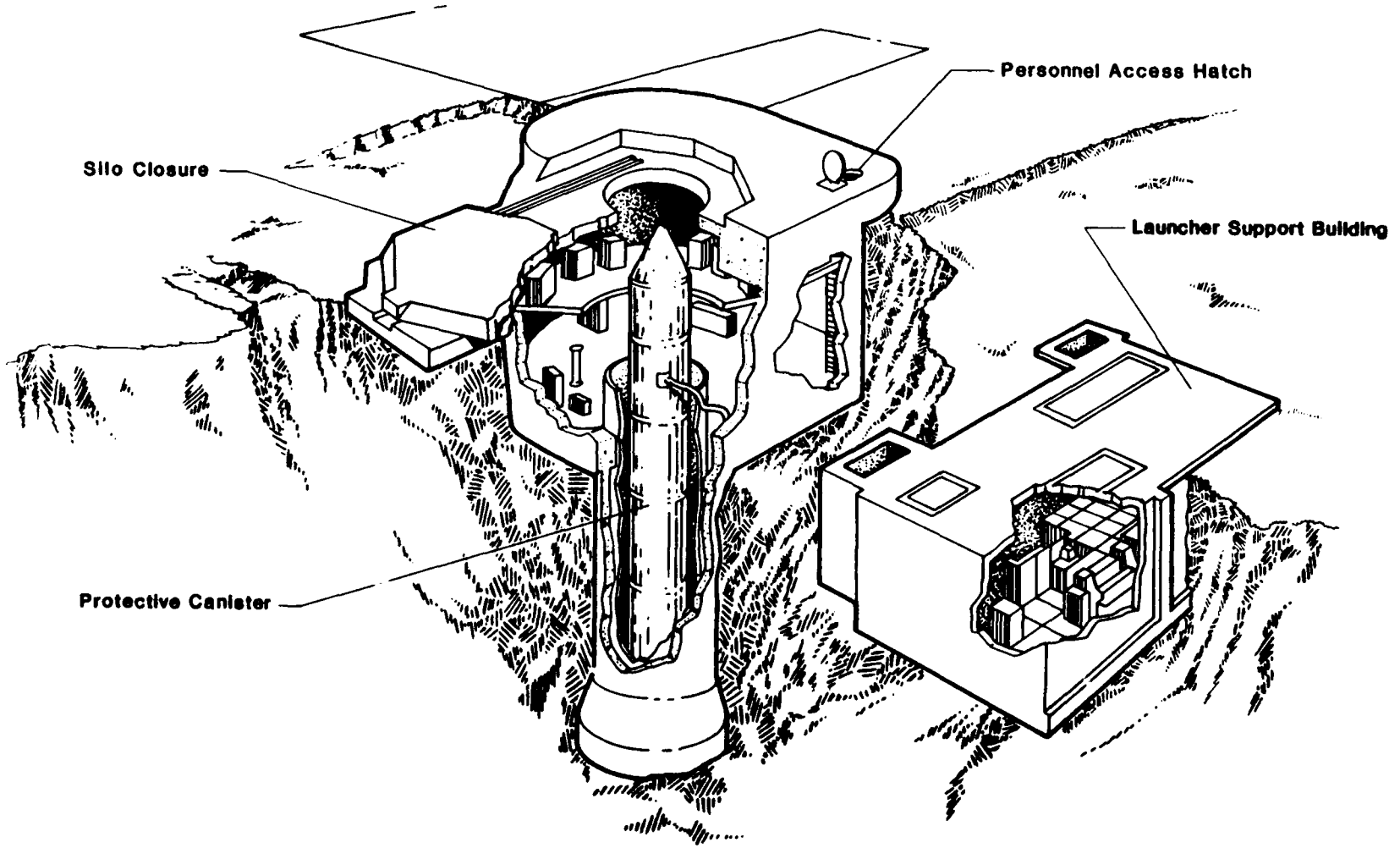
Unlike the current Minuteman III, the Peacekeeper will be enclosed within a protective steel canister (Figure 1.6.1-2). The canister is installed when the Launch Facility is modified. The canister serves the functions of debris protection and missile ejection.

The Peacekeeper will require two vehicles for transport to and placement within a Launch Facility. The stage transporter will be used to transport the individual stages to the Launch Facility. When carrying the first stage, the stage transporter will be about 100,000 pounds heavier, 12 feet longer, and 14 inches higher than the transporter erector currently used to transport the Minuteman missile. Vehicle dimensions for the stage transporter will be 76 feet long, 14 feet 8 inches high, and 10 feet 3 inches wide. Maximum loaded weight will be about 219,000 pounds (Figure 1.6.1-3). At full load, the axle weight will be 9,800 pounds heavier than the transporter erector. However, since the stage transporter will have twice as many wheels per axle (8), single wheel load will be 1,000 pounds lighter.



PEACEKEEPER MISSILE

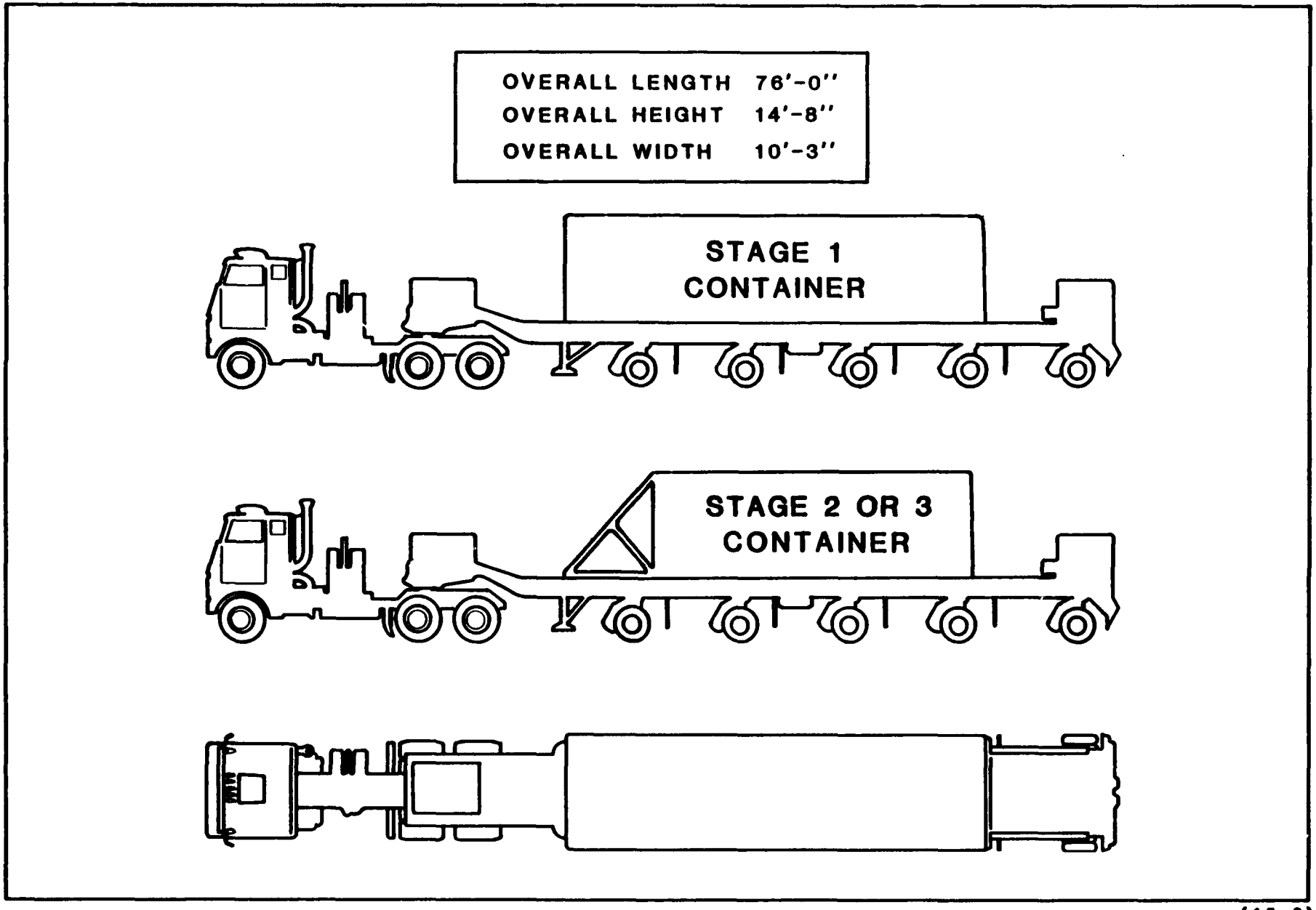
(16-7)
FIGURE NO. 1.6.1-1



(15-11)

PEACEKEEPER SILO WITH ITS PROTECTIVE CANISTER

FIGURE NO. 1.6.1-2



THE PEACEKEEPER STAGE TRANSPORTER

(15-8)
FIGURE NO. 1.6.1-3

The stage transporter will make three round trips between F.E. Warren AFB and a Launch Facility in order to deliver the first three stages of the Peacekeeper missile. A truck and trailer of conventional size will be used to transport the fourth stage. The Minuteman transporter erector currently makes one round trip and delivers the assembled missile (minus the reentry system).

Once a Peacekeeper stage reaches the Launch Facility it will be transferred to a second vehicle (Figure 1.6.1-4) for emplacement.

1.6.2 Operating Base and Vicinity

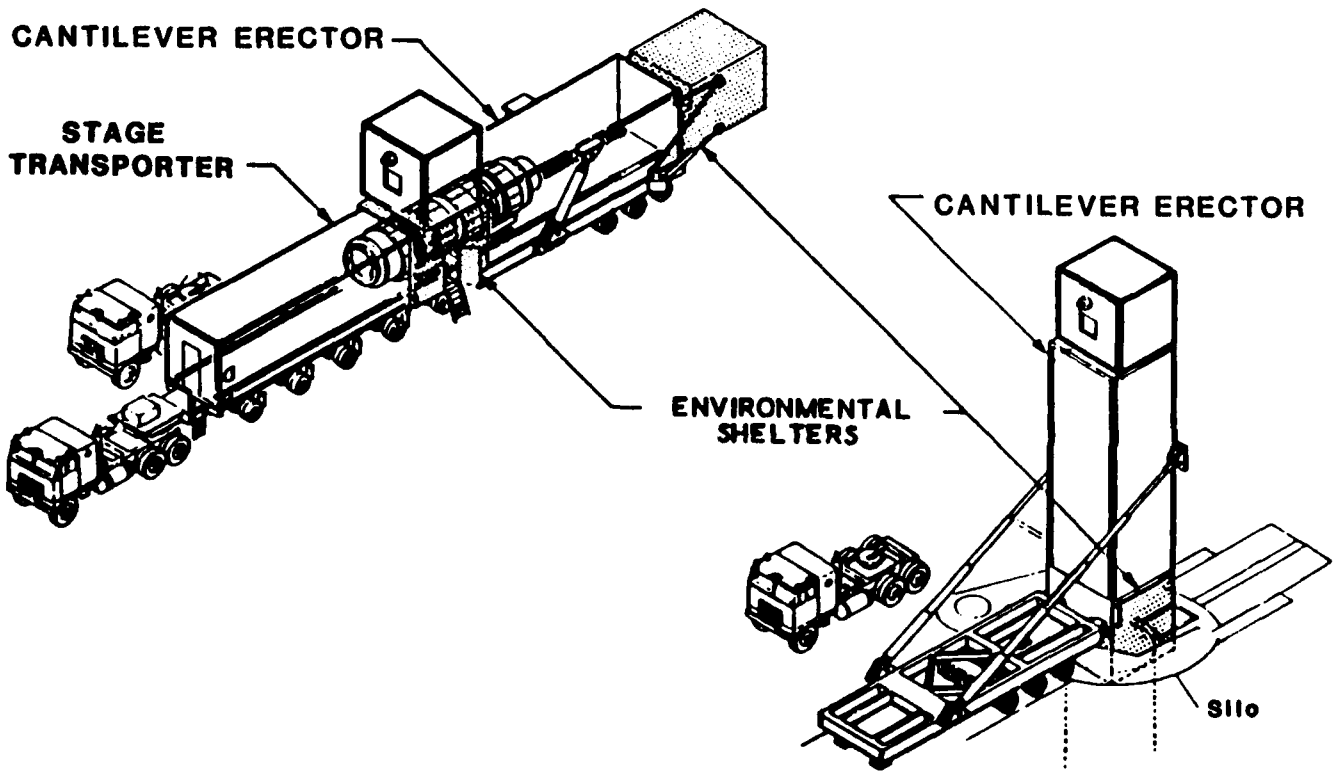
The Operating Base for the Peacekeeper system is located at F.E. Warren AFB, immediately west of Cheyenne, Wyoming. The Operating Base provides centralized facilities for missile component storage, assembly, and maintenance. It serves as the command, training, and operational and maintenance center for the weapon system. Figure 1.6.2-1 shows a map of F.E. Warren AFB. Currently F.E. Warren AFB hosts the 90th Strategic Missile Wing which operates 200 Minuteman III Launch Facilities and 20 Launch Control Facilities in the adjacent Deployment Area. In addition to the 3,700 personnel currently stationed at F.E. Warren AFB, approximately 475 additional operations personnel will be assigned.

The current missile storage area is located in the north central portion of the base. The administration, base support, and missile maintenance activities occur along and just south of Randall Avenue in the southcentral portion of the base. Immediately to the south, and near the east side of the base, is the Launch Facility Trainer. The southern portion of the base includes the logistics and material storage center, the vehicle maintenance area, and the helicopter landing area. Finally, a secure zone near the southwest corner of the base serves as the Weapons Storage Area.

Under the proposed project, approximately 337,000 square feet of new facilities will be constructed at the base in support of Peacekeeper operations. Additionally at the base, about 82,000 sq ft of existing floor space will be altered or added to. In addition various roads, utilities, and other support construction will be required.

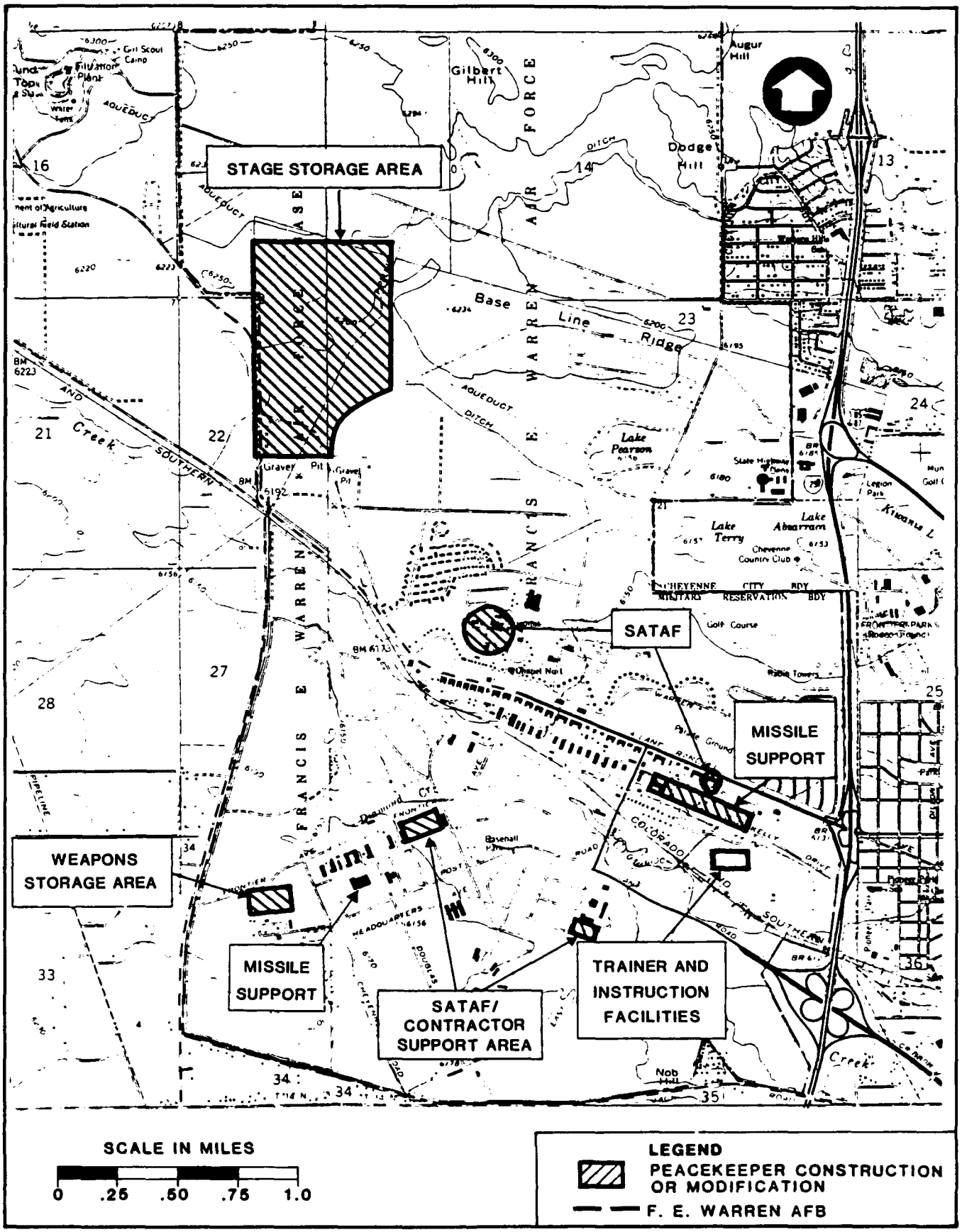
A wide variety of locations and conversion options were considered in comprehensive planning carried out for the base. The current siting of Peacekeeper facilities is based on functional relationships, land use compatibility, and environmental factors. Siting considerations include:

- Relationships between Peacekeeper and Minuteman functions;
- Availability of existing facilities;
- On and offbase land uses and circulation;
- Explosive safety criteria; and
- Environmentally sensitive areas of the base.



THE PEACEKEEPER ERECTOR

(15-9)
FIGURE NO. 1.6.1-4



(15-5)

F. E. WARREN AFB

FIGURE NO. 1.6.2-1

Table 1.6.2-1 lists the Peacekeeper facilities, their functions, and the other construction to be accomplished at the base. General locations of the buildings at F.E. Warren AFB are shown in Figure 1.6.2-1. All facilities will be built within the existing boundaries of the base. Most Peacekeeper-related construction at F.E. Warren AFB will fall into one of four functional groups.

- The Weapons Storage Area must be colocated with the existing Weapons Storage Area for functional and security reasons, and will thus be located on the southwest side of the base. Peacekeeper facilities will be constructed in an extension to the north end of the existing Weapons Storage Area. The north end is the only area that can accommodate the expansion while maintaining proper explosive safety distance.

- Peacekeeper missile maintenance and training functions are closely tied to Minuteman functions, both physically and organizationally. Most requirements involve additions or modifications to existing facilities, and the few new facilities will be located in the same general area in the southcentral portion of the base.

- The Site Activation Task Force (SATAF) and construction support buildings requirements are temporary, so the primary consideration in the location of their facilities was potential for long-term use for base operations following construction. The Site Activation Task Force administrative space will be provided mainly within existing, upgraded facilities in the central part of the base. Industrial facilities, including warehousing and shops, will be located in the southern portion of the base.

- The Stage Storage Area will be located in an undeveloped area of the base, northwest of existing activity with access to the existing rail spur. The site selected also avoids conflict with other missions (rifle range) and land uses (housing and recreation).

Site plans for each of the facility groups, showing sites for individual structures, continue to be refined and may undergo minor revisions through facility design. However, for purposes of this impact statement, the building locations can be expected to remain in the general locations shown in Figure 1.6.2-1.

The Peacekeeper stage transporter will travel from the Stage Storage Area and the Weapons Storage Area to Launch Facilities in the Deployment Area. Approximately ten miles of road will be constructed or improved onbase to provide access from these areas to offbase roads, and to improve circulation among Peacekeeper facilities. A new road will be constructed from the Stage Storage Area to Gate 5 of F.E. Warren AFB, which exits at the Central Avenue interchange of Interstate 25. A combination of new and existing roads will be used to provide offbase access from the Weapons Storage Area.

Table 1.6.2-1

MILITARY CONSTRUCTION PROGRAMS AT F.E. WARREN AFB[1]

Facility	Location	Scope
ADAL Energy Management Control System	INDRL AREA	OLS
ADAL Missile Maint Shops (Bldg 336)	INDRL AREA	3,800 sq ft
ADAL Missile Support FAC (Bldg 332)	INDRL AREA	10,000 sq ft
Alter Comm Maint FAC (Bldg 1250)	INDRL AREA	4,000 sq ft
Alter Corrosion Control Shop (Bldg 312)	INDRL AREA	2,400 sq ft
Alter Missile Maintenance Support (Bldg 340)	INDRL AREA	2,300 sq ft
Alter Security Control Center (Bldg 34)	INDRL AREA	2,000 sq ft
Heating Distribution Line	INDRL AREA	OLS
Integrated Support Complex	INDRL AREA	164,000 sq ft
Launch Facility Trainer (Silo)	INDRL AREA	one
Misc Facility Alterations (Bldg 152 & 250)	INDRL AREA	31,000 sq ft
Roads (INDRL Area Phase 1)	INDRL AREA	6MI
Roads (INDRL Area Phase 2)	INDRL AREA	OLS
SATAF FAC Alterations	INDRL AREA	18,800 sq ft
Shops	INDRL AREA	24,000 sq ft
Trainer & Instruction Facility	INDRL AREA	28,500 sq ft
Utilities-Sewage & Water-INDRL Area-PH1	INDRL AREA	OLS
Utilities-Sewage & Water-INDRL Area-PH2	INDRL AREA	OLS
Utilities-Power-INDRL Area PH1	INDRL AREA	OLS
Utilities-Power-INDRL Area PH2	INDRL AREA	OLS
Canister Processing Facility	SSA	10,500 sq ft
Equipment Maintenance Shop FAC	SSA	38,000 sq ft
MSL Stage Processing Facility	SSA	13,000 sq ft
Open Storage (SSA)	SSA	4,000 sq yd
Proof Load Test Facility	SSA	1EA
Rail Transfer Facility	SSA	1EA
Special Vehicle Parking Area	SSA	8,500 sq yd
Stage I/II Storage Facility	SSA	4,000 sq ft
Stage III Storage Facility	SSA	1,500 sq ft
Stage IV Storage Facility	SSA	1,000 sq ft
Stage Storage Area Fence	SSA	9,000 LF
ADAL Munitions Supply Inert Storage	WSA	7,000 sq ft
Alter Standby Power FAC (Bldg 1168)	WSA	400 sq ft
Entry Control (WSA)	WSA	750 sq ft
RS AS&I Facility	WSA	42,000 sq ft
RS Storage Facility	WSA	2,000 sq ft
RV Storage Facility	WSA	3,500 sq ft
Segregated Storage Magazine	WSA	4,000 sq ft
WSA Security, Lighting, Fence	WSA	OLS

Note: 1 From the Peacekeeper Facilities List dated September, 1983.

ADAL = Add or Alter
AS&I = Assembly, Surveillance, and Inspection
Bldg = Building
FAC = Facility
INDRL = Industrial
MISC = Miscellaneous
MOD = Modification
MSL = Missile
OLS = One Lump Sum
PH = Phase
RS = Reentry System
RV = Reentry Vehicle
SATAF = Site Activation Task Force
SSA = Stage Storage Area
WSA = Weapons Storage Area

Currently, Minuteman transporter erector travel from F.E. Warren AFB to the northern portion of the Deployment Area is via Interstate 25 north. The eastern portion of the Deployment Area is reached via Interstate 25 south to Interstate 80. The Peacekeeper stage transporter is taller, however, and is impeded in access to Interstate 80 by two low overpasses at Country Club and Happy Jack roads.

The Proposed Action is shown as R2 in Figure 1.6 2-2. All northbound stage transporter travel would exit the base at Central Avenue, while southbound travel would access Interstate 25 at Missile Drive. This requires realignment of Happy Jack Road to tie into the Missile Drive interchange and removal of the existing Happy Jack bridge in order to rectify the clearance problem. In order to avoid the Country Club Road overpass, the stage transporter must be able to reach Gate 5 from the Weapons Storage Area and Gate 2 from the Stage Storage Area (Figure 1.6.2-2). This would be accomplished by constructing a new road onbase between the Weapons Storage Area and the Stage Storage Area.

Two alternative solutions have been identified to accommodate the clearance problems. Alternative R1 involves removing the Country Club Road and Happy Jack Road clearance problems by raising the bridge or lowering the Interstate 25 roadbed. The stage transporter would exit F.E. Warren AFB at the Central Avenue interchange (Gate 5) and at the Missile Drive interchange (Gate 2) to travel north or south. This alternative is shown in Figure 1.6.2-3.

Alternative R3 would avoid both the Country Club Road and the Happy Jack Road overpasses by providing access to Interstate 80 via Round Top Road, south of the base. Round Top Road would require upgrading; new on and offramps would be constructed to Interstate 80 (Figure 1.6.2-4). Access to northern silos would still be via Interstate 25 from the Central Avenue interchange.

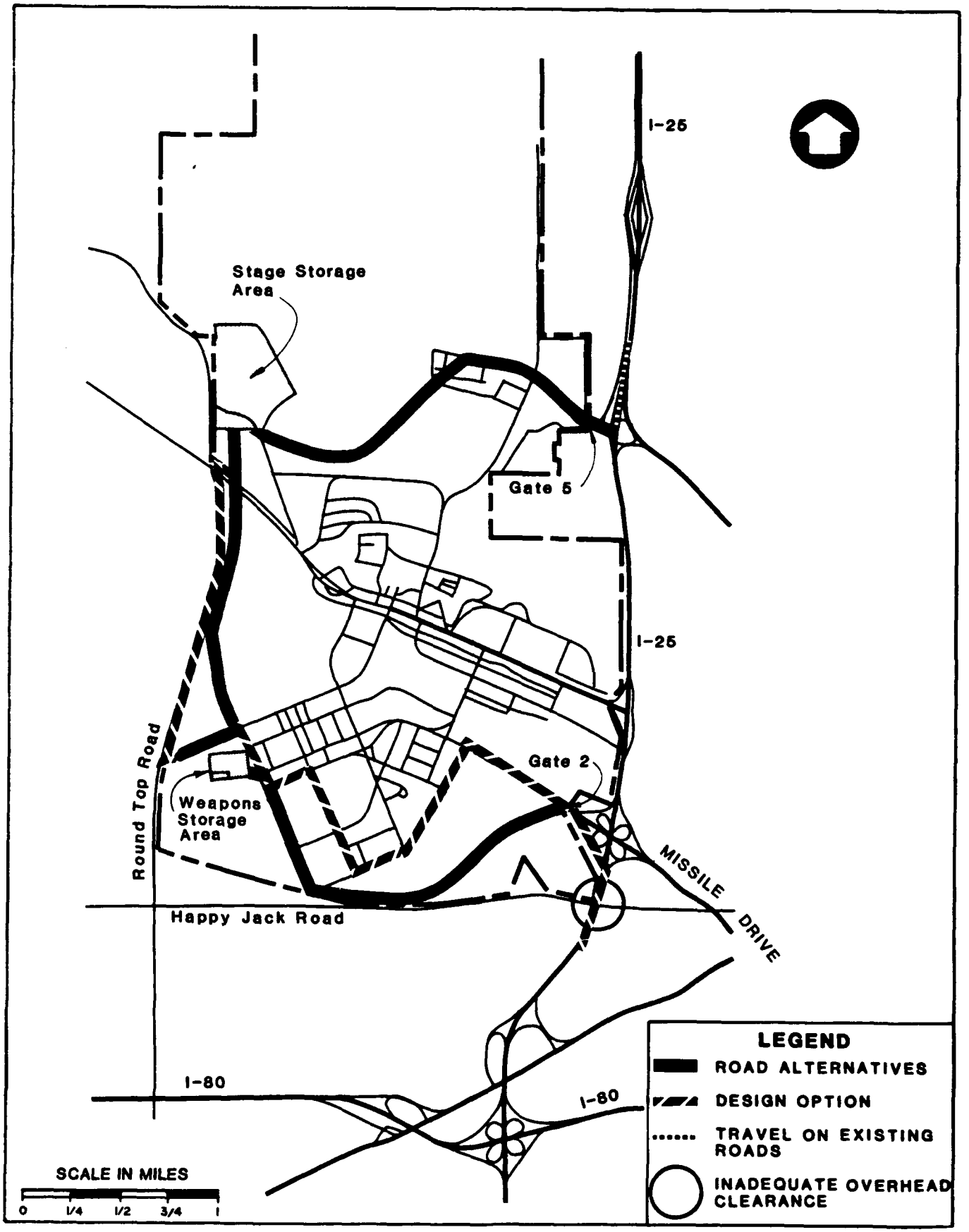
1.6.3 Deployment Area

Major components of the Deployment Area are:

- 100 Launch Facilities;
- Ten Launch Control Facilities;
- A cable system for command control and communication; and
- A system of roads to provide transportation access to the Launch Control Facilities and the Launch Facilities.

1.6.3.1 Launch Facility

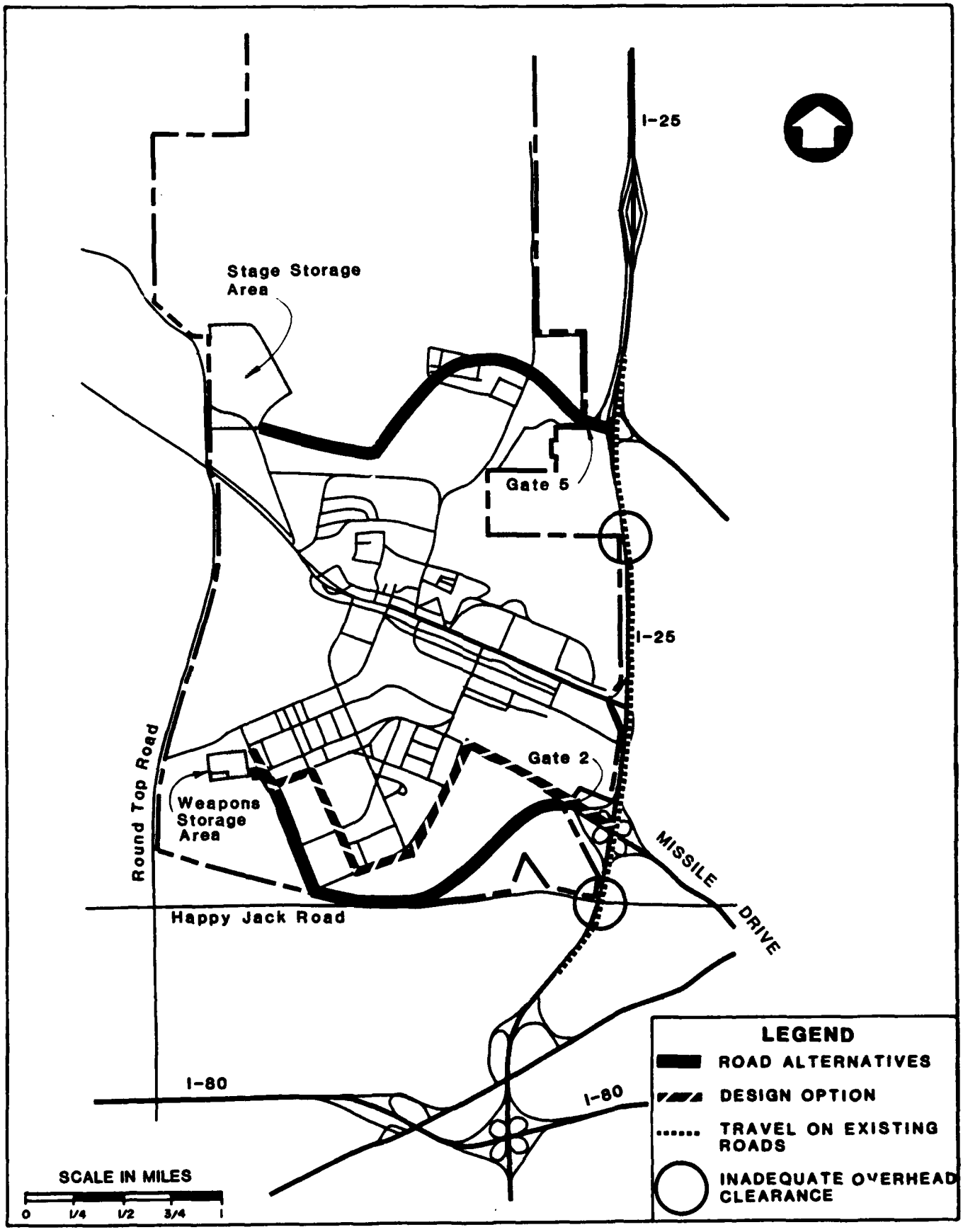
The Launch Facility is the remote, unmanned missile site. Launch Facilities are generally situated in sparsely populated land areas inside fenced areas of approximately



NEW ROADS AT F.E. WARREN AFB: PROPOSED ACTION-R2

(04-23A)

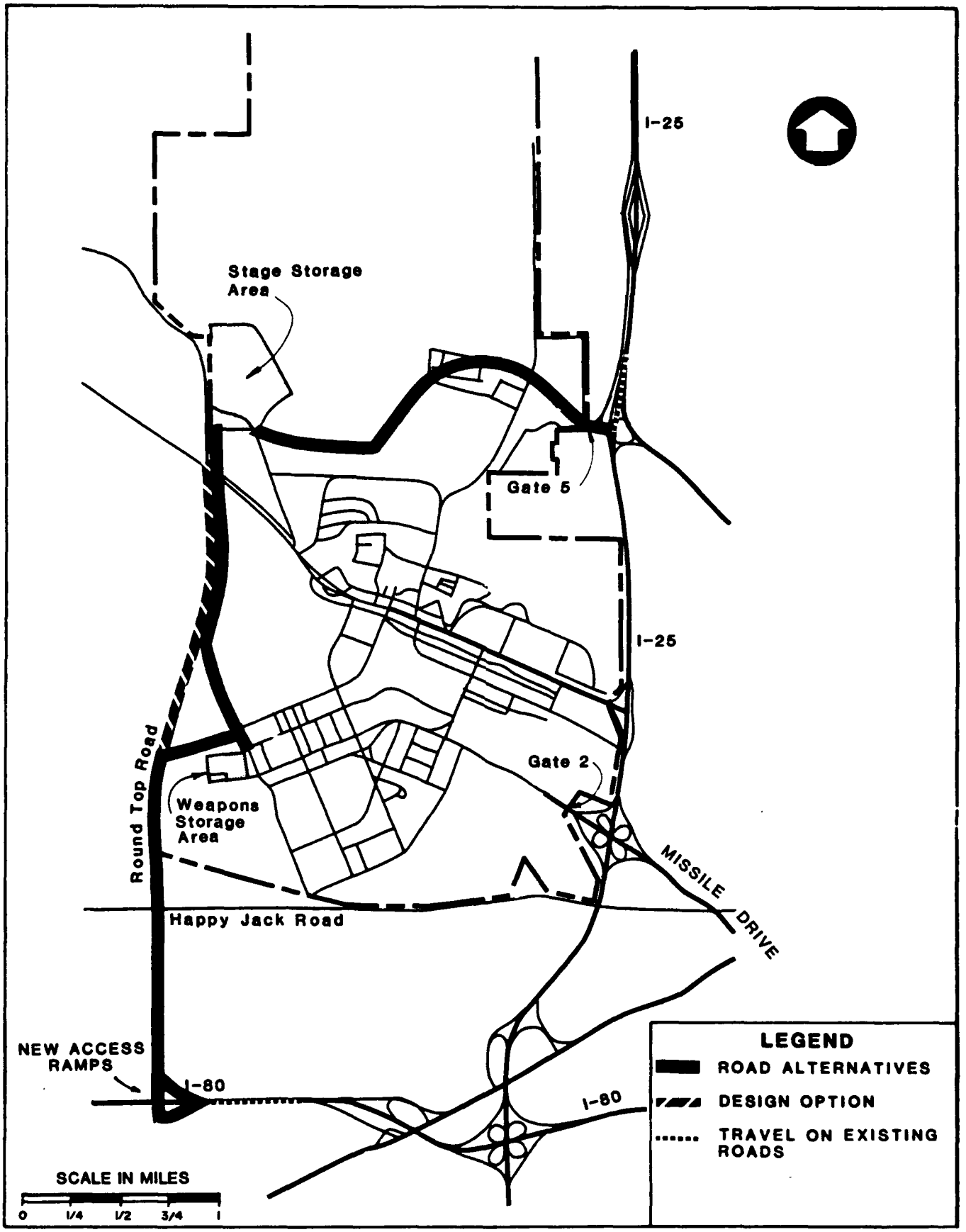
FIGURE NO. 1.6.2-2



(04-23B)

NEW ROADS AT F.E. WARREN AFB: ALTERNATIVE R1

FIGURE NO. 1.6.2-3



NEW ROADS AT F.E. WARREN AFB: ALTERNATIVE R3

(04-23C)

FIGURE NO. 1.6.2-4

1.2 acres each. Within this area are the silo (see silo description below), three security antennas, UHF antenna, launcher support building, and service area. The silo includes the launch tube, the launcher closure, dual-level equipment room, and provisions for personnel access. The site is also provided with access roads and vehicle maneuvering areas.

The launcher support building is an underground structure with its roof at ground level. The launcher support building is located adjacent to the silo. Support equipment within the building includes a diesel generator to supply electrical power to the silo in the event of commercial power failure, and a brine chiller for the silo's environmental system. A gravel service area surrounding the silo and launcher support building is primarily for maintenance and support vehicle maneuvering and parking. Pylons are located above the launch tube. The pylons and adjacent tie-downs and jack pads are used for supporting the equipment used during emplacement and removal of missile components.

The primary power to the Launch Facilities is supplied by commercial powerlines. Following Peacekeeper modification, each Launch Facility is estimated to have a peak electrical requirement of 32 kilowatts (kW) and an average annual consumption of 219 megawatt hours (MWh). This power will be used to run the communications, monitoring, and other electrical support equipment in the silo, the launcher support building, the security monitors, the missile guidance equipment, and the ventilation, dehumidifier and brine chiller equipment. In case of failure of the commercial power, standby power is provided by a 75 kW diesel generator. If both these systems are lost, emergency power is available from batteries.

The security system used to protect the Peacekeeper system during transport, maintenance, and operational readiness will be identical to the Minuteman III system. The security system will comply with Department of Defense (DoD) Directive 5210.41M of the Nuclear Weapons Security Manual (a classified document).

Since two large vehicles will be needed at one time to deliver and insert Peacekeeper stages at a Launch Facility, more maneuvering room is needed. Grading will be performed at the Launch Facility, to achieve this additional maneuvering room.

Below-ground Launch Facility modification (prior to Peacekeeper deployment) will be scheduled to follow the required site grading and access road upgrades. Launch Facility modification will occur in a systematic order so that portions of no more than two Flights will be depostured at any one time. The planned order of Peacekeeper deployment by Flight is: P, Q, T, R, S, A, B, C, D, and E (see Figure 1.1-1).

Major modification steps at each Launch Facility are:

- o Expansion of vehicle maneuvering area
- o Deposturing of missile site
  Remove reentry system, missile guidance set and communications security system. Remove Minuteman III missile and transport back to base.

- o Hardware removal and Launch Facility disassembly
  Establish contractor's temporary work area at the Launch Facility site. Remove operational ground equipment racks and other hardware.

- o Launch Facility modification
  Clear Minuteman equipment out of launch tube. Cut maintenance access into upper portion of tube. Replace as required the buried heating, ventilating, and water management piping running between the Launch Facility and the launcher support building. Install operational support equipment and electronics in the equipment room and launcher support building. Install the canister/shock isolation system in the missile tube.

- o Reposturing of the missile site
  Transport and install Peacekeeper missile stages. Test the various missile support subsystems. Insert the communications security equipment and the reentry system.

1.6.3.2 Launch Control Facility

Ten unmanned Launch Facilities make up a Flight of missiles. Each Flight receives primary support and control from a manned Launch Control Facility. Each Launch Control Facility contains a buried Launch Control Center and an above-ground support building. The Launch Control Center is hardened against attack, and the support building provides a kitchen, an electrical generator room, a security control center, and living quarters for the six-man security team. Each Launch Control Facility is fenced within a 5-acre site and includes parking for a number of trucks and vehicles, including limited room for the stage transporter.

Normally 50 Launch Facilities and 5 Launch Control Centers are electronically connected by the buried cable system to form a Minuteman squadron. Intersquadron connections for Peacekeeper will be obtained by adding five new cable links between the 319th and 400th Strategic Missile Squadrons. Even though each Peacekeeper Launch Control Center will be primarily responsible for 10 missiles, each Launch Control Center will be capable of monitoring and commanding any of the 100 Peacekeeper missiles. No surface modifications will occur at the Launch Control Facility. The only modifications within the Launch Control Facility will involve the electronic equipment and computer software.

1.6.3.3. Communication and Control System

Squadron-wide command and control communications between Launch Control Facilities and Launch Facilities is accomplished via the cable system. This is a network of buried and hardened communication cables connecting all Launch Facilities and Launch Control Facilities in a redundant manner.

Five additional buried cables will be installed between the 319th and the 400th squadrons. Ten possible cable routes have been identified (Figure 1.6.3-1). Existing rights-of-way were used to the extent practical (narrow lines in Figure 1.6.3-1).

Where overland crossing of private property would occur, a 1-mile path is indicated through which a specific route would be chosen should that alternative be selected. These routes were sited using available data and may be modified to reflect additional engineering and environmental studies as indicated in Section 1.4. For example, routes which are currently shown to cross private property may be modified to follow the boundary or fenceline of a field. Through more detailed site surveying and planning, the routes may also be modified to maintain a minimum of 7,900 feet between the new cable and existing Launch Facilities. The Proposed Action includes routes RB1, PD1, PA4, PA1, and SB1. They have a combined distance of 88 miles. The longest distance of any combination of five cables is 133 miles. The easements for PA1 and SB1 were acquired some time ago.

Easements for the other paths will be acquired for cable installation and maintenance. Landowners would be allowed to carry out normal ranching or agricultural operations over the permanent right-of-way following cable installation. A temporary easement width of 35 feet will be needed for trenching and cable placement. The permanent easement width will be 16.5 feet.

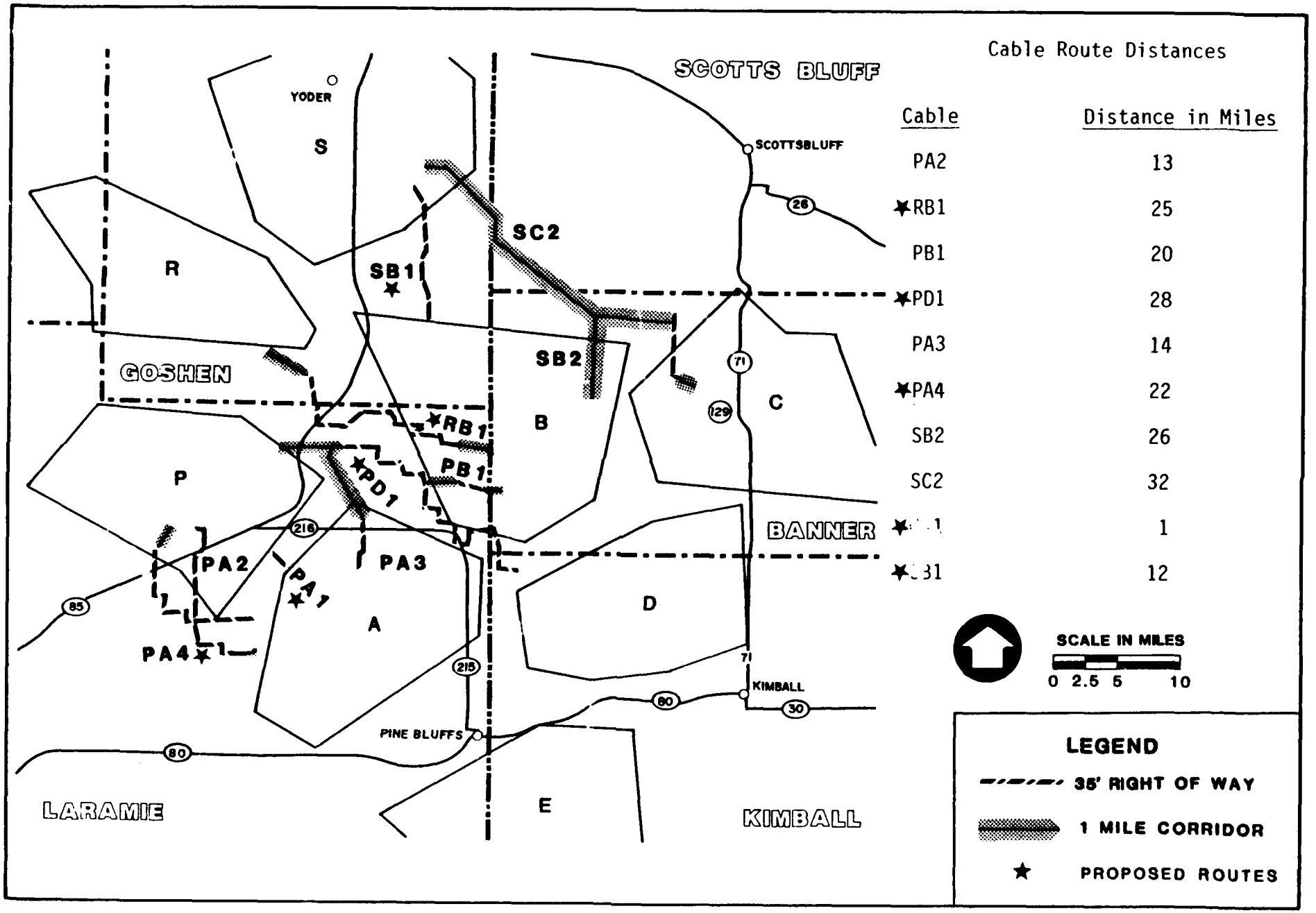
1.6.3.4 Deployment Area Roads

A system of designated roads in the Deployment Area is used to transport missile components to Launch Facilities and for security patrol. These include existing Minuteman routes and light vehicle routes.

Transporter erector routes include interstate highways, state-owned primary and secondary roads, and county roads. Most roads in the state system are paved, 2-lane highways at least 24 feet in width, and are well maintained. Approximately 400 miles of primary and secondary roads, including the interstate highways, are designated transporter erector routes in the Deployment Area. There are approximately 380 miles of county roads in the transporter erector network.

Some county-owned gravel roads accommodate cars and vans only. These roads are used by security police patrolling the Deployment Area.

Existing roads will be used by the stage transporter for the transport of the Peacekeeper missile components to the Launch Facilities. In addition to the two low bridges described in Section 1.6.2, three additional low clearance bridges have been identified. One is the existing railroad overpass on State Highway 71 near Kimball, Nebraska. The stage transporter can avoid this bridge by detouring 2 miles west on an existing county road, crossing the railroad at grade, and returning to Highway 71. The second is the Interstate 25 underpass of Bear Creek Road (28 miles north of Cheyenne) leading to Launch Control Facility Q1. This can be remedied by lowering Bear Creek Road. The third bridge clearance problem is the Interstate 25 underpass (2 miles north of Hill Road, and 34 miles north of Cheyenne) leading to Launch Facilities Q8 and Q11. This can be corrected by lowering the county road. Several other potential access restrictions to individual Launch Facilities have been identified and will need to be rectified by the project. A number of the county roads will have to be upgraded. In addition, some culverts and bridges may have to be strengthened or replaced. A joint engineering



ALTERNATIVE CABLE ROUTES

(15-6)

FIGURE NO. 1.6.3-1

determination regarding specific road upgrades will be made in late 1983 by the Air Force, Military Traffic Command, the Federal Highway Administration, and the affected state and local highway departments.

1.6.4 Mitigation Features Incorporated into the Project

Environmental impacts of the Proposed Action may be mitigated by commonly practiced construction methods or by standard Air Force procedures. To the extent practical in consideration of schedule and budget, standard construction practices that help reduce or eliminate environmental impacts are taken into account as part of the project. These assumed construction practices are discussed at the beginning of each resource's Section 3.0 analysis. Additional mitigation measures which have resulted from impact analysis of the proposed project can be found in Section 3.0.

1.6.5 Project Schedule

The overall schedule calls for the Peacekeeper system to be fully operational by the end of 1989. Major milestones to meet this schedule are as follows:

o	Complete the environmental impact statement	January 1984
o	Initiate construction at F.E. Warren AFB	June 1984
o	Complete construction at F.E. Warren AFB	Summer 1986
o	Upgrade Defense Access and DoD roads	Spring 1985 to Fall 1987
o	Modify 100 Launch Facilities	Early 1986 to 1989
o	First 10 Peacekeeper missiles become operational	December 1986
o	All 100 Peacekeeper missiles become operational	Late 1989

1.6.6 Manpower Requirements and Staging Area Alternatives

Direct manpower estimates for construction, assembly and checkout, and operation of the Peacekeeper system are shown in Table 1.6.6-1. This table shows the average annual workforce for each year of construction.

Under the Proposed Action, three construction staging areas would be established. Their locations would be limited to F.E. Warren AFB, the Cheyenne area and the Kimball, Nebraska, vicinity. The staging areas would be used for the temporary open storage of equipment and material. One or more buildings would also be present at each site for contractor use. All staging areas would be removed prior to project completion. Two staging area alternatives are considered in this environmental impact statement:

Table 1.6.6-1

AVERAGE PEACEKEEPER MANPOWER REQUIREMENTS BY YEAR

DEPLOYMENT AREA	1984	1985	1986	1987	1988	1989	1990	1991 and on
Construction	4	40	58	58	39	0	0	0
Defense Access Roads	15	280	315	150	0	0	0	0
Assembly and Checkout and Site Activation Task Force	0	15	240	310	265	265	10	0
SUBTOTAL:	19	335	613	518	304	265	10	0
F.E. WARREN AFB								
Construction	99	631	71	0	0	0	0	0
Assembly and Checkout and Site Activation Task Force	50	165	620	605	535	515	22	0
Operations								
Military	0	110	400	438	425	425	404	404
Civilian	0	20	70	77	75	75	71	71
SUBTOTAL:	149	926	1,161	1,120	1,035	1,015	497	475
TOTAL:	168	1,261	1,774	1,638	1,339	1,280	507	475

Source: Estimates based on average quarterly employment.

1) Staging areas at F.E. Warren AFB and Cheyenne, only; or

2) No staging areas.

1.6.7 Construction Material and Other Resources

The quantity of material needed for construction at F.E. Warren AFB and the Deployment Area is shown in Table 1.6.7-1. Contractors are expected to procure all materials. It is anticipated that no new gravel pits will need to be established to meet aggregate needs. In the case of water supply for construction, the Air Force will identify and, if necessary, obtain permits for the water or purchase existing water rights.

Table 1.6.7-2 shows other material needs associated with the project.

1.6.8 Operations

Operations for Peacekeeper will begin as the Launch Facilities are repostured, and continue throughout the life of the system. Once the system is fully deployed, activities will consist of weapon system operations, security, maintenance, and occasional equipment replacement. Operations personnel and their dependents will live on F.E. Warren AFB or in the Cheyenne area. Approximately 475 additional personnel will be stationed at the base to support long-term Peacekeeper operations.

One potential major change in Deployment Area operation over current conditions will be the greater number of round trips by the stage transporter between F.E. Warren AFB and an individual Launch Facility to accomplish Peacekeeper missile replacement. The current Minuteman III requires one round trip of its transporter erector for deployment into an empty silo. In contrast, the Peacekeeper stage transporter will be required to make four round trips for delivery of the first three stages and the missile canister closure. In addition, the erector will also make one round trip, resulting in a total of five round trips for the two vehicles.

1.6.9 Operational Life

The Peacekeeper system is expected to remain operational for 20 to 30 years. Peacekeeper decommissioning would entail a variety of physical, socioeconomic, and environmental consequences. Several years will be required to establish realistic alternatives, plan for their implementation, conduct the required environmental reviews, and carry out the selected action. Congress, the Department of Defense, the Air Force, state and local agencies, and the public will participate in the process. All actions will be in strict compliance with the laws applicable at the time.

1.6.10 Public Safety and Health

The Department of Defense and the Air Force have formal safety programs covering missile operations. These programs are guided by directives and regulations establishing policy and procedures; specifications, manuals, and pamphlets providing detailed safety requirements; reviews and inspections; training; and a mandatory reporting system for identification of safety-related problems.

Table 1.6.7-1

MATERIAL RESOURCES NEEDED FOR CONSTRUCTION

Resource	Unit	F.E. Warren AFB	Deployment Area	Total
Cement	Ton	3,525	2,870	6,395
Roofing	Ton	5,670	0	5,670
Lumber	Board-Ft	434,870	50,010	484,880
Wood Ties	Each	400	0	400
Steel Rail	Ton	23	0	23
Structural Steel	Ton	4,415	0	4,415
Reinforcement Steel	Ton	1,800	1,475	3,275
Coarse Aggregate	Ton	94,896	911,160	1,006,056
Fine Aggregate	Ton	56,922	34,152	91,074
Ballast	Cubic Yard	415	0	415
Asphalt	Ton	2,760	0	2,760
Water	Acre-Ft	67	449	516
Fuel	1,000 Gals.	765	3,740	4,505
Electricity	kWh	2,274,250	1,500,000	3,774,250

Table 1.6.7-2

ESTIMATED MATERIALS REQUIREMENTS
BY INDUSTRIAL CLASSIFICATION
(1982 Dollars)

Industrial Classification	Estimated Dollars Expended (1,000s)
Fabricated Metal Products	14,296
Unclassified Professional Services and Products	11,996
Cement and Concrete Products	4,130
General Wholesale Trade	5,836
Structural Metal Products[1]	6,846
Millwork, Plywood and Wood Products[1]	2,587
Copper, Copper Products	2,261
Electrical Lighting and Wiring	2,541
Truck Transport	2,556
Stone and Clay Mining and Quarrying	3,320
Stone and Clay Products[1]	1,940
Service Industry Machines	1,941
Blast Furnaces	808
Basic Steel Products	809
Heating and Air Conditioning Apparatus	1,001
Plumbing and Plumbing Fixtures	616
General Business Services	1,617
Petroleum Refining and Products	1,294
Material Handling Equipment	1,193
Electric Transmission Equipment	1,294
Sawmills and Planing Mills	970
Paints and Allied Products	970
Plastic Products	970
Furniture and Fixtures	647
Structural Clay Products	647
General Hardware	647
Scientific Instruments	647
Rail Transport	647
Real Estate	647
Construction, Mining and Oilfield Machinery	492
General Retail Trade, Except Eating and Drinking Places	4,219
Other, Unspecified	38,647
TOTAL:	119,032

Note: 1 Not included in other Industrial Classifications.

The safety analysis and evaluation techniques prepared for Peacekeeper were built upon the experience gained from Minuteman. Fault Tree Analysis plays a major role in analysis of both missile systems, but further refinement was gained for the Peacekeeper by the development of Hazard Control Analysis and Hazard Control Assessment Reports. The Fault Tree Analyses were (and continue to be) used to identify potential accident risks and establish design criteria which eliminate or control hazard assessments. Hazard control assessment reports identify operational constraints and cautions/warnings to minimize or control those risks which cannot be eliminated by design.

These reports are developed concurrently with system design and submitted periodically for detailed review, analysis, and evaluation. This iterative process starts with the system conceptual phase and continues throughout its life cycle from development through retirement. It is updated at the end of each program phase to describe tasks and responsibilities required for the subsequent phase. Computer systems are used to track identified hazards to ensure they are followed until satisfactorily resolved.

Peacekeeper safety will also benefit from the field experience gained during the last two decades. This experience and technological advancement are reflected in ordnance control and initiation, and safer handling and storage techniques. Considering all of these factors, the probability of a Peacekeeper missile stage burning or detonating at the Launch Facility is extremely remote. Such an accident has never happened during Minuteman operations over the last 19 years. Only one transportation mishap involving a solid fuel intercontinental ballistic missile of any type has ever occurred (a Navy A-3 motor burned, but no detonation occurred).

1.6.10.1 Explosives Safety

Development and use of Insensitive High Explosive in the Peacekeeper reentry system represents another significant safety improvement over previous weapon systems. Insensitive High Explosives are particularly effective in ensuring that ignition occurs only upon direct command. Those to be used with Peacekeeper have been rigorously tested and qualified to verify their insensitive nature in all shock, crush, and thermal environments which could result from potential mishaps. Test results show a consistent picture of an explosive which is significantly safer to handle than any previously studied. The application of Insensitive High Explosives to the Peacekeeper system provides a significant margin of safety over previous reentry system designs.

DoD Directive 5154.4-S and OSHA Standard 1910.109 establish safety criteria for explosives. Air Force Regulation 127-100 implements these requirements. The Peacekeeper missile uses three solid-propellant rocket motors and a small liquid-propellant rocket engine. The Stage III motor uses propellants that can detonate. The other stages use propellants that normally would not detonate, but would burn rapidly if ignited, and can cause explosions only through rupture of their containers.

The Peacekeeper propulsion system is similar to that of the Minuteman series, 1,000 of which are currently deployed. The solid propellants in these missiles are rubber-like substances which burn when ignited by a high-temperature starting device. The chemical composition of the first two stages is aluminum and ammonium perchlorate. In addition to these two compounds, the Stage III propellant contains cyclotetramethylethylenetetranitramine. The liquid propellants in the fourth stage ignite when mixed; however, they are stored in separate hermetically sealed containers, filled at the factory and never opened in the field, whose contents are released only under very controlled (metered) conditions during flight. Very limited quantities of liquid propellants are used in the Peacekeeper and the Minuteman. There have been no accidental ignitions of separate or assembled Minuteman stages during the weapon system's history, and no leaks of the liquid fuels.

Air Force Regulation 127-100 prescribes safety zones or Quantity Distance criteria for facilities which contain explosives. These criteria specify safe distances between places where explosives (including missile propellants) are based, stored, or processed, and other specified locations such as inhabited buildings, public traffic routes, powerlines, and pipelines. For planning purposes, Quantity Distance requirements for Peacekeeper in a Minuteman Launch Facility are 1,750 feet to inhabited buildings and 1,050 feet to public traffic routes as compared currently to 1,200 feet for inhabited buildings and 720 feet for public traffic routes for Minuteman. Stand-off distances also exist for powerlines, pipelines, and other public facilities. The foregoing safe distances are established for prudent planning purposes. Actual distances will be established following more complete simulation and testing activities prior to early summer, 1984.

Quantity Distance criteria may be addressed in a variety of ways, including acquisition of real estate interests, relocation of inhabited buildings, obtaining exemptions from the Secretary of the Air Force, or a combination of all of these. Real estate purchases would include restrictive easements to preclude future encroachment of inhabited buildings.

It is anticipated that exemptions will be granted for public roads as is the case for the current Minuteman missile system.

1.6.10.2 Peacekeeper in Silo

While the probability of an accident is extremely low, it is possible that an explosive detonation could occur from a deliberate or irrational act, a human-caused accident, or an act of nature. Although one of the the Launch Facilities lies within an area which may potentially be categorized as an active fault zone, the likelihood of ground rupture at the Launch Facility location, or sufficient ground motion to cause an explosive detonation, is extremely remote. For a discussion of geologic conditions of the Deployment Area, see Section 2.2.3. The likelihood of a deliberate or irrational act causing an explosion cannot be quantified. No such act has ever occurred to cause an accident or significant incident involving Minuteman. To prevent deliberate acts which could lead to an explosive detonation, all personnel assigned to nuclear weapons storage sites are evaluated under the criteria specified in Air Force Regulation 35-99, Personnel Reliability Program. This program is designed to ensure that personnel with unique military functions have no medical or mental traits that are or might

be a threat to the national security of the United States. In addition, those areas wherein such actions may be possible are designated "no lone" zones requiring at least two qualified individuals in sight of each other.

Within the Launch Facility, the only potential sources of ignition are from thermal, electrical, or shock sources. Highly abnormal conditions within the Peacekeeper Launch Facility could possibly lead to an accidental stage or motor ignition, deflagration, or detonation. History shows that the possibility of these events is extremely remote.

Electrical hazards to the propulsive stage ignitors are precluded by the design of the stage ignition system. Shock or fragments from the Stage IV gas pressurization system or other pressurized devices are not sufficient to create a stage detonation. Thermal conditions could possibly occur which could create a hazardous situation if one or both hypergolic fuel and oxidizer tanks in Stage IV were penetrated, leaked, or burst, the occurrence of which is extremely low.

Hydrogen gas generation in the Launch Facility as a result of battery charging would not result in concentrations great enough to create an explosion or fire, since the air is continuously recirculated. The only exception might occur under a special case of make-up air failure and long-term outgassing of hydrogen. If the environmental control system fails, an alarm is transmitted to the Launch Control Center. Outgassing only occurs during battery recharge after commercial power and standby diesel power loss.

If through some abnormal event an explosive component of one of the weapons did accidentally detonate, consequences would be restricted to airblast, fragments, and possibly dispersal of plutonium particles into the air. Air blast and fragments could cause casualties among the weapons personnel in the area. The regulations governing explosive safety, discussed in Section 1.6.10.1, minimize the likelihood of casualty to civilian or military personnel not directly related to the weapons. As noted in Section 1.6.10.3, the likelihood of inadvertent movement of the warhead caused by accidental propulsion, rocket motor or engine ignition is calculated to be less than one in ten million per missile per system lifetime. Even if this were to occur, it is most likely that the component containing plutonium would be blown free of the area in a relatively intact condition with no dispersal of plutonium. It is extremely unlikely that plutonium could ever be aerosolized by the heat of an explosion and then subsequently carried to surrounding areas.

It should be noted that the possibility of explosive accidents depicted above is not a new situation. That possibility, while extremely low, is present today with the Minuteman system. As previously stated, there has never been such an accident with Minuteman during 19 years of operation. Since the Peacekeeper and Minuteman propulsion systems are similar and the Peacekeeper Insensitive High Explosive in the warhead is a safety improvement, it is expected that the Peacekeeper operation will parallel the safety record of the Minuteman system.

1.6.10.3 Nuclear Weapon Safety

Nuclear safety requirements are dictated by DoD Directive 5030.15. The efforts to ensure maximum nuclear safety consistent with operational requirements start

with the nuclear system development cycle and continue until the system is retired. Air Force Regulation 122-2 tailors this directive to Air Force needs and establishes the Nuclear Weapon System Safety Group to conduct safety studies and operational reviews of nuclear weapon systems for which the Air Force has operations, custodial, or developmental responsibility. This group also includes non-Air Force members such as the Defense Nuclear Agency and the Department of Energy.

In-depth studies and rigorous reviews ensure that the nuclear weapon system design features and procedural safeguards are sufficient to meet the four DoD nuclear safety standards:

- Prevent accidents or incidents involving nuclear weapons and jettisoned weapons from producing a nuclear yield;
- Prevent deliberate prearming, arming, launching, firing, or releasing of nuclear weapons, except upon execution of emergency war orders or when directed by competent authority;
- Prevent inadvertent prearming, arming, launching, firing, or releasing of nuclear weapons; and
- Insure adequate security of nuclear weapons pursuant to the provisions of DoD Directive 5210.41.

In order to meet these standards, Air Force Regulation 122-10 defines the minimum criteria that apply to the design of a nuclear weapon system. Of particular interest are the probabilities against occurrence of certain catastrophic events:

- Inadvertent release of nuclear yield: The numerical specifications for nuclear weapon safety are that the probability of unintentional significant nuclear yield will be less than one in one billion per service life of the system.
- Inadvertent programmed launch: The probability of an inadvertent launch of the fully assembled weapon system must be less than one in ten trillion.
- Prearming: Faults or failures in the nuclear weapon system that result in inadvertent transmission of the prearm command will not occur with a probability greater than one in one million.
- Premature nuclear detonation: After application of the intent command and deliberate launch until the final warhead arming, the numerical specification for the probability of a premature nuclear detonation is one in ten thousand per event.
- Accidental motor ignition: The probability of accidental propulsion system, rocket motor, or engine ignition resulting in warhead movement in normal environments shall not exceed one in ten million per missile per system lifetime.

1.6.10.4 Transportation Safety

Transporting of nuclear weapons (or weapon components) as part of Peacekeeper will occur when they are:

- o Delivered to the Weapons Storage Area initially or returned to the Department of Energy. These movements will normally be via road, rail, or air. Ground shipments must comply with Department of Transportation regulations. Military air shipments must comply with Department of Defense directives and Air Force regulations to minimize shipping hazards.

- o Taken from or returned to storage at the Weapons Storage Area for assembly into reentry vehicles or deployment modules, or for surveillance or inspection.

- o Transported between the Weapons Storage Area and Launch Facility when a missile is deployed or removed from service. These movements are made on special transport vehicles. They will move under armed escort and only during daylight hours.

All vehicles utilized in moving nuclear weapons and missile stages components must meet strict design criteria and be nuclear certified for that purpose. Ballistic Missile Office 80-1A (which implements Air Force Regulation 122-3, The Air Force Nuclear Safety Certification Program) describes the Peacekeeper nuclear certification program and identifies the program responsibilities, equipment to be certified, and the certification procedures.

The Minuteman program provides insight into missile transportation safety. Over one million miles have been logged by the Minuteman transporter erectors, which transport the assembled missile (Stages I, II, III) over public roads. The two abnormal environments with the most potential for catastrophic accident to the Minuteman have been excessive shock and fire, yet during transportation, handling, and storage of Minuteman motors and missiles there have been no incidents of accidental ignition, burning, or detonation. Only five transportation accidents involving an assembled missile have occurred over the 19 years. None of them resulted in motor ignition, burning, or detonation. Because the Peacekeeper and Minuteman fuels are directly comparable with regard to explosive safety, as well as the increased safety design of the Peacekeeper, the safety of the Peacekeeper system is expected to exceed that of the Minuteman.

Ogden Air Logistics Center, which is the current weapons system manager for Minuteman, reports that during the system life to date, over 11,000 Minuteman missile movements have been made by air, rail or road. In addition, over 12,400 individual Minuteman solid stages and over 1,400 liquid-fueled propulsion system rocket engines have been transported without mishap.

In the event of an extreme abnormal environment, ignition of the solid stages (I, II, III) can take place by subjecting the propellant to severe shock, impact, or frictional heating by projectiles penetrating the motor case and propellant. The only place that the propellant could be penetrated without penetration of

the case is in the nozzle area. Should an accident result in propellant ignition and the case remain intact, the stage would burn propulsively. Should ignition take place through case penetration, the result would be a pressure-vessel type explosion. Tests of Stages I and II have shown that an explosion could distribute pieces of burning propellant of various sizes as far away as 1,000 feet. Stages I and II propellants would be consumed by subsequent burning.

The Stage III propellant does not burn well at atmospheric pressure and a burst-case ignition would result in the scatter of both burned and unburned propellant. The flame temperature would be approximately 5,900 degrees Fahrenheit for Stage I and II propellants and 6,500 degrees Fahrenheit for Stage III propellants.

Stage IV presents a different problem from the solid stages in the event of an accidental release of propellant. Should an accident result in the rupture of the monomethylhydrazine (MMH) fuel tank only, both toxic and fire hazards would result. MMH is flammable over a range of two and one-half percent to 98 percent mixture with air and can be ignited by sparks or open flames. Should the oxidizer tank (Nitrogen Tetroxide [N_2O_4]) alone be ruptured, both toxic and fire hazards would result. Combustibles and other organic materials can ignite spontaneously when mixed with N_2O_4. Should an accident result in rupture of both tanks and mixing of the propellants take place, a fire and explosion would result.

Each Stage IV propellant tank would be expected to contain 85 gallons of liquid. In the event of a spill, the liquid would spread over a relatively small area (5 to 8-foot diameter circle) on an absorbent surface such as sand or gravel. On a nonporous surface the area of spread would be larger (20 to 30-foot diameter circle). Propulsive ignition in an accident is highly unlikely. Stage IV propellants are hypergolic, and as a result, mixing causes a fire with flame temperatures of approximately 5,600 degrees Fahrenheit.

1.6.10.5 Radiation and Toxic Substances

The normal exposure of weapons personnel to radiation has been measured and found to be well within established federal exposure standards. The weapons are constructed and maintained to preclude the possibility of leakage of radioactive material during operational status. No hazard from intrinsic radiation exists for civilians or military personnel including those who are part of nuclear weapons operations.

Some flammable and toxic substances (i.e., lubricants, cleaning solvents, etc.) may be used in limited quantities in the maintenance of weapons, but this is little different from many industrial operations where proven procedures have been adopted to ensure both worker and public safety. The one possibility of an accident involving toxics would be puncture of the sealed containers of Stage IV which contain N_2O_4 and MMH. MMH is a volatile caustic liquid which can cause a toxic reaction by inhalation or absorption through the skin. The Threshold Limit Value for MMH is 0.2 parts per million with a 10-minute emergency exposure level of 30 parts per million. The material produces respiratory irritation as well as systemic central nervous system effects. The Threshold Limit Value for 8-hour exposure to N_2O_4 is 5 parts per million with a 10-minute emergency exposure

limit of 30 parts per million. N_2O_4 causes severe burns on contact with skin but is much more toxic when inhaled. Severe symptoms can develop many hours after exposure and are mainly respiratory in nature. The containers are separate from each other and are hermetically sealed at the factory and never opened. The monomethylhydrazine is a particularly toxic substance, and were a leak to occur, extreme care would have to be taken.

1.6.10.6 Hazardous Wastes

The deployment and operation of the Peacekeeper system is not expected to generate large quantities of hazardous wastes. Potential sources of such wastes include expended or unusable fuels, oils, and lubricants, solvents, paint and thinners, hydraulic and machine fluids, cleaning agents, and adhesives. To the extent that the types and quantities generated meet the EPA criteria for hazardous wastes, the formal handling and reporting requirements will be observed.

The special nuclear materials incorporated into the Peacekeeper warheads are not sources of hazardous wastes within the meaning of the Resource Conservation and Recovery Act of 1976, as amended. Wastes from such materials are handled and disposed of in accordance with regulations established by the Department of Energy. None will be produced and stored at F.E. Warren AFB or in the Deployment Area. Hazardous wastes that are generated during construction and operation of the Peacekeeper system must be handled and disposed of in accordance with the Resource Conservation and Recovery Act of 1976, as amended.

1.6.10.7 Air Force Contingency Plans

The Department of Defense requires that a comprehensive systems safety hazards analysis addressing all potentially hazardous elements of the Peacekeeper missile system be accomplished prior to deployment. The various Department of Defense, Air Force, and other agency directives regulating the scope and content of the specific sections of this analysis have been identified in previous sections of this chapter. These directives provide for the following:

1) Identification of hazard by category (e.g., explosive, chemical, nuclear);

2) Systems analysis concerning potential effect of the subject hazardous elements on personnel and resources given various mishap scenarios;

3) Safety criteria pertaining to the use and handling of hazardous materials; and

4) Studies and reviews to ensure that the weapon system design features and procedural safeguards are adequate to meet all Department of Defense and Occupation Safety and Health Administration safety standards.

The above is instrumental in the preparation of plans to address potential mishaps. This overall iterative process is initiated during the system concept phase and continues throughout the life cycle of the program.

The specific plans for response to accidents involving the Peacekeeper missile associated hazards are contained in Air Force Regulations 122-23, 122-25, 127-4, 355-1 and SACR 207-18, SACR 355-1 and the Ogden Air Logistics Center Peacekeeper Recovery Plans which are still being developed. The specific response, aimed at protecting civilian and Air Force personnel and property, would vary with the facts of an incident, but would contain the following elements as appropriate:

1) An onsite team chief would assume and maintain control of the site.

2) Appropriate local agencies would be advised, and all responses would be coordinated with those agencies.

3) All personnel would be evacuated to a predetermined distance depending on the nature of the mishap.

4) A Base Disaster Control Group composed of safety, maintenance, bioenvironmental engineers and other personnel from the base would be dispatched to the accident scene if necessary.

Cleanup actions for liquid propellant spills would initially include dispersal, then removal of contaminated property and equipment in accordance with applicable statutes and regulations concerning hazardous wastes. In the unlikely event that cleanup activities would involve the components of the reentry vehicle, the Defense Nuclear Agency and the Department of Energy would also be involved.

1.6.11 Authorizing Actions

Certain project facilities and activities will require a variety of authorizing actions, i.e., permits, approvals, and consultations. Sources of air, water, and solid and hazardous waste will be permitted in accordance with state and federal law prior to construction. State and local road permits needed for delivery of Peacekeeper missile stages to F.E. Warren AFB and their movement to and from the Deployment Area will be obtained as required. A list of such authorizing actions and the agencies involved, along with corresponding descriptions of the relevant facilities or activities is set forth in Appendix F.

2.0

AFFECTED ENVIRONMENT

2.0 AFFECTED ENVIRONMENT

This section presents a systematic description of existing environmental conditions in the project area. Existing environmental conditions form the background against which impacts of the Proposed Action can be considered (Section 3.0).

2.1 Human Resources

2.1.1 Employment Demand

The analysis of Employment Demand describes the regional economy and area demographics. An historic profile of population, labor force participation, unemployment, and income was developed, and used to forecast future activity in order to determine what labor force is available for work on the project. Demand for project employment was then compared with available labor in order to determine what resources are required and the levels of inmigration expected.

2.1.1.1 Region of Influence and Data Sources

2.1.1.1.1 Region of Influence

The Employment Demand analysis considers a Region of Influence which includes 16 counties in Nebraska, Wyoming, and Colorado (Figure 2.1.1-1). These counties are: Albany, Goshen, Laramie, and Platte, Wyoming; Kimball, Banner, and Scotts Bluff, Nebraska; and Adams, Arapahoe, Boulder, Denver, Douglas, Gilpin, Jefferson, Larimer, and Weld, Colorado.

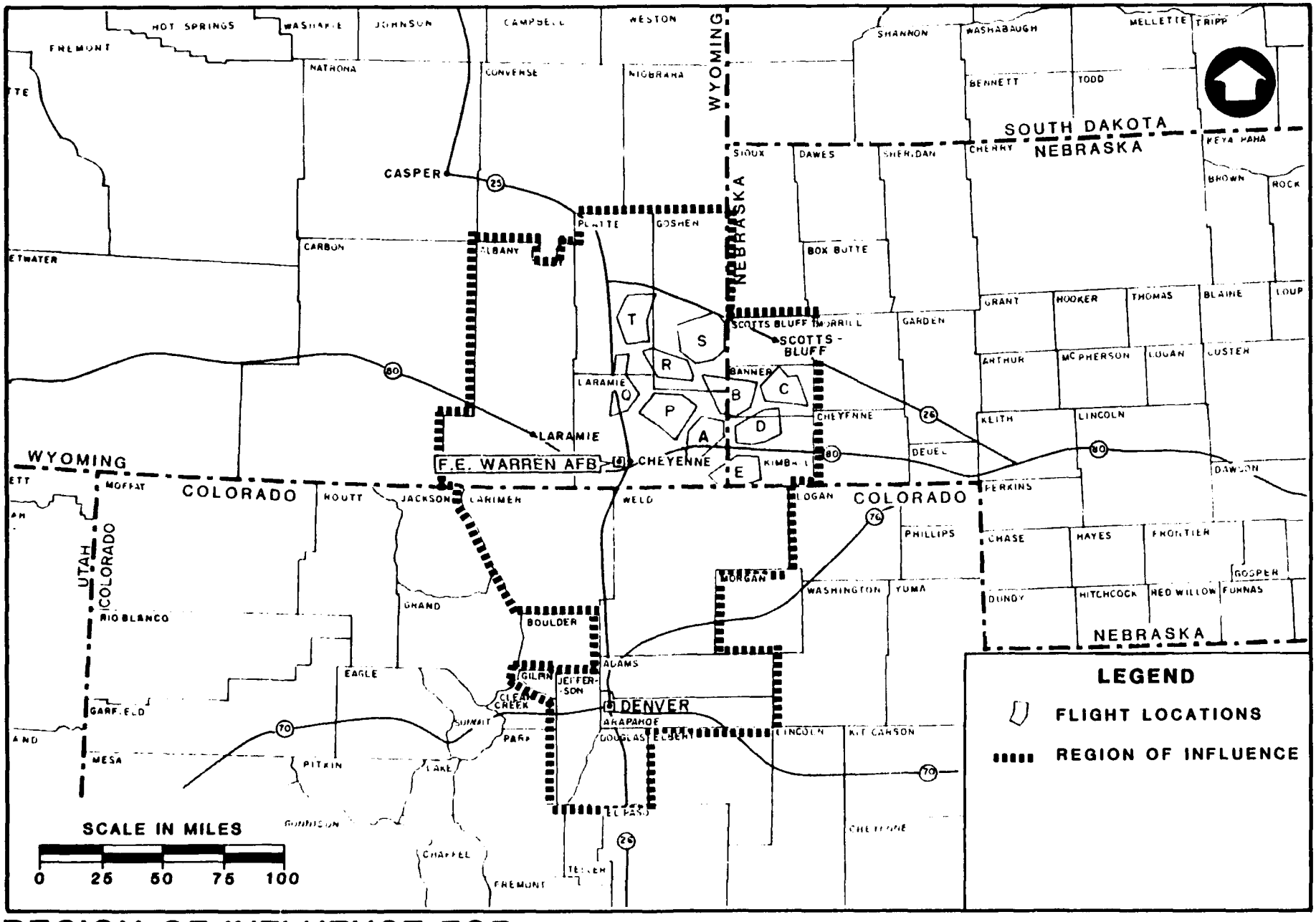
The Region of Influence is delineated on the basis of a 60-mile radius surrounding F.E. Warren AFB. This defines an area where the project can draw a local (daily commuting) labor force. Because this radius extends into the Denver metropolitan area, the entire Denver Standard Metropolitan Statistical Area is included, due to its role as a regional distribution and service center. The 60-mile factor was derived from a review of construction projects of similar magnitude in and around Wyoming, Nebraska, North Dakota, and Colorado (Dunning 1981, Coon et al. 1976, and Battelle 1979).

An Area of Concentrated Study within the Region of Influence is derived to include the following: Albany, Goshen, Laramie, and Platte counties, Wyoming; Kimball and Scotts Bluff counties, Nebraska; and Larimer and Weld counties, Colorado. This Area of Concentrated Study is based on impact-associated population allocations to communities in those counties as shown in Table 3.1.1-7. For a more detailed justification of the Area of Concentrated Study, see Section 3.1.1.1.

2.1.1.1.2 Data Sources and Analytic Methods for Existing Conditions

2.1.1.1.2.1 Data Sources

The Regional Economic Information System of the U.S. Bureau of Economic Analysis



REGION OF INFLUENCE FOR POPULATION AND EMPLOYMENT

FIGURE NO. 2.1.1-1

provided historical time series data for employment and personal income. Population is derived using data from the U.S. Census Bureau and the Bureau of Economic Analysis.

2.1.1.1.2.2 Analytic Methods for Existing Conditions

The existing conditions section provides a profile of economic characteristics. This profile was developed using secondary data sources.

2.1.1.2 Existing Conditions

Regional employment trends are summarized in Table 2.1.1-1. These data were aggregated at the county level from the Bureau of Economic Analysis and the respective states' employment security agencies. Employment by place of work, as reported by the Bureau of Economic Analysis, includes all employment (full and part-time) in the county where the employer is located. Employment by place of residence is reported by county of residence of the employee and includes employment covered by unemployment legislation.

The region experienced strong employment growth between 1970 and 1980. Regional employment was approximately 710,000 in 1970, and over 1 million by 1980, showing an annual growth rate of 5.7 percent. The gross Labor Force Participation Rate was somewhat higher at the regional level than in the local area around F.E. Warren AFB. In 1970, it was 42 percent in the region, and in 1980, 52 percent. Nationally, a similar trend has occurred. This is because of the increased number of women who have entered the labor force.

In 1975, the peak year for national unemployment during the 1970s, the unemployment rate reached 7.8 percent. This was also the peak year for the region with a 5.0 percent rate. The peak seasonal rate has approached 8 percent in the winter of 1982 to 1983, and the unemployment rate in some counties has approached 12 percent recently. Regional unemployment rates generally reflected national rates, while averaging about 2 percent below the national rates.

The income statistics were derived from estimates of personal income by the Bureau of Economic Analysis. In 1980, total real personal income increased to approximately $26 billion. This represents a 75 percent increase over 1970 total personal income (approximately $15 billion, constant 1982 dollars).

TABLE 2.1.1-1

HISTORICAL ECONOMIC DATA
FOR THE SIXTEEN-COUNTY REGION

YEAR	POPULATION	HOUSEHOLDS	LABOR FORCE	GROSS[1] LFPR	RESIDENT EMPLOYMENT	UNEMPLOYED WORKERS
1970	1572300	497260	667290	42.4	645792	21500
1971	1627700	521790	699280	43.0	677908	21369
1972	1696500	553020	763240	45.0	741424	21811
1973	1760000	584340	816570	46.4	793711	22863
1974	1796200	605700	839950	46.8	812293	27659
1975	1820600	623440	853910	46.9	811383	42525
1976	1860500	648690	883400	47.5	842971	40431
1977	1909500	674880	931840	48.8	892008	39836
1978	1969900	710510	1001190	50.8	967996	33191
1979	2030800	742150	1051560	51.8	1020760	30799
1980	2068600	766910	1081230	52.3	1045199	36034
1981	2115520	786990	1104030	52.2	1061028	42999
1982	2171920	819610	1119190	51.5	1072337	46849

YEAR	UNEMP. RATE	EMPLOYMENT BY PLACE OF WORK	EARNINGS (MILLIONS OF CURRENT $)	EARNINGS (MILLIONS OF 1982 $)	EARNINGS PER WORKER (CURRENT $)	EARNINGS PER WORKER (1982 $)
1970	3.22	704618	5275.8	11749.3	7500	16700
1971	3.06	739981	5949.3	12700.1	8000	17200
1972	2.86	788830	6821.8	14052.9	8600	17800
1973	2.80	847572	7803.0	15207.3	9200	17900
1974	3.29	864154	8602.6	15224.6	10000	17600
1975	4.98	872576	9281.6	15259.5	10600	17500
1976	4.58	904334	10328.1	16154.7	11400	17900
1977	4.27	958161	11649.6	17227.7	12200	18000
1978	3.32	1031547	13623.4	18822.4	13200	18200
1979	2.93	1091146	15667.8	19861.9	14400	18200
1980	3.33	1117546	17647.5	20286.8	15800	18200
1981	3.89	1151181	19999.6	21182.1	17400	18400
1982	4.19	1155481	20963.5	20963.5	18100	18100

YEAR	PERSONAL INCOME (MILLIONS OF CURRENT $)	PERSONAL INCOME (MILLIONS OF 1982 $)	PERSONAL INCOME PER CAPITA (CURRENT $)	PERSONAL INCOME PER CAPITA (1982 $)
1970	6555.1	14598.5	4200	9300
1971	7356.1	15703.3	4500	9600
1972	8341.7	17184.0	4900	10100
1973	9533.5	18579.9	5400	10600
1974	10672.4	18887.7	5900	10500
1975	11700.0	19235.5	6400	10600
1976	13031.1	20382.7	7000	11000
1977	14665.9	21688.2	7700	11400
1978	16988.4	23471.6	8600	11900
1979	19605.0	24853.0	9700	12200
1980	22304.4	25640.1	10800	12400
1981	25484.2	26991.0	12000	12800
1982	26582.1	26582.1	12200	12200

Notes: 1 Gross LFPR= Unemployment plus Employment divided by Population.

2.1.2 Housing

The Housing resource describes the existing housing stock, including single-family, multifamily, mobile homes, and temporary housing accommodations within the Region of Influence. The resource includes consideration of banking and financial institutions; federal, state, and local governments; and the private housing industry (land developers and home builders) and their capabilities to respond to changes in demand.

2.1.2.1 Region of Influence and Data Sources

2.1.2.1.1 Region of Influence

The Housing Region of Influence includes eight counties in Wyoming, Nebraska, and Colorado (Figure 2.1.2-1). They are:

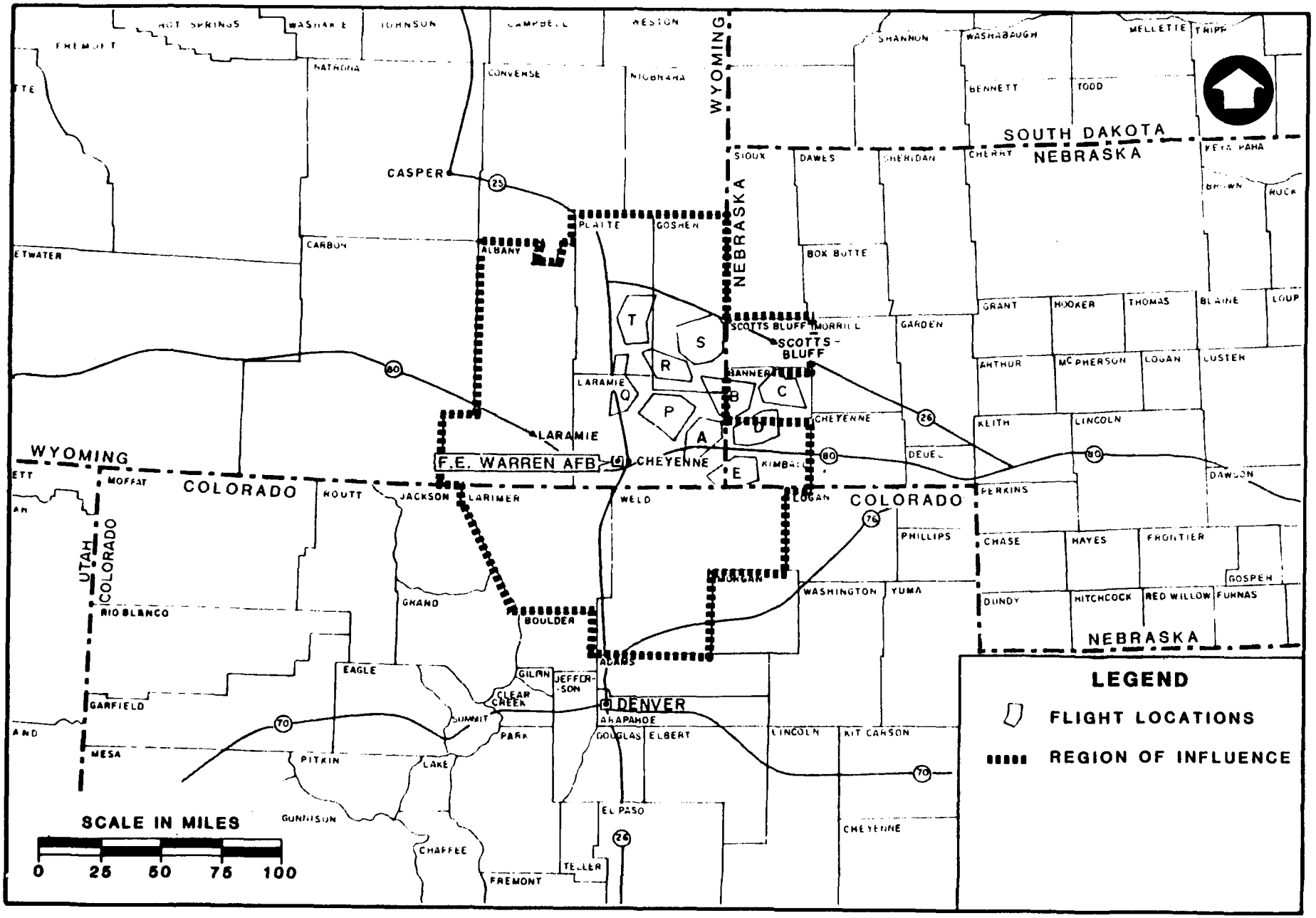
Wyoming	Nebraska	Colorado
Albany	Kimball	Larimer
Goshen	Scotts Bluff	Weld
Laramie		
Platte		

The Housing Area of Concentrated Study is the Cheyenne Urbanized Area and the city of Kimball, Nebraska. By census definition, the Cheyenne Urbanized Area includes the City of Cheyenne and the adjacent densely settled areas of Laramie County. The Housing resource Region of Influence is derived from the assumptions involved in allocating the population and employment Area of Concentrated Study described in Section 2.1.1.1.1, and justified on the basis of relative increases in population (Section 3.1.2.1).

2.1.2.1.2 Data Sources and Analytic Methods for Existing Conditions

Data collection included the use of primary and secondary sources. Interviews with local property owners and real estate managers were conducted to obtain detailed information regarding housing conditions, dwelling types, rates, and occupancy levels. Interviews of financial institutions were also conducted to determine the historical levels of home mortgage and construction activity and local developer capabilities. In addition, contacts with federal, state, and local housing agencies and authorities were made as a supplementary measure to update historic housing data. Secondary sources included the utilization of census information, housing monitoring surveys, and building permit data which assisted in profiling local housing conditions.

Data developed and analyzed from primary and secondary sources were used to profile housing supply in the Region of Influence. The existing housing conditions and trends include a 10-year analysis of housing mix, vacancy rates, value, and



REGION OF INFLUENCE FOR HOUSING

FIGURE NO. 2.1.2-1

utilization. Mortgage financing capabilities, government permit processing, and builder and developer capabilities were analyzed to determine existing and historic levels of development activity.

2.1.2.2 Existing Conditions

2.1.2.2.1 Cheyenne Urbanized Area

Year-round housing stock in the Cheyenne Urbanized Area grew by over 8,500 units, or 58 percent, between 1970 and 1980 as shown in Table 2.1.2-1. The total county housing stock increased 41 percent. Approximately 86 percent of all year-round housing units in Laramie County is in the Cheyenne Urbanized Area. The remainder is in the small communities of Albin, Burns, and Pine Bluffs, and on scattered farms and ranches throughout the county.

Since 1980, the housing stock in the Cheyenne Urbanized Area and county has not increased at historical 1970 to 1980 levels. Recent building permit data indicate the area has experienced a decline in housing construction due to economic conditions and high interest rates.

The housing mix for the Cheyenne Urbanized Area presented in Table 2.1.2-1 indicates that single-family units make up the largest housing category. A major increase occurred between 1970 and 1980 for the mobile home category. In 1980, the Cheyenne Urbanized Area contained 84 percent of all single-family units in the county, 94 percent of the multifamily units, and 85 percent of the mobile homes. Utilizing housing mix as an indication of housing preference, the 1970 and 1980 Census shows a preference change to mobile homes with percentage reductions in single family and multifamily.

Despite the growth in housing stock experienced in the Cheyenne Urbanized Area, the total vacancy rate declined approximately 1 percent according to Census data for 1970 and 1980. Total vacancy rates have fluctuated slightly from 1980 through 1982 for the Cheyenne Urbanized Area. In 1982, the total vacancy rate as defined by the Federal Home Loan Banks was 2.5 percent.

Housing values for the Cheyenne Urbanized Area rose substantially between 1970 and 1980, from $24,616 (adjusted for 1982 constant dollars) to $55,600. Median monthly rent in 1970 was $159 (adjusted for 1982 constant dollars) and increased in 1980 to $191. The average price for residential units in late 1982 was $63,666.

According to 1983 inventory data collected, 57 mobile home parks and 6 campgrounds containing over 2,300 and 372 spaces, respectively, are located in the Cheyenne Urbanized Area. Mobile home parks represent less than a 2 percent total vacancy rate, with campgrounds showing a total vacancy rate of 20 percent. The inventory of multifamily housing identified 13 apartment complexes in the area, which contain approximately 900 units and list a total vacancy rate of 4 percent. The 1983 inventory of temporary housing also identified 29 hotels in the Cheyenne Urbanized Area, of which 21 are nonfranchised and account for 987 rooms and 1,389 beds. The franchised hotels account for 1,145 rooms and 1,850 beds.

Table 2.1.2-1

HOUSING MIX, 1970 AND 1980
CHEYENNE URBANIZED AREA

Type of Structure	1970 # of Units	1970 % of Total	1980 # of Units	1980 % of Total	1970-1980 Change # of Units	1970-1980 Change % Change
Cheyenne Urbanized Area[1]						
Single Family	10,543	71%	15,695	67%	5,152	49%
Multifamily	4,108	28%	5,465	23%	1,357	33%
Mobile Home	172	1%	2,305	10%	2,133	1,240%
TOTAL:	14,823	100%	23,465	100%	8,642	58%

Note: 1 1970 Cheyenne Urbanized Area only includes the City of Cheyenne.

Source: U.S. Bureau of the Census, Wyoming General Housing Characteristics, 1970 and 1980.

2.1.2.2.2 City of Kimball

Year-round housing stock in Kimball increased 12 units, or 1 percent between 1970 and 1980. Single-family housing stock decreased by 17 units, or 2 percent for the same period. Multifamily units decline by 2 units, or a 1 percent change. Mobile homes increased by 27 percent from 113 units in 1970 to 144 units in 1980.

Single-family units comprise 73 percent of all housing units in the city. Multifamily and mobile homes number 18 percent and 9 percent of the housing stock, respectively. Between 1970 and 1980, there has not been a substantial shift in the housing mix. Mobile home units showed the only positive change, increasing from 9 percent to 11 percent of the total housing stock.

According to Census information, the highest vacancy rate by type of unit was 16 percent for multifamily units. Although the largest number of vacant units was found to be single family, the rate was only 6 percent. Mobile homes, the only housing type to show growth from 1970 to 1980, experienced a 6 percent vacancy rate in 1980. The overall vacancy rate for the city in 1980 was 8 percent, identical to the 1970 rate.

Owner-occupied units totaled 824 and renter-occupied totaled 345 for the city in 1980. With 20 units listed as for sale only, and 41 units as for rent, the city experienced a homeowner vacancy rate of 2 percent and a rental vacancy rate of 11 percent in 1980. By comparison, for 1970 the average homeowner total vacancy rate was also 2 percent while the rental vacancy rate was 14 percent.

The median value of owner-occupied housing for the city of Kimball was $12,200 in 1970 and by 1980 increased to $31,800. After adjusting for inflation (constant 1982 dollars), housing values have appreciated approximately $10,000 during this period. However, 1982 state data indicate an average sales price of $25,846. The median monthly contract rent increased from $74 in 1970 to $118 in 1980.

According to 1983 inventory data collected, 2 mobile home parks and 2 campgrounds containing 162 and 71 spaces, respectively, are located in Kimball. Mobile home parks represent less than a 25 percent vacancy rate, with campgrounds showing a vacancy rate of 89 percent. The 1983 inventory of temporary housing identified 8 hotels in Kimball, of which 3 are nonfranchised and account for 75 rooms and 179 beds. The franchised hotels contain 151 rooms and 190 beds. No apartment complexes containing ten or more units were identified in Kimball.

2.1.3 Public Finance

The Public Finance resource examines the budgets, fiscal resources, and obligations of all major governmental entities, including school districts and urban service areas projected to receive major population allocations as a result of project-related impacts.

2.1.3.1 Region of Influence and Data Sources

2.1.3.1.1 Region of Influence

The Public Finance Region of Influence is the eight-county region described earlier under the Region of Influence for Housing.

The justification for the Public Finance Region of Influence is identical to the Housing Region of Influence justification. (See Section 3.1.2.1).

The Area of Concentrated Study for Public Finance focuses on Laramie County, the City of Cheyenne, Wyoming, the City of Kimball, Nebraska, as well as various special district governmental jurisdictions. These jurisdictions receive the greatest population allocations relative to their size, and are discussed in Section 3.1.3.1.

2.1.3.1.2 Data Sources and Analytic Methods for Existing Conditions

Annual budgets for governmental entities were the major data sources utilized. Additional data sources included annual financial reports, financial statements, and reports from the education, revenue, and taxation departments. Where local data were unavailable, budget summaries at the state level were utilized. Certificates of taxes levied and abstracts of assessed valuation were utilized to determine existing mill levies and property valuations.

Actual 1982 revenues for each jurisdiction were identified by revenue source. Interest income and carryover amounts were also identified. Expenditures were aggregated by major categories specific to the type of services provided by each jurisdiction.

2.1.3.2 Existing Conditions

2.1.3.2.1 City of Cheyenne, Wyoming

Net total revenue for the City of Cheyenne exclusive of the 1-percent sales and use tax carryover amount in 1982 was $23,137,992 or a total increase of 82 percent since 1980. The major revenue sources for the City are the 3-percent and 1-percent local option sales tax, the mineral royalty, and the severance tax transfers from the state. Expenditures in 1982 were $22,128,103 or a 71 percent increase since 1980. Assessed valuation for the City of Cheyenne was $121,077,236 in 1982. At the end of FY 1982, Cheyenne had approximately 53 percent of its bonding capacity available for debt service out of a legal debt

limit of 4 percent of assessed valuation. Use of existing debt capacity is constrained by prevailing political attitudes, property assessment procedures which maintain property values at their 1967 market value, and low mill levy caps.

2.1.3.2.2 City of Kimball, Nebraska

In 1982, the City of Kimball had total revenues of $1.167 million and expenditures of $753,058. The net surplus of all funds was $414,855. The City's total assessed valuation was $49,113,855. Bonded indebtedness was $595,000 out of a legal debt limit of $3,432,845.

2.1.3.2.3 Laramie County, Wyoming

Total revenues for Laramie County in 1982 were $9,323,896, a 51-percent increase since 1980. Total expenditures were $8,412,319, or an increase of 67 percent since 1980, leaving a surplus of $911,577. The major revenue sources for the County in 1982 were the 3 percent state sales and use tax and the 1-percent local option sales and use tax, and the severance tax transfer from the State. Property tax revenues have not increased substantially since 1980. The County's assessed valuation in 1982 was $225,718,250. In FY 1982, Laramie County had 100 percent of its $4,514,365 general obligation bonding capacity available.

2.1.3.2.4 Kimball County, Nebraska

Selected revenues identified for Kimball County were $821,945 in 1982, representing a 10-percent increase over 1981. Expenditures were $751,566, or an 8-percent increase over 1981, leaving a net surplus of $170,000. Total assessed valuation in 1982 was $204,129,273. Property tax revenues increased by 26 percent from 1981 to 1982. In 1982, Kimball County had 21 percent, or $1,683,000, of its bonded indebtedness capacity available.

2.1.3.2.5 Laramie County School District No. 1

Laramie County School District No. 1 is the second largest school district in the state in terms of enrollment, and the lowest in terms of assessed valuation per average daily membership. Total revenues for the District were $44,584,274 in 1983, and total expenditures were $39,213,021. These numbers represent general fund revenues and expenditures. If capital replacement and maintenance expenditures are included, they approach or exceed existing revenues. Accordingly, the District has deferred capital maintenance and improvements in the past 5 years due to its constrained ability to fund such projects. As a result, through 1983 the District was in critical financial condition, but revisions to the State Foundation Program in 1983 will provide the District with an additional $8.37 million from this source with which some of these needs can now be addressed. At the beginning of FY 1984, the District had less than 25 percent of its legal bonding capacity remaining with $16.219 million obligated out of a total limit of $20.274 million.

2.1.3.2.6 South Cheyenne Water & Sewer District

The South Cheyenne Water & Sewer District is an urban service district which

operates its own wastewater treatment facility, purchasing its water from the City of Cheyenne and distributing it through its transmission system. The South Cheyenne Water & Sewer District funds its operation through property taxes and user fees. Expenditures and revenue in 1982 were $599,541 and $614,032, respectively, leaving an operating surplus of $14,491.

2.1.3.2.7 City of Cheyenne Board of Public Utilities

The Board of Public Utilities is an enterprise fund which finances its operations entirely through user fees. The waterworks fund portion of total revenues and expenditures in 1982 were $3,944,302 and $3,600,253, respectively. The Board of Public Utilities has recently undertaken a major expansion of its facilities through the Stage II Water Project and is scheduling increases in fees and rates to cover increased debt and loan obligations.

The sewer fund portion of total revenues and expenditures in 1982 was $1.210 million, and $1.096 million, respectively. Total bonded indebtedness consisted of $10,280,000 for water bonds and $2,975,000 for sewer bonds. There is no legal bonding limit on water bonds. However, sewer bonding is restricted by a cap of 4 mills on assessed valuation. Remaining sewer bonding capacity in 1982 was approximately $1.6 million.

2.1.3.2.8 Kimball County School District

Total revenues and expenditures for Kimball County Elementary School District No. 3 in 1982 were $1,699,049 and $1,307,762, respectively, leaving a net surplus of $391,187. The District had no bonded indebtedness in 1982.

Total revenues and expenditures for Kimball County High School District No. 1 in 1982 were $993,335 and $969,977, respectively, leaving a net surplus of $23,358. The District had no bonded indebtedness in 1982.

2.1.4 Construction Resources

The Construction Resources inventory describes construction materials markets in the Region of Influence. Existing levels of supply and demand are estimated for construction resources by identified trade areas and producers in the Region of Influence.

2.1.4.1 Region of Influence and Data Sources

2.1.4.1.1 Region of Influence

The Construction Resources Region of Influence is identical to the Employment Demand Region of Influence. The Area of Concentrated Study is also identical to the Region of Influence. The justification for the Region of Influence is identical to the Employment Demand justification described in Section 2.1.1.1.

2.1.4.1.2 Data Sources and Analytic Methods for Existing Conditions

The Construction Resources inventory was based on publications of the U.S. Bureau of Mines, the Census Bureau, state and local agencies, trade organizations, and professional journals. Discussions with trade organizations and major material producers provided vital information regarding the regional sales and purchasing patterns in the Region of Influence. The major project materials and quantity requirements are classified by four-digit Standard Industrial Classification code. Based upon historical shipping data and interviews with trade area officials, a trade area was delineated for each construction material. Historical data and forecasts of production and consumption in the trade areas were identified for specific project construction materials.

The general trade area, Region of Influence purchasing patterns, and the affected material capacity within the Region of Influence are described below.

2.1.4.2 Existing Conditions

2.1.4.2.1 Cement

A hydraulic cement plant ordinarily supplies a limited regional market due to the product's high transportation costs and relatively common inputs (e.g., limestone, gypsum, and shale). There are three cement plants within the Region of Influence. Estimated annual production capacity of these plants are:

Plant Name, Location	Annual Capacity
Monolith Portland Cement, Albany County	500,000 tons
Ideal Basic Industries, Larimer County	460,000 tons
Martin Marietta, Boulder County	430,000 tons

These plants have historically satisfied most of the region's demand.

2.1.4.2.2 Coarse and Fine Aggregate

The market area of an aggregate pit (or quarry) is influenced by the proximity of other suitable sources. Usually the closest supply will be used since the transportation costs rise as distances increase.

Throughout the Region of Influence, native aggregates are found in abundance, although these are not always suitable for all projects, as some have expansive qualities. Two pits in Laramie County that provide better quality aggregates include the Morrison-Knudsen quarry west of Cheyenne and the Great Western Sugar quarry north of Cheyenne.

2.1.4.2.3 Ballast

It is difficult to define a typical market area for ballast, since railroads often produce their own material. Thus, regional availability may be offset by railroad-owned quarries.

Three Wyoming counties within the Region of Influence contain major producers of ballast: Morrison-Knudsen, Guernsey Stone Company, W.E. Wimmer, and Wyoming Construction Company, which account for 80 percent of the state's crushed stone production.

2.1.4.2.4 Asphalt

The general asphalt market area extends 200 to 400 miles. Within the Region of Influence there are two asphalt refineries: Husky Oil Refinery in Cheyenne (daily production capacity: 66,071 tons) and Conoco in Denver (daily production capacity: 58,921 tons).

Wyoming refineries satisfy most of the state's asphalt needs and could supply the three Region of Influence counties in Nebraska as well.

2.1.4.2.5 Roofing

The market area for asphalt roofing extends to a 300-mile radius around the producing plant. Only one roofing manufacturer was identified in the Region of Influence. Specific capacity, production, and consumption information was not available.

2.1.4.2.6 Lumber

The market area for lumber and softwood plywood encompasses the entire nation. The state directories of manufacturing indicate that the small sawmills in the Region of Influence do not produce softwood plywood and usually provide specialty products for the local market.

2.1.4.2.7 Wood Ties

According to the state directories of manufacturing, no sawmills or logging operations in the Region of Influence are major producers of wood ties. Production and consumption data for wood ties were not available.

2.1.4.2.8 Structural Steel

The market area for structural steel encompasses the entire nation, although distance from the mills influences competitive pricing due to transportation costs. There are no steel mills within the Region of Influence. Regional consumption data were not available for the Region of Influence.

2.1.4.2.9 Reinforcement Steel

The market area for reinforcement steel encompasses the entire nation. There are no producers of reinforcement steel in the Region of Influence and consumption data were not available.

2.1.4.2.10 Steel Rail

The market area for rail producers encompasses the entire nation. There are no producers of steel rail in the Region of Influence. Detailed purchasing data for steel rail in the Region of Influence were not available.

2.1.4.2.11 Other Materials

Other project-related materials which may be required are identified by Industrial Classification in Table 1.6.7-2. These have not been specified as to the quantities needed, and are therefore not discussed in detail at this time.

2.1.5 Social Well-Being

The Social Well-Being existing conditions section describes the social conditions of area residents by identifying information on local issues, opinions, and selected indicators of behavior. This information is used to characterize existing conditions both in terms of quantitative social indicators and qualitative judgments based on people's feelings and opinions.

2.1.5.1 Region of Influence and Data Sources

2.1.5.1.1 Region of Influence

The Region of Influence for Social Well-Being is the same as that for Housing (Figure 2.1.2-1). The justification for the Region of Influence is that these counties represent the areas where population inmigration is expected to occur.

The Social Well-Being Area of Concentrated Study is limited to the counties of Laramie (Wyoming) and Kimball (Nebraska) including the cities of Cheyenne, Wyoming, and Kimball, Nebraska, because these are the communities where the major population inmigration of over 5 percent is expected to occur. For Area of Concentrated Study justification see Section 3.1.5.1.

2.1.5.1.2 Data Sources and Analytic Methods for Existing Conditions

2.1.5.1.2.1 Data Sources

Data sources included secondary materials obtained from the Wyoming Division of Health and Medical Services, the University of Wyoming Institute for Policy Research, and the University of Nebraska Bureau of Sociological Research. Other data sources included residents, officials, and planning impact groups in the area, including the Heritage, Values, and Well-Being subcommittee, and the Coping Mechanisms subcommittee of the Mayor's Task Force.

2.1.5.1.2.2 Analytic Methods for Existing Conditions

The methods used to analyze existing conditions consisted of three parts: 1) appropriate indicators of well-being were identified and evaluated, 2) interviews were conducted with local residents, and 3) information was obtained from local study groups formed to plan for the project.

2.1.5.2 Existing Conditions

A summary of Social Well-Being existing conditions on a county level is provided below. Significant data on social well-being are described first for Laramie County and Cheyenne followed by Kimball County and the city of Kimball.

2.1.5.2.1 Laramie County and the City of Cheyenne

Significant factors identified in the analysis of indicator data are presented below.

Only indicators that point to relevant characteristics or show important change over time are presented for Laramie County. Population in Laramie County has increased steadily since 1920. The population is predominantly white, with 10 percent being of Hispanic descent. Average ages are increasing within the county, as for the nation. While the county has enjoyed periods of robust economic growth, it has also experienced declines typical of boom/bust cycles. Currently, unemployment and income are comparable to state levels, although a greater proportion of residents have incomes below the poverty level. Divorce rates exceed state and national rates. The statewide and county suicide rates (15.8 and 14.6) also exceeded the national rate in 1980 of 12.2 per 100,000 population.

The following paragraphs describe current information provided by local groups in the Cheyenne area such as the Heritage, Values, and Well-Being Subcommittee regarding positive features of life in the area, concerns that need improvement, and issues related to the project.

Identified positive features of life in the area include educational opportunities, a spirit of volunteerism, medical care, an ability to influence decisions, local and regional cultural advantages, a lack of elitism, the natural environment, a small community, and a low cost of living.

Issues and concerns identified as needing improvement include cultural and ethnic diversity, substance abuse, a resistance to change, a sense of community direction, an acceptance of limited diversity, leadership, the social services, quality development, and an improved downtown image.

Issues and concerns specifically identified with the project include transients and indigents, absorbing newcomers, hiring locals, substance abuse/alcoholism, mental health needs, crime levels, a lack of community spirit, changes in lifestyle, unwanted teenage pregnancies, personal safety, the preservation of historic resources, the appearance of the community and downtown development, resistance to community planning, dealing with social change, a clear vision of future, impacts of inflation, and the changes in the local way of life.

2.1.5.2.2 Kimball County and the City of Kimball

The population in Kimball County was 4,882 in 1980, as compared to the 1930 population of 4,675. The population has fluctuated over time with a peak of 7,975 in 1960. Steady declines since that time are typical of population trends in many rural areas. The average age has increased in recent years, from 27.2 years in 1970, to 32 years in 1980. The average per capita income consistently exceeds state levels, although the percentage of persons living below poverty level also exceeds the state average.

According to data from the Nebraska Commission on Law Enforcement and Criminal Jursidiction, all crimes reported by the Kimball County Sheriff's Department have increased, although they still averaged below state levels. Between 1981 and 1982, the city of Kimball's crime index rate increased from 37.3 percent to 50.7 percent.

During interviews, Kimball area residents characterized their community as one with an active spirit of support for their neighbors through volunteerism for local projects. They are proud of the cleanliness and recreational opportunities in and around their community. They are generally satisfied with local services and the performance of City government. They look forward to economic growth to offset recent increases in unemployment and population outmigration. A drug and alcohol abuse program was recently formed to assist youth. Citizens also continue to be concerned about the problems associated with transients in their community.

2.1.6 Public Services and Facilities

The Public Services and Facilities resource consists of eight primary responsibilities of the public sector that provide for the health, safety, and welfare of the general public. Within each of the following eight elements of Public Services and Facilities, the supply (institutional) and demand (clientele) sides of the elements are addressed and include facilities, staffing, organization, and, where appropriate, capital equipment discussions. The eight elements are:

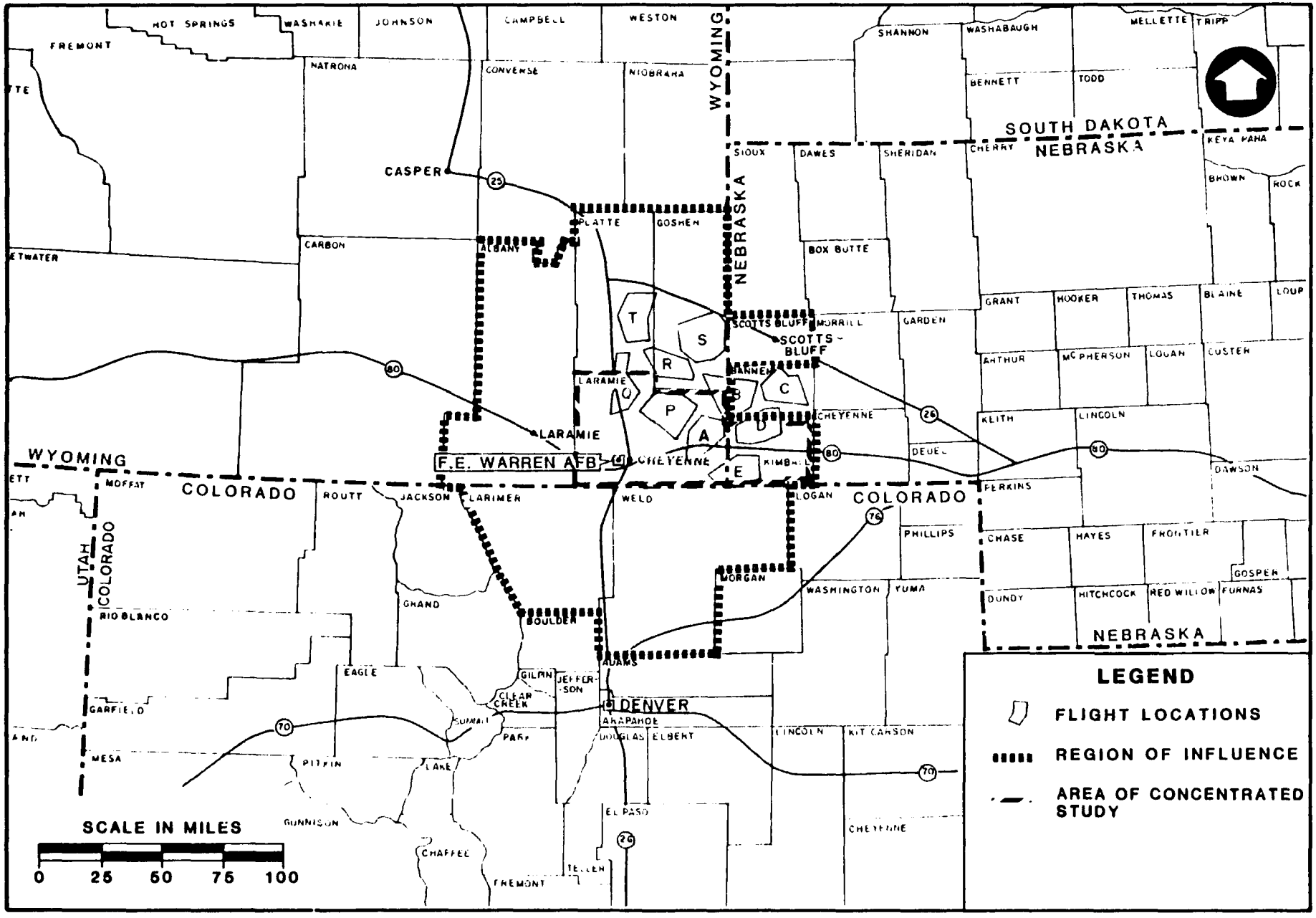
- Education (public and private elementary, junior high schools, senior high schools, special education, gifted programs, and post-secondary education);
- Law enforcement (county sheriff and municipal police departments);
- Criminal justice (municipal, county level, and district courts; public defender and district or county attorney's offices);
- Fire protection (municipal fire departments and rural fire districts);
- Health care (local and military hospitals, public and private health services, special health services, and emergency medical services systems);
- Human services (state and local social service agencies and quasi-public providers);
- General government (municipal and county administration and maintenance); and
- Libraries (state, municipal, county, college, and military).

2.1.6.1 Region of Influence and Data Sources

2.1.6.1.1 Region of Influence

The Public Services and Facilities Region of Influence is restricted to an area of potentially measurable impacts. This includes any governmental jurisdictions that would receive direct population inmigration resulting from the project. As can be seen in Figure 2.1.6-1, the Region of Influence includes the counties of Laramie, Albany, Platte, and Goshen, Wyoming; Kimball and Scotts Bluff, Nebraska; and Larimer and Weld, Colorado.

Definition of the Region of Influence is based upon anticipated level of impact. Since local jurisdictions provide public services, increased population is the single most important determinant of effects on service provisions.



2-20

REGION OF INFLUENCE FOR PUBLIC SERVICES

FIGURE NO. 2.1.6-1

Within the Region of Influence, an Area of Concentrated Study has been determined by identifying communities with potentially significant population impacts. This includes Laramie County, and the city of Cheyenne, Wyoming, and Kimball County, and the city of Kimball, Nebraska. See Section 3.1.6.1 for a more detailed justification of the Area of Concentrated Study.

2.1.6.1.2 Data Sources and Analytic Methods for Existing Conditions

2.1.6.1.2.1 Data Sources

Both primary and secondary data sources were utilized in this analysis. Primary data sources included extensive interviews with local officials in the Area of Concentrated Study. In addition, a condition and capacity analysis was performed on selected facilities in the study area. Secondary data included annual reports of the various agencies and departments, local government budgets, state government publications on local service providers, professional papers and reports on applicable local and state service levels, and census materials.

2.1.6.1.2.2 Analytic Methods for Existing Conditions

The methodology employed for existing conditions consisted primarily of an inventory assessment. Both primary and secondary data sources were utilized. Methods included a case study approach utilizing personal interviews with local officials, review of existing budgets, annual agency reports, comprehensive plans, and other applicable local and state data publications. Existing conditions were primarily determined through interviews with local representatives.

After information on existing conditions was collected, it was organized and refined to permit an analysis of the adequacy of existing services and facilities to meet the needs of the current populations within their respective governmental jurisdictions. Except where absolute standards were available, this analysis was based primarily on current local service delivery standards, and the historical conditions which have led to these service levels.

2.1.6.2 Existing Conditions

2.1.6.2.1 Education

2.1.6.2.1.1 Laramie County

Laramie County is divided into two public school districts, No. 1 in western Laramie County including Cheyenne, and No. 2 in eastern Laramie County. District No. 1 contains 25 elementary, 3 junior high, and 2 high schools, plus the alternative high school. Total enrollments have decreased from 1974 to 1982 for all grade levels along with declines in the student-to-teacher ratio. Total enrollment in 1982 was 12,793 students, while certified staff numbered 897, and noncertified support staff totaled 528 persons. Since the District makes every attempt to enroll students with special needs in regular classrooms, those special education students assigned full time to special classrooms have declined from 347

in 1975, to 95 in 1982. There presently is excess capacity in nonpublic schools in Cheyenne. The majority of nonpublic schools have religious affiliations. The State of Wyoming has no control over these schools; centralized records are not maintained on staff, enrollments, and curricula. The following are the major nonpublic schools in Cheyenne: Cheyenne Christian School, Our Savior Lutheran Elementary, Redeemer Lutheran School, St. Mary's Elementary, Seton Catholic High School, Seventh-Day Adventist Elementary, Trinity Lutheran School, and Full Gospel Church Fellowship Baptist School. Total enrollment in these schools in 1982 was approximately 638.

A facilities study of public elementary schools in District No. 1 indicates that there is a need to upgrade space for regular and special instruction and support areas. Overall, elementary, junior high, and high schools in the District are operating at or near capacity.

Post-secondary education in Laramie County is offered at Laramie County Community College, the Cheyenne Field Office of the University of Wyoming, and evening courses at Carey Junior High School.

Within the Area of Concentrated Study, there are five other school districts including District No. 2 in Laramie County and four school districts in Kimball County.

2.1.6.2.1.2 Kimball County

The four school districts in the Kimball County system are Kimball County High School (9-12), Dix Public School (K-12), Kimball Public School (K-8), and Bushnell Elementary (K-8). Enrollment records for Kimball County indicate that total system enrollments during 1973 to 1982 decreased by 39 percent while pupil-to-teacher ratios remained steady. As such, considerable excess facility capacity presently exists. There are no post-secondary schools in Kimball County, but adult education is offered in the city of Kimball.

2.1.6.2.2 Law Enforcement

2.1.6.2.2.1 Laramie County

The Laramie County Sheriff's Department has 62 officers, of which 29 are patrol deputies. Civilian support staff numbers 22, including dispatchers, jailers, and others for a total Department staff of 84. Department vehicles include 15 marked patrol cars and 21 other vehicles.

The Sheriff's Department and County Jail are located in Cheyenne in the City/County Building. Administrative and office space is 2,071 square feet (sq ft), or 25 sq ft per employee, indicating overutilization and a significant space shortage. The jail, built in 1911, contains 3,371 sq ft and has a nominal capacity of 61, plus 8 more in trusty quarters. Average daily occupancy is 33; however, capacity is often approached. In addition, the jail is inadequate by fire code and other county building standards, and needs to be modernized or replaced.

2.1.6.2.2.2 City of Cheyenne

The Cheyenne Police Department has 85 officers of which 64 are on patrol duty. In addition, 25 civilians are employed by the Department as support personnel. The Department has 19 marked cars, 16 other cars, and 6 motorcycles. Although the Department has requested enough marked cars to operate a one patrol officer per car system, it has not yet been implemented. The Department is located in the basement and first floor of a 2-story building in central Cheyenne and fully utilizes the available 12,912 sq ft. The second level is 6,700 sq ft and is devoted to the 69-prisoner jail, which averages 19 inmates per day.

2.1.6.2.2.3 Kimball County

The Kimball County Sheriff's Department has one sheriff, one deputy, four reserve deputies, and a civilian staff of four persons. There are two marked patrol cars in service. The Department's offices contain 960 sq ft; there is also a 9-prisoner jail which averages 3 occupants per day including city of Kimball prisoners.

2.1.6.2.2.4 City of Kimball

The City of Kimball Police Department has six officers and two civilians. There are two marked patrol cars and one unmarked unit. The Department's offices are located in City Hall and consist of 960 sq ft. There is no jail as all prisoners are taken to County Jail.

2.1.6.2.3 Criminal Justice

2.1.6.2.3.1 Laramie County

Laramie County Court has jurisdiction for all misdemeanors in the county (except for municipal ordinance violations) and includes all offenses not punishable by death or imprisonment in the state penitentiary. The County Court's annual caseload is about 8,800 of which over 90 percent are traffic violations. The majority of dispositions are by forfeiture and guilty plea. Case backlog is 23 percent of the total indicating that the Court is now at capacity. Staffing consists of two full-time judges and one part-time support person. Space for the Court is located in the County Courthouse; courtrooms are shared with District Court which handles all felony cases. Office and workspace are limited; total space available to the County Court is 1,233 sq ft.

2.1.6.2.3.2 City of Cheyenne

The Cheyenne Municipal Court has exclusive jurisdiction over municipal ordinance violations such as traffic citations, animal control violations, and others. During July 1981 to June 1982, over 12,100 cases were filed or pending of which 60 percent were traffic violations. Only 9.5 percent of total cases end up in a trial, and approximately 20 percent of the total are backlogged at any one time. The Court staff consists of one full-time attorney judge, one part-time attorney judge, one court clerk and commissioner, one liaison city police officer, and

three clerk typists. There is space in the Municipal Building to accommodate Court functions, however, the large backlog of cases indicates the Court is now operating at capacity.

2.1.6.2.3.3 Kimball County

In Kimball County, County Court has jurisdiction over violations of City of Kimball ordinances, misdemeanors, juvenile matters, and preliminary hearings. The only other court, County District Court, has jurisdiction over all felony cases and appeals from County Court. County Court handles about 1,000 cases per year with little or no backlog. Staffing includes the court clerk (who also serves as an associate county judge and is paid by the State), a deputy clerk, and two clerical workers. County Court is located in the Kimball County Courthouse and space is considered adequate.

2.1.6.2.4 Fire Protection

2.1.6.2.4.1 Laramie County

Fire protection for rural Laramie County is provided by seven fire districts, of which only two, District No. 1 and 2, would receive sufficient inmigration to warrant attention. District No. 1 serves a 200 square mile (sq mi) area from the Cheyenne city limits south of the Union Pacific Railroad tracks to the Colorado state line. The District has 13 volunteer firefighters and 1 paid employee, a mechanic. The District's one fire station was built in 1967, and contains approximately 3,600 sq ft. Major equipment includes 2 pumpers that pump 750 gallons per minute, 3 tankers, a pickup truck, a van, and the chief's car. On a scale of one to ten (with one being the highest level of protection), the present (1983) fire insurance rating is nine. Existing service levels are 2 volunteers per 1,000 population, 1 firefighting vehicle per 1,300 population, and 500 sq ft per vehicle.

Laramie County Fire District No. 2 is located directly north of Cheyenne and serves 164 sq mi with 21 volunteers, a total expected to grow to 25 by fall 1983. The District has two fire stations, one built in the late 1950s containing 2,160 sq ft and a second, constructed in 1972, containing 3,600 sq ft. Equipment consists of 3 pumper tankers that pump from 250-750 gallons per minute, 1 quick attack truck, 2 four-wheel drive vehicles, and a chief's car. Staffing, equipment, and facilities are considered adequate to meet present needs.

Existing mutual aid agreements between Laramie County District No. 1, Laramie County District No. 2, the Cheyenne Fire Department, and F.E. Warren AFB contribute to the provision of fire protection services in the area.

2.1.6.2.4.2 City of Cheyenne

Fire protection services in Cheyenne are provided by the Cheyenne Fire Department. Staffing consists of 89 firefighters, the chief, a secretary, a training officer, and 6 others distributed among 6 fire stations. Major firefighting equipment totals 10 units that consist of 8 pumpers that pump between 1,000-1,250 gallons per minute, an aerial unit, and ladder truck, assisted by a utility vehicle, the chief's car, a pick-up truck, and 8 cars. Response time is from 3 to 4 minutes, and

the present fire insurance rating is 5. Space in 1983 totals 32,948 sq ft. Existing service levels are 1.8 firefighters per 1,000 population, 1 firefighting vehicle per 5,000 population, and 668 sq ft of station space per 1,000 population.

2.1.6.2.4.3 Kimball County

Fire protection in Kimball County, including the city of Kimball, is provided by the Kimball Fire Department, the Kimball Rural Fire District, the Dix Volunteer Fire Department, and the Bushnell Volunteer Fire Department. Kimball Rural Fire District is a cooperative effort of 39 volunteer firefighters operating out of the 3,500 sq ft fire station in the city of Kimball. While both units utilize the same staff, space, and equipment, the equipment is owned separately. Total equipment consists of 4 pumpers that pump from 500-1,000 gallons per minute, 1 tanker, 1 quick-attack unit, and 1 ambulance/rescue vehicle which serves as a backup to the county private ambulance service. Kimball has a fire insurance rating of six while the rural area is rated eight.

2.1.6.2.5 Health Care

2.1.6.2.5.1 Laramie County

Laramie County is served by four hospitals, two civilian and two federal, all located in Cheyenne. Laramie County Memorial has 179 licensed beds and currently averages a typical occupancy of 60 to 65 percent although during peak demand operates at 100 percent capacity. There are 91 physicians with staff privileges at County Memorial Hospital, approximately 114 registered nurses (RNs), and 108 nursing support personnel including licensed practical nurses (LPNs), aides, and clerks. Available services include a 24-hour physician-staffed emergency room, pharmacy, X-ray, radioisotope, surgery, social work, obstetrics, electroencephalogram, therapies (chemical, radium, cobalt, X-ray, and inhalation), CT scan, and psychiatric inpatient. Cardiac rehabilitation services are presently being expanded.

DePaul Hospital (civilian), a private facility constructed in 1952, is funded entirely from patient fees. There are 121 licensed beds and average occupancy is about two-thirds of capacity. There are 80 physicians with staff privileges, 83 RNs, 31 LPNs, 31 nurses aides, 3 pharmacists, 3 dieticians, 3 physical therapists, and 18 specialized technicians. The physician staff levels of DePaul and Laramie County Memorial are adequate for providing health services to Laramie County. DePaul Hospital offers a wide variety of services including among others, a 24-hour physician-staffed emergency room, X-ray, pharmacy, laboratory, surgery, social work, speech pathology, electroencephalogram and inhalation therapy. In addition, DePaul has specialty services such as helicopter pad, pediatrics, chemical dependency, poison control, and alcohol rehabilitation.

The Veterans Administration Hospital has 129 medical and surgical beds and 47 nursing home beds. Occupancy is currently 74 and 96 percent, respectively. In 1982, patient care was given to 3,000 inpatients and 18,000 outpatients. Staffing consists of 13 physicians, 3 general surgeons, 9 internal specialists, 1 psychiatrist, 65 RNs, 40 LPNs and nurses aides, and 21 other staff.

The F.E. Warren AFB Hospital has 32 medical/surgical beds, and 8 obstetric beds. The average annual occupancy rate is approximately 72 percent. The service population for the facility is between 13,000 and 14,000 persons, including active duty personnel and dependents, retirees and dependents, and a few Army and Navy dependents. Staffing consists of 15 physicians, 32 nurses, 1 psychologist, and 1 other support staff. Services provided include an emergency room, X-ray, laboratory, diagnostic ultrasound, and physical therapy.

Apart from hospitals, health care is also provided by the emergency medical system, an integrated service of hospital facilities, an emergency 100-bed mobile hospital, communications, ambulances, helicopter service, 123 emergency medical technicians (EMTs) and paramedics, and other county and regional resources.

The Public Health Department, known as the City/County Health Unit, has two divisions, Nursing Services and Environmental Health. Nursing Services have a staff of 23 including supervisors and nurses and others housed in a central Cheyenne building which is inadequate for the staff due to size and location. The Environmental Health Division handles 13 separate programs and is staffed by 10 persons. The Division is housed in a building separate from nursing which is too small to accommodate current staff and facilities. Current staffing levels are low relative to state standards.

In addition to the above services, there are two nursing homes and several medical and dental clinics in the county. Both nursing homes are at capacity. The county's two private medical clinics are staffed by six pediatricians, three RNs, two LPNs, assistants, specialists, and office staff. Total physicians in Laramie County number 91; there are approximately 40 dentists in the county.

2.1.6.2.5.2 Kimball County

Kimball County's only hospital has 30 beds and an average occupancy of 52 percent. There are 3 family practice physicians on staff, 14 RNs, 4 LPNs, 20 nurses aides, and other technicians and staff. Services include X-ray, surgery, laboratory, cardiac care, obstetrics, ultrasound, and a nursery. Although there is no Kimball County health department, there is emergency transport available through the Kimball County Ambulance Service and its 10 EMTs, and the fire department's backup unit. One of the family practice physicians serves as the county physician in lieu of a formal public health agency.

2 1.6.2.6 Human Services

2.1.6.2.6.1 Laramie County

Human service agencies deal with problems and needs or provide services that help preserve quality of life. Determination of impacts on services which influence quality of life, and associated needs and problems, are often highly controversial.

Human services for Laramie County are provided by the Laramie County Department of Public Assistance and Social Services and several other quasi-public agencies. Department of Public Assistance and Social Services provides public assistance,

income maintenance, social services, and food stamps. Current staffing is 28 with a staff-to-population ratio of 1 to 4,893. Space is considered adequate at present.

Pathfinder, a statewide drug abuse treatment center for all ages, provides outpatient services in counseling, biofeedback, and methadone treatment. Staffing is four full-time and two part-time professionals, with outside administrative support. Annual clients served number 125 with a monthly caseload of 110. The agency is housed in a renovated dairy processing plant, which is currently large enough to accommodate the present caseload.

The Alcohol Receiving Center, a 24-hour detoxification center, serves the 4-county area of Laramie, Albany, Goshen, and Platte counties. Professional staffing is by 7 counselors who attended 521 persons in FY 1983. The facility can only hold 5 individuals at one time and is therefore frequently filled to capacity.

COMEA is a 24-hour emergency shelter for unemployed persons without children. It is staffed by 1 full-time person and 40 volunteers who handle 2,256 cases annually. The facility can accommodate 25 persons per night and averages 20.

The Salvation Army provides a wide range of emergency and disaster material, and counseling services, including an extensive free meals program, with 4 paid staff and 170 volunteers. This agency is currently operating with a deficit.

Youth Alternatives, a citywide program for youths between the ages of 10 and 18, provides services to divert youths from the court system and alternatives to probation as well as substance abuse, family, and individual services. Present staff is 7.5 for a staff-to-client ratio of 1 to 153. In FY 1983, clientele numbered 1,054 or an estimated 95.8 per month.

The Southeast Wyoming Mental Health Center, Laramie County Branch, served 1,330 clients of all ages in FY 1983. Although the existing facility is inadequate, a new facility is under construction and will be occupied shortly by the staff of 16 persons.

The Community Center on Domestic Violence and Grandma's Safe House provides services to battered and abused women and their children. The current staff-to-client ratio is 1 to 24.7, with services being provided to female clients by 7 persons. The existing facility is filled to capacity (nine persons) nearly half the time.

Community Action of Laramie County provides assistance to the elderly and unemployed or low-income population of Laramie County. Services include employment counseling, training and referral services, clothing, shelter, food, utility bill assistance, and others.

The Stride Learning Center is a private nonprofit agency that provides preschool education for handicapped and developmentally disabled children. A program is being initiated for emotionally disturbed preschoolers.

In Laramie County, as of April 1983, there were 13 day care centers, 5 group day care homes, and 75 family day care homes, not including providers who take care of children in private homes. All of these day care facilities are certified through Laramie County Department of Public Assistance and Social Services.

The Attention Home is a foster care home for children 11 to 17 years of age. It provides a supervised home atmosphere for children who must be out of their own homes for short periods of time. Referrals to the Attention Home are usually received from the Department of Public Assistance and Social Services, Awareness House, Mental Health Center, ministers, courts, and schools.

2.1.6.2.6.2 Kimball County

Human services delivery in Kimball County is provided for by a public welfare office, a nursing home, and a senior center, all located in Kimball, and regular visits from a representative of the Panhandle Community Action Agency, the Panhandle Mental Health Center in Scottsbluff (a speech therapist), and the Sidney Mental Health Center satellite (a caseworker). Kimball residents in need of mental health or other services generally travel to Scottsbluff.

Community Action services are provided in Gering, and consist of expectant mother services, nutrition services for children under five, distribution of government supplied commodities, free immunization to school age children, home weatherization, and others. Kimball staff has been reduced in recent years to one person and office space is shared with the local Head Start program. Clientele is mainly local, low-income families and individuals.

As of July 1, 1983, public welfare has become a branch of the Nebraska State Department of Social Services. Services include income maintenance programs, such as Aid to Families with Dependent Children and food stamps, administration of programs such as day care, transportation, homemaker services, child abuse casework, and medical services for the aged, blind, and disabled. In addition, indigents are provided emergency food and shelter assistance. While caseloads vary from month to month, at any given time there are about 250 cases.

2.1.6.2.7 General Government

Within the Area of Concentrated Study there are four local governments of concern, Cheyenne and Laramie County, Wyoming, and Kimball County, city of Kimball, Nebraska. Although other local governments are present in the Area of Concentrated Study, they would experience negligible impacts due to the Proposed Action and therefore are not addressed further.

2.1.6.2.7.1 Laramie County

Laramie County government is administered by a three-member Board of Commissioners and several elected officials. The County offers a wide range of internal services through the County Clerk's office to the balance of County government, as well as a diversity of public services through the various County departments such as the Clerk, Treasurer, Assessor, Sheriff, Attorney, Clerk of the Court, Planning, Zoning, County Engineer, Road and Bridge, Extension Agent,

and others. County payroll records indicate that annual average total staffing has grown from 88 persons in 1963, to 266 persons in 1982; staffing also essentially doubled between 1975 and 1981. Staffing has recently remained stable at around 270 persons. Space for general administration consists of 16,916 sq ft, mainly in the City/County Building. Maintenance and storage space in the County shop totals 12,168 sq ft. Space for both administrative and shop purposes is overutilized. The County's vehicle and equipment fleet is in generally good condition.

2.1.6.2.7.2 City of Cheyenne

The City of Cheyenne has a mayor-council form of government with three Council committees and nine Council members. Total staffing has grown from 397 in 1977, to its present (1983) level of about 480 persons. Administrative space is located almost entirely in the new (1979) Municipal Building and consists of 47,822 sq ft. In addition, the City has active shop and storage facilities at the Happy Jack Road shop (22,914, sq ft), 15th and Snyder Avenue (7,260 sq ft), the Salt Shed north of the airport (1,800 sq ft), and Hangar #101 (129,000 sq ft leased). The City has a fleet of over 500 vehicles and equipment that is in generally good condition.

2.1.6.2.7.3 Kimball County

Kimball County government is administered by a three-member Board of Commissioners and several elected officials such as the Clerk, Treasurer, Assessor, Clerk of the Court, County Attorney, and other departments such as Civil Defense and Highways. Staffing has remained virtually constant, at about 50 persons, for 20 years or more. The courthouse provides 10,500 sq ft of general administrative space. County maintenance space is divided between three locations. Space for both administration and maintenance is considered adequate. The County equipment and vehicle fleet is mainly devoted to highway maintenance and is considered to be in generally good condition and adequate for the County's needs.

2.1.6.2.7.4 City of Kimball

The City of Kimball has a mayor-council form of government with general administration performed by the City Administrator/Engineer and the City Clerk. Permanent staffing has remained steady at 40 employees for many years. Administrative space, located entirely in City Hall, totals 2,190 sq ft, and shop space totals 2,600 sq ft. Administrative and shop space are able to accommodate existing levels of service. The City vehicle and equipment fleet is considered to be in good condition and adequate to meet the City's needs.

2.1.6.2.8 Libraries

2.1.6.2.8.1 Laramie County

Library services in Laramie County consist of the County Public Library system, the Community College Library, the Wyoming State Library, and several special libraries. Within the County system, libraries are located in Cheyenne (Central

Library), Pine Bluffs, Burns, and one bookmobile. According to recommended standards of the Wyoming State Library, the system is inadequate in per capita space, books per capita, and per capita expenditure.

The Central Library has capacity for 150,000 volumes and presently contains close to 100,000. Staff is presently working at capacity and space is extensively utilized.

Additional library services are provided to Laramie County residents by the Laramie County Community College Library. Although the staff is at or over capacity, the library now meets or exceeds national standards for college libraries.

The Wyoming State Library provides assistance to local libraries, but has no authority to intervene in local decisionmaking. The library also provides services for the blind and physically handicapped. In addition to the State Library, there are 16 other special government agencies and institutional libraries in Laramie County.

2.1.6.2.8.2 Kimball County

Library services for Kimball County residents include the Kimball Public Library, and access to all library resources within 11 counties in the western Nebraska Panhandle through the Panhandle Library Networks system. The Kimball Public Library rates well for space and books per capita compared to Nebraska Library Commission service standards. Staff, although at capacity, is also considered adequate. However, low per capita expenditures are a constraint to maintaining current levels of service.

The Panhandle Library Network system, initiated in 1969, provides support in the 11 county Panhandle region for service development, reference services, Inter-Library Loan access, workshops, books for the blind and handicapped, and other services.

2.1.7 Utilities

Utilities, as used here, include facilities provided in towns and cities for water treatment and distribution, wastewater collection and treatment, storm drainage, solid waste collection and disposal, and telephone service.

2.1.7.1 Region of Influence and Data Sources

2.1.7.1.1 Region of Influence

The Region of Influence for Utilities includes the counties in three states where inmigrating populations have been projected, as well as all the counties in which project deployment will occur. This area includes the nine counties shown in Figure 2.1.7-1. The Region of Influence is the same for all subelements (water treatment and distribution, wastewater, solid waste, storm drainage, and telephones).

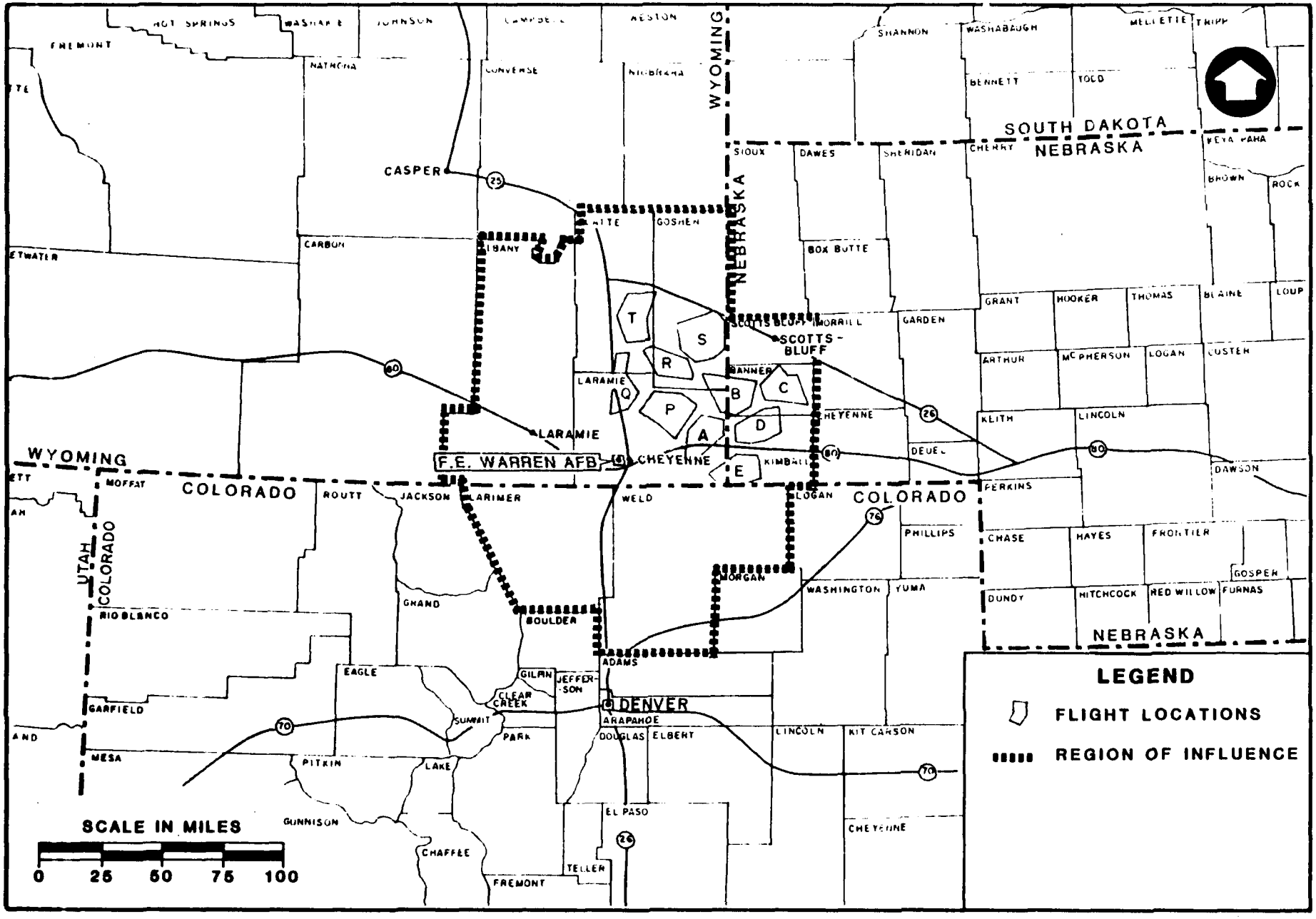
A much smaller geographic area than the nine counties has received concentrated analytical attention. This area is identified as the Area of Concentrated Study. It includes those towns, cities, and special districts to which the inmigrant populations have been allocated in this study. These include Cheyenne, Laramie, Pine Bluffs, Torrington, and Wheatland, Wyoming; Gering, Kimball, and Scottsbluff, Nebraska; and Fort Collins and Greeley, Colorado. They are shown in Figure 2.1.7-2.

Other than the area around Cheyenne, the extent of these places is defined by the corporate boundaries of each community. The Cheyenne Urban Area for Utilities is defined as:

- The city limits of the city of Cheyenne;
- A special district south of the city to which the City provides some services, namely the South Cheyenne Water and Sewer District;
- F.E. Warren AFB; and
- Areas north and east of the city which the Board of Public Utilities and others anticipate to be future growth areas that will first be annexed.

This inclusive boundary of the Cheyenne Urban Area is shown in Figure 2.1.7-3.

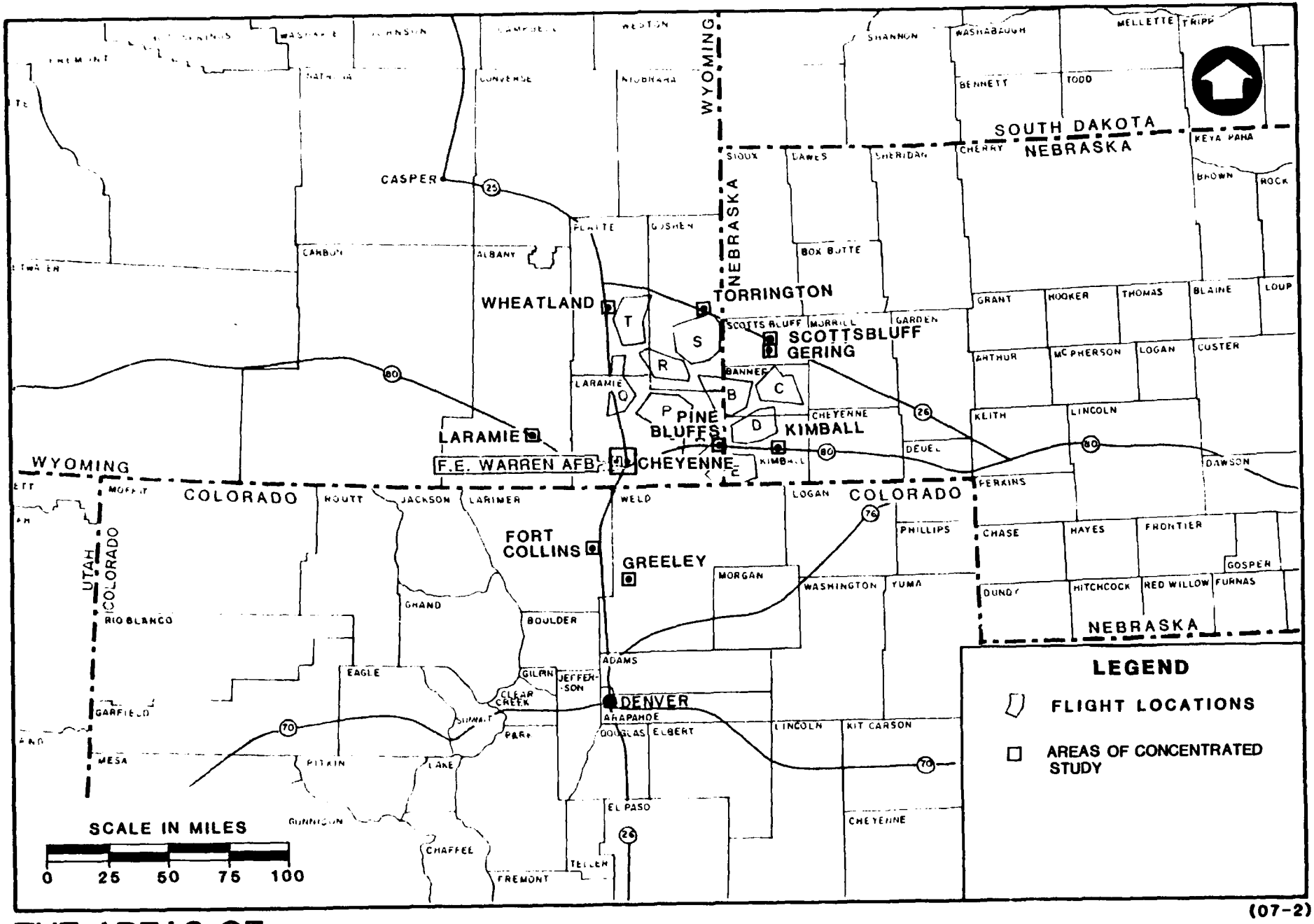
County boundaries have been used to define the Region of Influence because regulations (such as those dealing with individual homes' wells or septic tanks, and solid waste disposal sites) are administered by county jurisdictions, and because solid waste disposal sites tend to be city owned but in nearby unincorporated locations. Storm sewers are in individual communities, but they drain to streams that traverse entire counties. Telephone service is provided by private utilities who serve multiple counties, even though the relevant service areas for telephones are within individual cities that lie within the county boundaries comprising the Region of Influence. Section 3.1.7.1 provides a fuller justification for the Area of Concentrated Study.



REGION OF INFLUENCE FOR UTILITIES

(07-1)

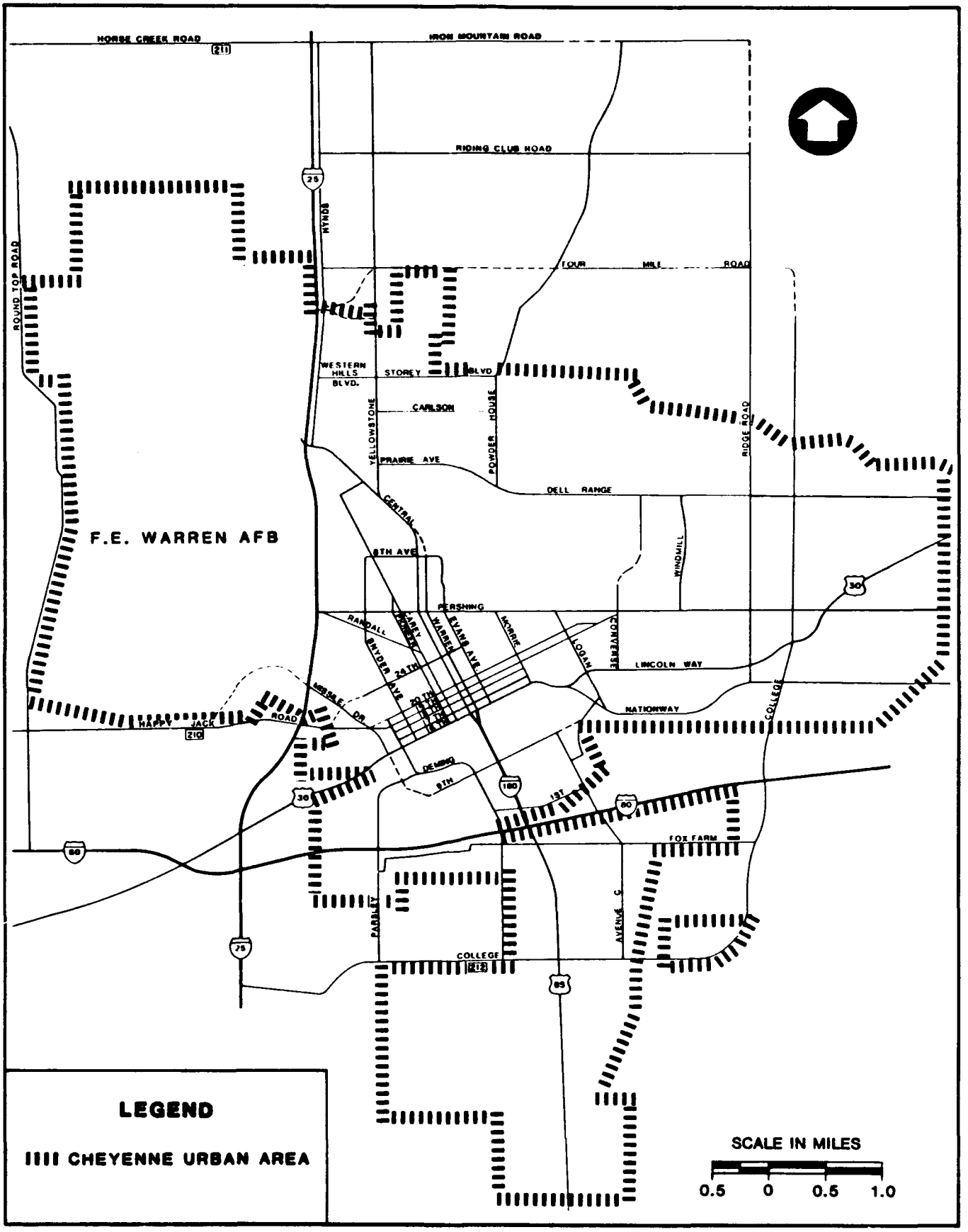
FIGURE NO. 2.1.7-1



(07-2)

THE AREAS OF CONCENTRATED STUDY FOR UTILITIES

FIGURE NO. 2.1.7-2



THE CHEYENNE URBAN AREA AS DEFINED FOR UTILITIES

(07-3)

FIGURE NO. 2.1.7-3

2.1.7.1.2 Data Sources and Analytic Methods

Similar sources of data sufficed for all five subelements. They included technical literature, local agency personnel, and one excursion to the field to collect primary measurements. These sources are summarized below.

2.1.7.1.2.1 Literature Sources

Generally accepted environmental engineering texts and technical publications were used only sparingly for standards-of-practice to derive such things as unit water demands or runoff coefficients not available from local agencies or which could not be measured as primary data in the field. References to such publications are noted throughout, and the full bibliographic citations are given in Appendix E.

2.1.7.1.2.2 Group and Agency Contacts

Public works officials were contacted in all communities in the Region of Influence where inmigrant, project-induced populations were estimated. Data were requested from these individuals to describe existing facilities and already planned future expansions or improvements.

Additionally, state officials in Wyoming and Nebraska were interviewed to obtain data on water, wastewater, and solid waste regulations and requirements for building and operating new facilities that may be necessary.

Several private service companies were also contacted to learn their current capacities. Among these were Mountain Bell Telephone Company; United Telephone Service, Western Division; and several private waste haulers in the Cheyenne area.

2.1.7.1.2.3 Primary Data

With one exception, no data were collected in the field by primary measurement methods to support the Utilities work. The exception was a 10-day field surveying effort in Cheyenne to determine as-built information on the size and slopes of existing storm sewers and a few invert elevations in the sanitary sewer system.

2.1.7.1.2.4 Analytic Methods

Adequacy of existing facilities was determined by comparison of capacities in place with demands for all services as reported by local officials. Where data concerning existing demand levels did not exist, current populations were multiplied by nominal unit loads (such as gallons per capita per day) to arrive at an estimate of existing demand conditions.

For the Cheyenne Urban Area (as defined for Utilities), water supply, wastewater, and stormwater pipeline capacities were checked against mathematical model simulations of the existing flows in those systems. Deficiencies identified by

the models were noted. Some waste treatment plants in Cheyenne and other communities were also simulated mathematically to determine the adequacy of existing plant types and sizes to treat current waste flows.

2.1.7.2 Existing Conditions

2.1.7.2.1 Water Treatment and Distribution

Everywhere in the Region of Influence, communities are now supplying their residents safe, potable water supplies, and each community has excess capacity to accommodate some additional growth. Torrington, Wyoming, is studying feasible means for adding in-system storage for firefighting purposes. Torrington is the only community in the Region of Influence where an apparent deficiency in storage has been identified.

Greeley and Fort Collins, Colorado, supply all their municipal water from surface water. Laramie and the Cheyenne Urban Area use both surface water and groundwater. All other communities in the Area of Concentrated Study supply groundwater exclusively.

Only two isolated existing water transmission difficulties have been identified.

At Greeley, Colorado, a 30 mgd water treatment plant is limited to production of 18 mgd by the capacity of its transmission main into the city. Sufficient supply capacity exists with that limitation, coupled with capacities at several other plants; but studies are underway to determine feasible corrections to the limited transmission capacity from the one plant.

For the Cheyenne Urban Area, a simulated firefighting event at the Frontier Mall shopping center, with a peak-day demand imposed throughout the city as well, caused water pressures around the Mall to drop to 5 psi. This was caused by the existence in the pipe network near the Mall of an 8-inch main. Other simulations demonstrated that a 12-inch main would adequately convey water during a firefighting event and maintain pressures above 20 psi, a nominal criterion or standard-of-practice value.

Data for water supplies in communities throughout the Region of Influence are given in Table 2.1.7-1.

2.1.7.2.2 Wastewater

With two minor exceptions, described below, sanitary sewer systems throughout the Area of Concentrated Study perform well; and they contain sufficient and even excess capacities for existing waste flows. Exceptions occur in Torrington and in a portion of the sewer system in Cheyenne.

Torrington's sewers have been ingrown and clogged in some places by roots from nearby trees. This problem can be solved through a fairly routine maintenance practice of routing the affected sewers with a root-cutting device.

Table 2.1.7-1

WATER TREATMENT AND DISTRIBUTION INFORMATION FOR COMMUNITIES IN THE REGION OF INFLUENCE

Community	1983 Population	Average Demand mgd	Peak Demand mgd	Storage Capacity, MG	Surface Water Treatment Capacity, mgd[a]
Cheyenne Urban Area	60,781	13.2	27.3	12.0	24
Fort Collins, CO	96,092	15.0	41.0	30.0	47
Gering, NE	8,480	2.7	6.5	1.2	0
Greeley, CO	76,026	18	44	67	6
Kimball, NE	3,129	0.92	2.8	1.0	0
Laramie, WY	24,840	4.8	13.0	12.0	6
Pine Bluffs, WY	1,125	0.56	1.43	0.22	0
Scottsbluff, NE	14,156	4.0	12.0	2.8	0
Torrington, WY	5,665	1.4[b]	3.5	0.35	0
Wheatland, WY	4,500	1.1[b]	2.8	2.0	0
F.E. Warren AFB	3,700	1.0	2.5	N/A	0

Notes: a Groundwater suppliers are not required to provide treatment, except chlorination in some cases.
b Estimates based on 250 gpcd.
N/A Data not available.

Source: Local official interviews for water system data.

In Cheyenne, a 12-inch sewer accepts flows from F.E. Warren AFB which are discharged through a 15-inch sewer. Predictably, the 15-inch sewer occasionally flows near full and overwhelms the capacity of the downstream sewer. This condition is known by officials of the Cheyenne Board of Public Utilities. The condition also occurred in computer simulations of the sewer system in this study.

Waste treatment, by contrast with sewer systems, is not generally adequate throughout the Region of Influence. Four of the ten studied communities are experiencing difficulties with sewage treatment plants now. In the Cheyenne Urban Area, the South Cheyenne plant, owned and operated by the South Cheyenne Water and Sewer District is overloaded. It receives average daily flows of almost 0.7 mgd and peak monthly flows of nearly 0.8 mgd. The District is aware that the plant cannot normally meet its discharge quality requirements. Computer simulations in this study have determined that some processes at this plant should not be attempting to treat more than 0.55 mgd.

The Crow Creek plant in Cheyenne receives flows near its capacity (4.0 mgd). Local officials are fully aware of area-wide treatment deficiencies, and in October 1982, they submitted a plan for correction to the State of Wyoming and the EPA. The Cheyenne Board of Public Utilities, the South Cheyenne Water and Sewer District, and Laramie County continue to await funding approval, although the State of Wyoming's Department of Environmental Quality has approved the plan in concept.

Gering has recently expanded its waste lagoon system of treatment, but the plant receives peak flows equal to the plant's new capacity. Gering continues to grow, and limited capacity may exist to accommodate that growth for more than a few years, although some local officials believe the new capacity is adequate for 10 to 15 years.

Pine Bluffs has a lagoon system that is undersized for today's population. Plans for expansion, like those in Cheyenne, have already been prepared.

Torrington operates a lagoon system which is prohibited from discharging to surface streams. Wastewater now either evaporates from the ponds or seeps into the ground. The 64 acres of existing ponds provide a half-year's storage at the existing flow rate (0.57 mgd). In the summer, only 50 percent of the influent could possibly evaporate, and over a whole year only 35 percent of the wastewater can evaporate. The indicated seepage rate (50 to 65 percent of 0.57 mgd) is simply too great for the ponds not to overflow in the near future, particularly since in wet years (such as 1983) groundwater is known to seep the wrong way, into the ponds, reducing needed capacity. An expansion plan and funding request are now being prepared.

Wastewater conditions for communities throughout the Region of Influence are summarized in Table 2.1.7-2.

2.1.7.2.3 Solid Waste

Every community studied in the Region of Influence has existing collection equipment

Table 2.1.7-2

WASTEWATER INFORMATION FOR COMMUNITIES
IN THE REGION OF INFLUENCE

Community	1983 Population	Average Waste Flow, mgd	Peak Waste Flow, mgd	Treatment Type[1]	Treatment Capacity, mgd
Cheyenne Urban Area	60,781	7.3	9.8	AS,TF	9.1
Fort Collins, CO	96,092	10.1	18.0	AS,TF	18.0+
Gering, NE	8,480	1.93	3.86	Lagoon	3.86
Greeley, CO	76,026	7.7	9.0	AS,TF	10.7+
Kimball, NE	3,129	0.3	(0.5)[2]	AS	0.58
Laramie, WY	24,840	(2.5)	(5.0)	Aer. Lagoon, plus	5.0
Pine Bluffs, WY	1,125	0.1	0.2	Lagoon	0.09
Scottsbluff, NE	14,156	2.5	3.4	Aer. Lagoon, plus	3.14
Torrington, WY	5,665	0.57	(1.0)	Lagoon	0.57
Wheatland, WY	4,500	0.3	(0.5)	Aer. Lagoon, plus	0.5
F.E. Warren AFB	3,700	0.6	N/A	N/A	N/A

Notes: 1 AS = Activated Sludge.
TF = Trickling Filter.
Lagoon = Nonaerated ponds.
Aer. Lagoon = Aerated lagoons.
Aer. Lagoon = Aerated lagoons plus polishing equipment.

2 Values in parentheses are estimates.

N/A Data not available.

Source: Local official interviews for wastewater data.

and disposal sites that are adequate for today's solid waste loads. Daily loads range from 2.8 tons per day at Pine Bluffs to 240 tons per day at Fort Collins. Pine Bluffs has the shortest remaining life at its landfill site (2 years), but it has access to a new Laramie County landfill at nearby Burns, Wyoming.

Unit loads have been assumed for each community to be 5.0 pounds per capita per day (ppcd). Data from F.E. Warren AFB indicate that the unit solid waste load is only 2.76 pounds per resident per day, and that value was used to estimate existing and all future garbage quantities for the base.

Toxic and hazardous wastes generated in the private sectors in the Region of Influence are currently collected and disposed safely by private waste haulers, in accordance with applicable state and federal laws and regulations.

F.E. Warren AFB is a "small quantity generator" of hazardous materials as defined by the Resource Conservation and Recovery Act. This means it produces and stores onsite less than 1,000 kilograms (kg) or 2,200 pounds of these wastes per month; and unlike larger generators, the base is not limited to storage onsite of 90-days' generation of these materials. In fact, F.E. Warren AFB generates and stores about 500 pounds per month of a dilute solution of sodium chromate from the Minuteman missile support equipment. All other hazardous wastes produced at the base are routinely sold for recycling or are hauled away for reclamation. These include 500 gallons per month of contaminated fuels and spent lubricants, 275 gallons of contaminated helicopter fuel (JP4), and a very small quantity of spent battery acid. (Quantities of reclaimed and recycled materials, such as these, are permitted by the regulations to be excluded from the quantity determination of amounts a generator may generate and store.)

2.1.7.2.4 Stormwater

An examination of peak runoff rates was made for communities in the Area of Concentrated Study in which appreciable (roughly greater than 1 percent) land use change would be induced by the project such that runoff rates might be noticeably increased. These communities included Cheyenne, Gering, Kimball, Pine Bluffs, Scottsbluff, Torrington, and Wheatland. All of these communities have some storm sewers in part of their developed areas, but most also use roadway swales and drainage ditches along roads to convey stormwater.

Only Cheyenne has existing problems of serious magnitude with respect to stormwater. These occur in the most developed downtown areas where storm sewers in place are very old and undersized. Computer simulations of 2-year and 10-year storm events confirmed that existing storm sewers will flood relatively frequently. City officials have reported that the existing systems fill to overflowing in one-third to one-half of the downstream pipes once or more each year. The computer model determined that diameters of the downstream storm sewers should be 1.5 to 2 times larger.

New-growth areas in Cheyenne, where project-induced populations can be expected to move, are controlled with respect to storm drainage by ordinances requiring developers to install adequate storm drainage and detention facilities.

South Cheyenne, an area where a significant fraction of the induced population is expected to live, includes considerable flat terrain where drainage problems have occurred in the past. Some 24-inch culverts or storm drains exist in this area, but analyses herein suggest that thirty-five 24-inch storm sewers (separate lines) would be required to drain the area adequately toward Crow Creek. Perhaps more appropriately, 3 storm sewer pipe systems equivalent to 60-inch sewers are indicated, and the area currently does not have that level of protection.

All other communities reported little or no existing problems with storm drainage, although several reported current studies underway to determine if further storm sewers should be added.

2.1.7.2.5 Telephone Service

Telephone service is provided by Mountain Bell for all the communities in Colorado in the Area of Concentrated Study and for most of those in Wyoming. Nebraska communities and Torrington, Wyoming, are served by United Telephone Service, Western Division. Excess capacity exists at all these communities.

F.E. Warren AFB has a small central phone exchange of its own, connected to the Mountain Bell system. Four hundred and fifty AFB telephone lines are connected through this facility. An additional 50 lines (for Building 250) are routed directly off the base into the Mountain Bell system in Cheyenne. Still further, 1,300 line pairs serve the housing complex on the base of which 1,030 are currently being used. Mountain Bell's cables onto the base to serve all these needs are near capacity, and sizeable increases in service needs would require new telephone cable to be strung to the base.

Again, telephone service in all community systems is adequate today, and the two companies routinely plan and install capacity expansions as required.

2.1.8 Energy Resources

Energy resources to be assessed in conjunction with the proposed project include electricity, natural gas, petroleum products, and coal. These account for the majority of the energy consumed in the study area. Analysis includes energy sources, distribution systems, and transmission lines.

2.1.8.1 Region of Influence and Data Sources

2.1.8.1.1 Region of Influence

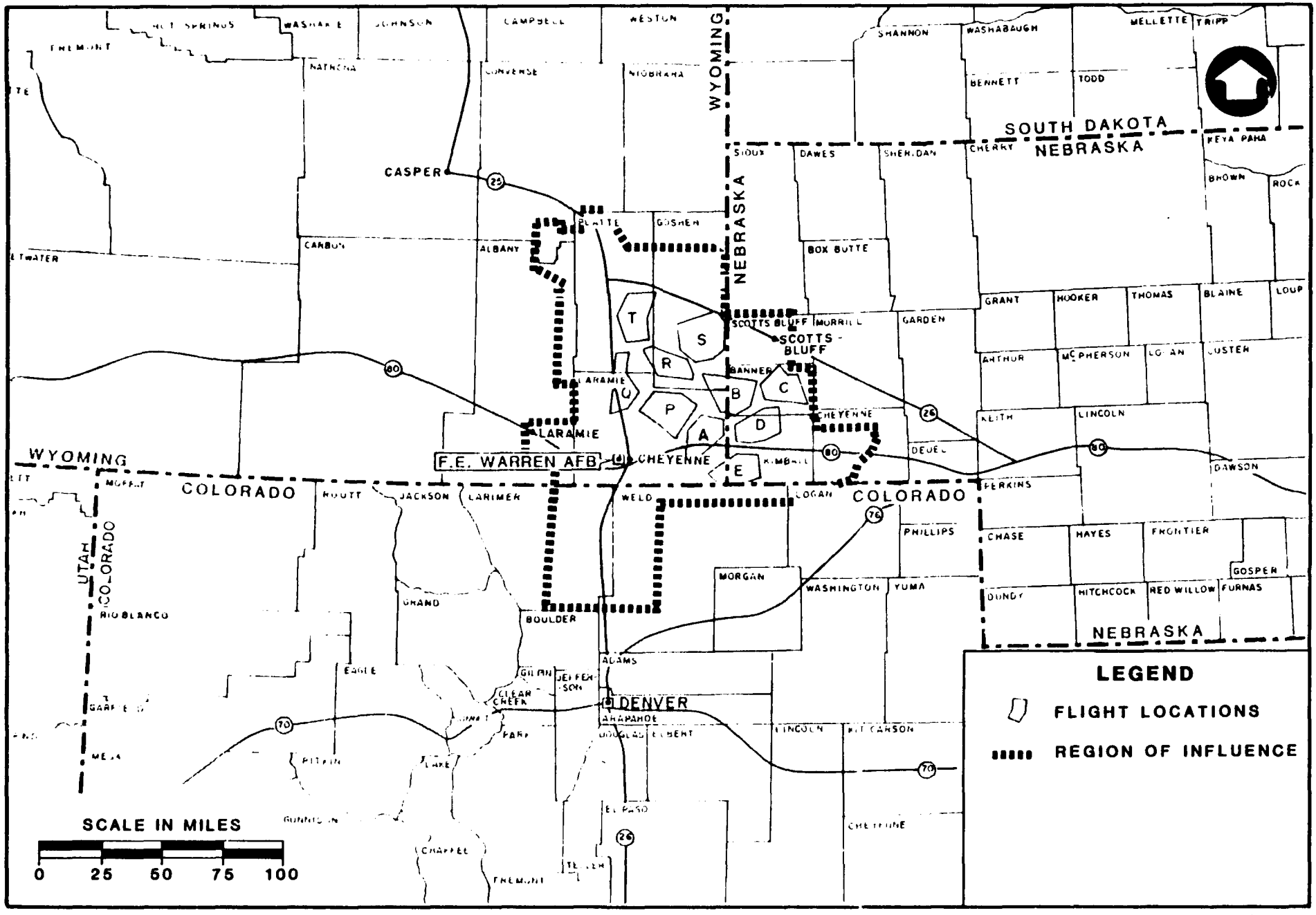
The Region of Influence for Energy Resources (Figure 2.1.8-1) is defined as the service area of three rural electric companies plus Cheyenne Light, Fuel and Power Company which supplies electricity to the 100 silos scheduled to receive Peacekeeper missiles. The rural electric companies are the Wyrulec Electric Company, the Rural Electric Company, and the Wheatland Rural Electric Association. In addition the Region of Influence includes the energy utility service areas of the cities and towns, identified as receiving project-induced population. Specifically, these include Laramie, Cheyenne, Pine Bluffs, Torrington, and Wheatland, Wyoming; Greeley and Fort Collins, Colorado; and Kimball, Gering, and Scottsbluff, Nebraska.

The Region of Influence encompasses all direct project energy impacts, both in Cheyenne and the Deployment Area. For towns outside the Deployment Area facing population impact, the Region of Influence also includes the service areas of their respective electric and natural gas utilities. Local gasoline and diesel distributors are included within the defined Region of Influence. The only identified coal user affected by the project is the heating plant on F.E. Warren AFB which is included.

None of the electrical and only one of the two natural gas utilities produce its own supply; nearly all utilities buy from regional wholesalers. While increased demand on the regional electrical grid or natural gas pipeline system may be anticipated to result from the project, this added demand is expected to be negligible at the regional level and thus neither the regional electric nor natural gas supplies are considered in detail.

The analysis in Section 3.1.8.1 narrows the Region of Influence for each energy resource to an Area of Concentrated Study. In most cases, the Area of Concentrated Study for each energy resource was determined by comparing peak, project-related consumption to 1982 consumption. Those locations where minimal energy impacts are likely to occur due to the project were eliminated, and the bulk of the environmental analysis was concentrated on locations where potentially significant impacts may occur. The Area of Concentrated Study for the four energy resources are:

- Electricity - The service area of the three rural electric companies mentioned above, Cheyenne Light, Fuel and Power Company, and Kimball's electric department.



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REGION OF INFLUENCE FOR ENERGY

FIGURE NO. 2.1.8-1

- o Natural Gas - The cities of Cheyenne, Kimball, Gering, Torrington, and Wheatland.

- o Gasoline/Diesel - The counties of Platte, Goshen, and Laramie, Wyoming; and Banner, Kimball, and Scotts Bluff, Nebraska.

- o Coal - F.E. Warren AFB.

The rationale for selection of these Areas of Concentrated Study can be found in Section 3.1.8.1.

2.1.8.1.2 Data Sources and Analytic Methods

Some of the important sources of energy data for the Region of Influence were:

- o Federal Energy Information Administration;

- o Wyoming and Nebraska Energy Office;

- o State public utility commissions;

- o Local electric and natural gas utilities; and

- o Local fuel wholesalers.

Members of the engineering staff at F.E. Warren AFB were interviewed to determine electrical, natural gas, and coal use at the base and in the missile Deployment Area. Base fuel use data was obtained from the Fuels Allocation Officer. Finally, energy-related data for project construction and system operation were obtained from discussions with the AFRCE-BMS and the Ballistic Missile Office at Norton AFB, California.

2.1.8.1.3 Analytic Methods for Existing Conditions

Data obtained from interviews with local energy utility managers are summarized in tabular form for the most current year for which data are available (generally 1982). For natural gas and electricity, the information presented includes number of customers, total consumption, average residential use, standardized monthly costs, and other data needed to draw a summary of each utility. Regional wholesale suppliers are also characterized, and their capacity to supply energy needs within the Region of Influence is discussed. Brief accounts of regional and national energy supply are provided for perspective.

Gasoline use in Wyoming was calculated from sales tax data available at the town level. In Colorado and Nebraska, only statewide fuel use figures were available. Per-capita fuel usages were calculated in these instances as well as for diesel fuel in Wyoming. Local estimates of fuel consumption were then calculated using 1982 population figures.

2.1.8.2 Existing Conditions

2.1.8.2.1 Electricity

2.1.8.2.1.1 Regional Situation

Nebraska and Wyoming are both net exporters of electricity. Wyoming exported approximately 60 percent of the 26 million megawatt hours (MWh) generated within the state in 1980. Coal-fired generating plants provide the bulk of the generating capacity in Wyoming. In Nebraska, nuclear power plants generate 50 percent of the state's power with coal generation accounting for most of the remainder.

Few of the local electrical companies in the Region of Influence own any generating facilities, and those that do rarely use them due to the availability of cheaper regional power. The regional wholesalers own most of the high voltage transmission lines in the area. Major wholesale distributors to the Region of Influence include the Western Area Power Administration, Tri-State Generation and Transmission Association, Pacific Power and Light Company, and the Nebraska Public Power District. Together they account for over 15,000 megawatts (MW) of generation capacity and electrical sales of 74 million MWh.

Although the Western Area Power Administration's electrical output is fully committed, the remaining wholesalers together have ample capacity to serve the Region of Influence through the 1980s. The region is generally in a very favorable position from an energy supply standpoint, including electrical energy. Two large generating stations located in the Region of Influence are the Laramie River Station, with a net generating capacity of 1,500 MW, and the Rawhide Power Project, due to start generating in 1984. These projects make the Region of Influence a net electrical energy exporter for the first time.

2.1.8.2.1.2 Local Distributors

Electricity in the Region of Influence is distributed either by town electrical utilities or by rural electric associations. For the most part, a town electric utility serves only the town and its immediately surrounding area. Rural electric associations serve the intervening, lightly populated, rural areas and often the smaller towns. These associations were formed in the 1930s and 1940s with the assistance of the federal Rural Electrification Administration. They own little, if any, generating capacity of their own. Their electric supply comes from regional wholesalers.

Three rural electric associations, Wheatland Rural Electric Association, Wyrulec Electric Company, and the Rural Electric Company supply electrical power to 96 of the 100 silos to be converted for Peacekeeper missiles. In 1982 these 3 rural electric companies supplied over 31 million kilowatt hours (kWh) of electricity to the Air Force in the missile Deployment Area. Average annual electrical consumption at each silo is about 180,000 kWh, while peak demand is approximately 25 kilowatts (kW). Pertinent information on the rural electric associations is shown in Table 2.1.8-1.

Table 2.1.8-1

RURAL ELECTRIC ASSOCIATIONS - 1982

Name	Location	Number of Customers	Peak Demand MW	Annual Consumption kWh x 10^6	Mean Annual Use Per Residential Customer kWh	Mean Monthly Residential Cost	Wholesale Supplier
Wheatland Rural Electric Association	Wheatland, WY	3,100	20	86	12,350	$62	Tri-State
Wyrulec Electric Company	Lingle, WY	3,650	28	87	10,250	$51	Western Area Power Administration Tri-State
Rural Electric Company	Pine Bluffs, WY	6,000	43	153	11,760	$58	Tri-State

Source: Unpublished data from Wheatland Rural Electric Association, Wyrulec Electric Company, and the Rural Electric Company.

Table 2.1.8-2 lists basic data on town electric utilities within the Region of Influence. Like the rural electric associations, the town utilities generally have no generating capacity of their own but rather import all electricity from large regional suppliers.

None of the rural or town electric utilities reported any major difficulties in meeting present customer electrical demand. Nearly all reported significant excess capacity in their local substations and distribution systems. The Kimball and Wheatland systems have supported populations at least 25 percent higher than at present.

The main supplier of electricity to F.E. Warren AFB is the Western Area Power Administration. In 1982 the base consumed 23.8 million kWh and had a peak electrical demand of about 4,000 kW.

2.1.8.2.2 Natural Gas

2.1.8.2.2.1 Regional Situation

Following a national trend, natural gas consumption in the region has dropped substantially in response to rapidly rising prices. Wyoming exported a net 85 percent of the 455 billion cubic feet (BCF) produced in 1981 and accounted for 2 percent of the national supply. On the other hand Nebraska had to import 98 percent of the 138 BCF consumed in that state in 1981. Residential consumers in both states paid less than the national average for natural gas.

Two regional producers of natural gas supply the towns and cities in the Region of Influence. They are Colorado Interstate Gas and Kansas/Nebraska Natural Gas Company. Neither distributor indicated any supply or distribution problems during the past several years. No interruption of service to customers has occurred during this period. In 1982 total Colorado Interstate Gas natural gas production was 323.2 BCF. Kansas/Nebraska Natural Gas Company production was 93.5 BCF. Both companies report ample supplies to serve foreseeable demand.

2.1.8.2.2.2 Local Distributors

Natural gas distribution to the Region of Influence is considerably different from that described for electricity. In general, natural gas transmission lines serve only cities or sizeable towns. From 80 to 95 percent of the dwellings in the gas service areas use natural gas for heating. The rural areas are not served and the isolated farmhouses and the smaller towns must use propane, heating oil, or electricity for heating.

Table 2.1.8-3 summarizes the natural gas supply statistics for towns and cities in or near the Region of Influence. Cheyenne's apparently high total gas consumption is partially explained by the fact that until recently Cheyenne Light, Fuel and Power Company supplied gas to Wycon, a large producer of nitrogen fertilizers west of town. Average yearly residential use of natural gas is also shown in Table 2.1.8-3. It varied from 143 thousand cubic feet (MCF) in Laramie to 117 MCF in Torrington in 1982. Actual average yearly consumption is closely tied to the winter weather. In Cheyenne the 1982 heating degree days of 7,534 was fairly close to the average of 7,255.

Table 2.1.8-2

CHARACTERISTICS OF CITY AND TOWN ELECTRIC UTILITIES - 1982

Distributor	Number of Customers	Peak Demand MW	Annual Consumption kWh ($x10^6$)	Mean Residential Consumption kWh/Year	Residential Monthly Cost[a] $	Wholesale Supplier
Cheyenne Light, Fuel and Power Company	28,000	83	462	6,250	23.83	Pacific Power and Light Company, Western Area Power Authority
Wheatland Electric Department	2,141	5.3	27	6,000	30.40	Western Area Power Authority, Laramie River Station
Torrington Electric Department	3,052	9.2	46	5,125	16.38	Western Area Power Authority, Pacific Power and Light Company
Kimball Electric Department	1,700	4.1	20	6,040	35.43	Nebraska Municipal Power Pool
Gering Electric Department	3,349	17.7	54[b]	6,000	25.41	Western Area Power Authority, Nebraska Municipal Power
Nebraska Public Power District (Scottsbluff - Terrytown)	6,334[a]	27	148	6,000	41.00	Nebraska Public Power District
Fort Collins Light and Power Company	27,407	95	496	6,855	29.83	Platte River Power Authority
Home Light and Power Company (Greeley, Colorado)	35,589	108	478	6,370	35.04	Public Service Company of Colorado

Notes: a Residential customers only.

b 1981 data.

Sources: Unpublished data from the electric companies listed above under Distributor.

Table 2.1.8-3

CHARACTERISTICS OF MUNICIPAL NATURAL GAS UTILITIES - 1982

Town	Distributor	# Customers	1982 Gas Sold MMCF	Mean Annual Residential Gas Use MCF	Avg. Monthly Residential Cost $	Wholesale Supplier
Nebraska						
Kimball	K/N[1]	1,425	280	128	37.82	K/N
Gering	K/N	3,000	478	122	39.02	K/N
Scottsbluff	K/N	6,050	1,179	125	39.94	K/N
Wyoming						
Torrington	K/N	2,260	389	117	37.50	K/N
Wheatland	K/N	1,825	314	124	39.62	K/N
Cheyenne	Cheyenne LF&P	23,636	14,200	129	46.00	CIG[2]
Pine Bluffs	Cheyenne LF&P	-Included under Cheyenne-				CIG
Laramie	Northern Gas Co.	9,000	2,251	143	61.24	K/N
Colorado						
Fort Collins	Public Serv. Co. of Colo.	19,424	4,304	120	52.93	CIG
Greeley	Greeley Gas Co.	26,003	5,753	120	52.58	CIG

Notes: 1 K/N = Kansas-Nebraska Natural Gas Company.
2 CIG = Colorado Interstate Gas.

Sources: Unpublished data from Kansas/Nebraska Natural Gas Company; Cheyenne Light, Fuel and Power Company; Northern Gas Company; Public Service Company of Colorado; and Greeley Gas Company.

Although a coal-fired hot water plant heats the major portion of F.E. Warren AFB, buildings at the southern end of the base, and three tracts of housing on the base, are heated by natural gas. The gas is supplied by Cheyenne Light, Fuel and Power Company. Consumption on the base was 332,872 MCF in 1982 (F.E. Warren AFB Civil Engineering Office 1983).

2.1.8.2.3 Petroleum Products

2.1.8.2.3.1 Regional Situation

Crude oil production in Wyoming totaled 126 million barrels in 1981, 4 percent of national production. Only 5.1 million barrels of oil were produced in Nebraska. Consumption of gasoline and distillate fuel oil (including diesel) in Wyoming was 375 million gallons and 523 million gallons, respectively. The respective figures for Nebraska were 788 million gallons and 376 million gallons. Between 1979 and 1982 gasoline consumption dropped by 14 percent in Wyoming and 23 percent in Nebraska.

2.1.8.2.3.2 Local Consumption of Gasoline

The fuel distribution network in the Region of Influence relies upon a combination of pipeline and truck delivery for supply to local distributors. This system is highly flexible. Competing private supply companies assure a rapid response to new fuel needs. The price and availability of fuel is far more heavily influenced by regional and national supply and demand than by local (e.g., individual town or city) demand. The 1982 gasoline consumption in the Region of Influence is estimated at 240-million gallons and diesel fuel consumption is estimated at 58-million gallons.

Local distributors supply the fuel needs of F.E. Warren AFB. The current supplier is the Fleischli Oil Company. Fuel allocation at F.E. Warren AFB is carefully managed. The 1982 gasoline consumption was 729,000 gallons. The goal for 1983 gasoline usage is for a 9 percent reduction. If met, fuel use would be the same as that achieved in 1980 (F.E. Warren AFB Fuel Supply Office 1983). Use of diesel fuel at the base was 79,000 gallons in 1982. The goal for 1983 is for a 17 percent reduction in diesel use versus 1982.

2.1.8.2.3.3 Refineries and Regional Fuel Supply

The Cheyenne area has a single petroleum refinery, Husky Refinery, with a capacity of 30,000 barrels per day (bbl/day). In 1982 it produced nearly 5 million barrels of gasoline products and over 2 million barrels of diesel fuels (Husky Oil Refinery 1983). Most of its crude oil comes by pipe from the Rocky Mountain area. Some oil is trucked in from wells near Greeley, Colorado.

Regional fuel supply to the Cheyenne area occurs via truck and rail shipments. A refined petroleum products pipeline (the WYCO pipeline) also delivers refined fuels to the Cheyenne area. Local distribution to retailers is handled by about a half dozen local wholesalers. Data on quantities handled is generally unavailable due to competitive reasons.

2.1.8.2.4 Coal

2.1.8.2.4.1 Regional Situation

In 1982 Wyoming's production and distribution of coal accounted for 3 percent of total U.S. domestic production and distribution. Approximately 20 million short tons of bituminous coal and lignite were produced in Wyoming in 1982. Almost all of this total output was strip-mined and shipped by rail or used by mine-mouth generation plants. Total consumption of coal in Wyoming in 1980 was approximately 15 million short tons.

Nebraska's production and distribution of coal accounted for less than 1 percent of total U.S. production and distribution in 1982. Approximately 6 million short tons of bituminous coal and lignite were produced in Nebraska in 1982. In 1981, consumption of coal in Nebraska totaled approximately 5.3 million short tons.

2.1.8.2.4.2 Coal Project Area

Notable coal consumption in the Region of Influence is limited to a few locations. The largest consumers are Laramie River Power Station (7 million tons per year) and Rawhide Power Station (920,000 tons per year).

The central heating plant of F.E. Warren AFB heats about 1.15 million square feet (sq ft) of building space and consumed 10,800 tons of coal during the 1981-82 season (F.E. Warren AFB Civil Engineering Office 1983).

2.1.9 Transportation

The Transportation resource is defined as the study of the various modes of travel used for the safe and efficient movement of persons and goods. Its focus includes transportation planning, and the design and operation of roads, railroads, aviation facilities, public transit, and pedestrian and bicycle facilities, as well as the interrelationships between these travel modes.

Of particular importance is the study of the roads to be used by the stage transporter vehicle and other project-related traffic, and the evaluation of necessary bridge and road improvements. This system includes those roads used for transporting missile components to the selected missile Launch Facilities.

2.1.9.1 Region of Influence and Data Sources

2.1.9.1.1 Region of Influence

The geographical limits of the Region of Influence for Transportation include Laramie, Goshen, and Platte counties, Wyoming; Kimball, Banner, and Scotts Bluff counties, Nebraska; and a corridor along Interstate 25 and adjacent rail lines in Colorado, which encompasses Fort Collins, Greeley, and Denver (Figure 2.1.9-1). The Region of Influence includes construction sites directly disturbed by the project, (particularly the work at F.E. Warren AFB), access roads, and the cable connections between missile flights.

The boundaries of the Region of Influence encompass all major transportation systems affected by major deliveries of materials, and movements of construction workers and vehicles to and from job sites. These include roadways, railroads, aviation, public transit, and pedestrian and bicycle facilities. The Region of Influence also includes transportation systems in areas where inmigrant populations are expected to reside, shop, and use recreational facilities.

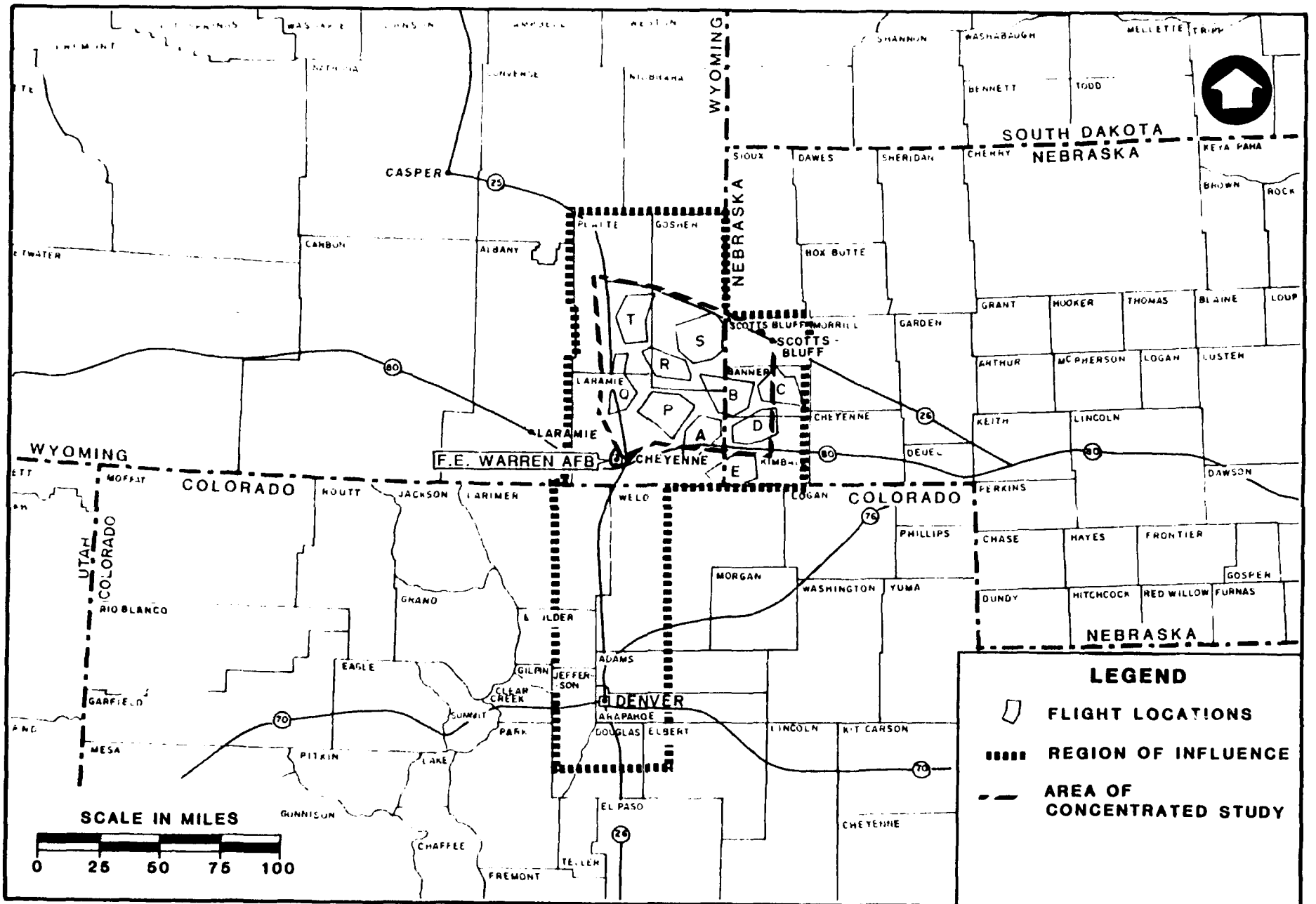
The Area of Concentrated Study is defined as an area approximately bound by Interstate 25, U.S. Route 26, Nebraska State Highway 71, Interstate 80, and portions of Kimball County, Nebraska and Laramie County, Wyoming, south of Interstate 80. Justification for the Area of Concentrated Study is discussed in Section 3.1.9.1.

2.1.9.1.2 Data Sources and Analytic Methods

2.1.9.1.2.1 Sources of Existing Information

For the roads analysis, information on roadway and traffic conditions was provided by the Wyoming State Highway Department, the Nebraska Department of Roads, and engineering or planning departments on the county and local level.

For the railroad analysis, the state rail plans for Wyoming, Nebraska, and Colorado, including their most recent updates, were reviewed. The Wyoming State Public Service Commission provided data on statewide rail shipments originating and terminating in Wyoming. The Nebraska Public Service Commission and the Nebraska



REGION OF INFLUENCE FOR TRANSPORTATION

(14-4)

FIGURE NO. 2.1.9-1

Department of Roads provided maps and data on rail operations in Nebraska. Both the Burlington Northern and Union Pacific railroads provided information. A meeting discussing Union Pacific's operations in Cheyenne was held in Omaha, Nebraska, in April.

For the aviation analysis, information was obtained from local airport officials. In addition, a large number of Federal Aviation Administration's published reports, including the National Airport System Plan, were reviewed. State Airport System Plans for Wyoming and Nebraska, and the Cheyenne Airport Master Plan, were also reviewed.

For public transit, information was obtained from the Cheyenne transit and taxi system and the intercity bus lines.

For the analysis of pedestrian and bicycle facilities, existing bicycle circulation data and accident data for both pedestrians and bicyclists were reviewed. Information on bikeway facilities was provided by the City of Cheyenne.

2.1.9.1.2.2 Primary Data

A road inventory was performed on the roads to be used by the stage transporter vehicle. This inventory involved an extensive data collection effort of roadway and bridge characteristics. Data were also collected concerning traffic, roadway, and land use information at F.E. Warren AFB.

The Wyoming State Highway Department and the City of Cheyenne collected traffic volume data in the Cheyenne area. Similarly, Nebraska Department of Roads collected traffic data at 36 locations in Kimball and Banner counties.

2.1.9.1.2.3 Analytic Methods for Existing Conditions

The methodology for characterizing existing road and traffic conditions is described according to travel demand, traffic engineering, and physical condition of roads and bridges. Travel demand for rural areas was assessed through a review of current traffic volumes and historic traffic growth, and an understanding of local development trends.

Travel demand for the Cheyenne Urban Area was assessed by developing a computerized transportation model to simulate existing traffic conditions. The modeling approach followed procedures outlined in the National Cooperative Highway Research Program's Report 187, Quick Response Urban Travel Estimation Techniques and Transferable Parameters. Level of service, capacity, queuing, delay, and safety analysis were performed for traffic conditions for the roadway study network for the current year 1983.

To assess the physical condition of roads that would be utilized by the stage transporter vehicle, a comprehensive road condition inventory was conducted on presently designated Minuteman transporter erector routes. It was assumed that the stage transporter vehicle would use existing transporter erector routes. Data gathered during this inventory included roadway surface type, surface width, shoulder width, number of lanes, and structural properties. In addition, information was

gathered on structures such as bridges, culverts, and cattle guards, as well as potential obstructions such as rail crossings, utility crossings, and substandard curves. A computerized procedure was used to summarize both roadway and structure information, and to store a detailed record of the physical condition of the affected roads.

For railroads, physical condition and rail yard capacity were evaluated, based on operational and capacity information provided by rail officials.

A demand and capacity evaluation of existing facilities at area airports was made using general procedures and criteria recommended by the FAA and a review of existing capacity analyses from these airports' master plans.

An analysis of existing bus and taxi service in the Cheyenne area, as well as intercity bus service, was conducted through a determination of extent of service areas, frequency of service, ridership, and potential for expansion.

For pedestrian and bicycle facilities in the Cheyenne area, the Cheyenne bikeway plan and related planning and development documents were used to determine existing and planned facilities.

2.1.9.2 Existing Conditions

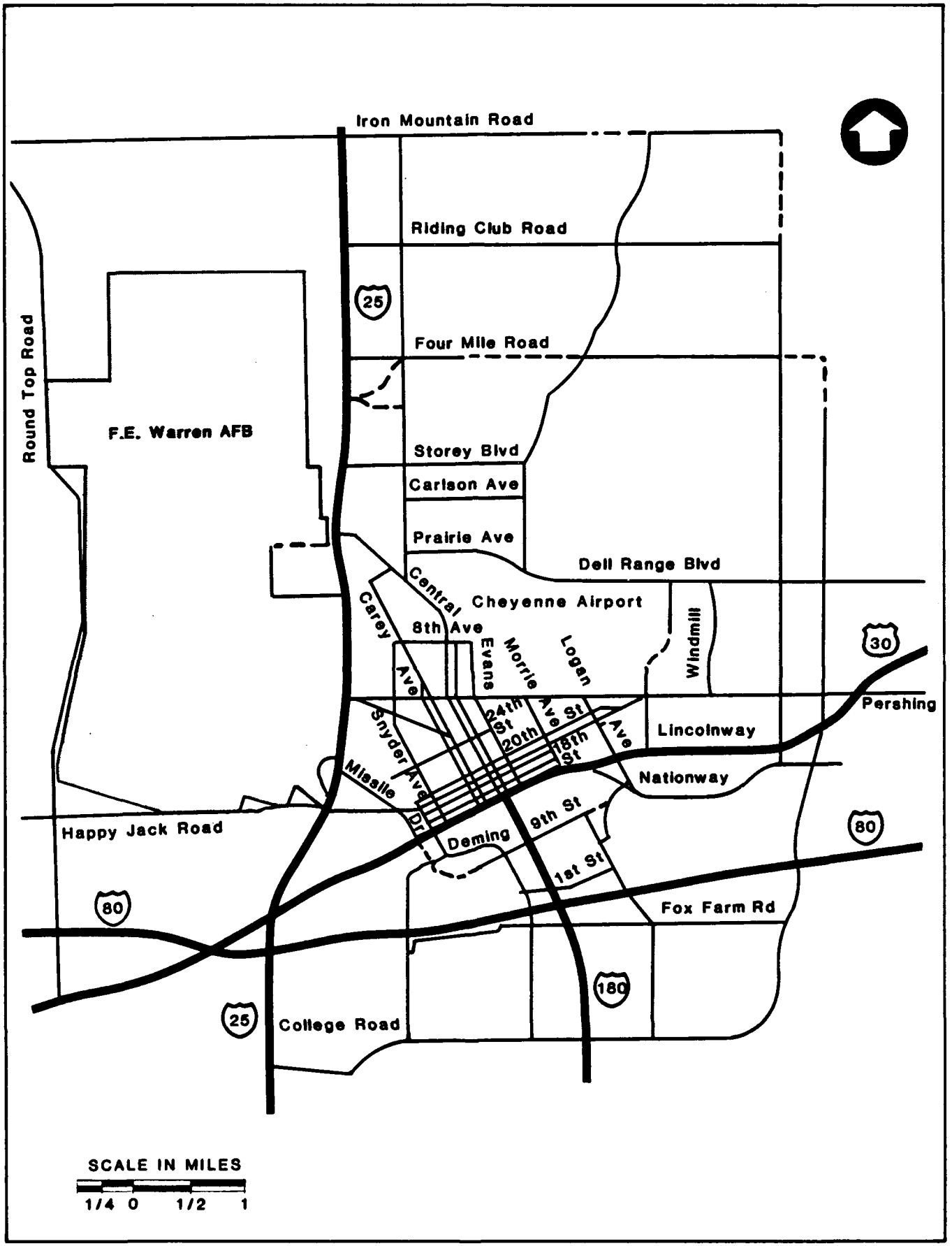
2.1.9.2.1 Roads

2.1.9.2.1.1 Urban Area

The Cheyenne study area and the major roadways in the area are shown in Figure 2.1.9-2. The Cheyenne study area includes that part of the urban region that may be impacted during project implementation. Both the study area and the major roadways were determined through consultation with representatives of the Wyoming State Highway Department, the City of Cheyenne, and Laramie County.

Particular attention was given to traffic operations at F.E. Warren AFB. F.E. Warren AFB is primarily serviced by four gates. Gate No. 1 (Randall Avenue) is the main access for military personnel, civilian workers, and visitors. Gate No. 2 (Missile Drive) is utilized by military personnel, civilian workers, and delivery vehicles. Gate No. 5 (Central Avenue) is used for military operations, such as the movement of the missile transporter, and is normally locked. Gate No. 4 (Round Top Road) is accessed by a magnetic-card-actuated automatic gate system.

Traffic volume data for 1982, obtained from the Wyoming State Highway Department, show Gate No. 1 to have a total average weekday volume of 12,500 vehicles. In comparison, Gate No. 2 has only a total average weekday volume of about 2,000 vehicles. At Gate No. 1, the maximum queue of 15 vehicles in 2 lanes extends 200 feet easterly on Randall Avenue. At Gate No. 2, the maximum queue of 3 vehicles in 2 lanes extends 50 feet easterly on Missile Drive.



CHEYENNE ROADWAY NETWORK

(14-23)

FIGURE NO. 2.1.9-2

2.1.9.2.1.2 Rural Roads

The Area of Concentrated Study is served by a network of national, state, and local roads. The region is traversed by two routes of the National System of Interstate and Defense Highways. Interstate 25 serves northsouth traffic movement, while Interstate 80 serves east-west movement within and through the region. These traffic arteries are augmented by several state highways and county roads which serve population centers and rural areas of the Area of Concentrated Study.

Project-related roadways consist of transporter erector routes, Air Force security routes, and roads functionally classified as collectors or arterials. Table 2.1.9-1 presents a summary of existing physical conditions on these transporter erector routes. This summary includes surface type and structural classifications as well as information on associated roadway elements. Additional information was collected for other project-related rural roads.

2.1.9.2.2 Railroads

Two rail lines operate in the Area of Concentrated Study. The Union Pacific Railroad operates a major line, classified as a route required for defense, extending from Council Bluffs, Iowa, to Salt Lake City, Utah, which is then single-tracked to the West Coast. Other mainlines extend from this trunk line from Egbert, Wyoming, north to South Torrington, Wyoming, and south to Denver, Colorado; and from North Platte, Nebraska, parallel to the North Platte River to the Torrington area.

Burlington Northern Railroad and its subsidiary, Colorado and Southern Railroad, operate a mainline from Cheyenne north through Wyoming and an unclassified line south toward Denver. A major Burlington Northern line runs north from Sterling, Colorado, to Bridgeport, Nebraska, and then parallels the North Platte River west into Wyoming.

2.1.9.2.3 Aviation

2.1.9.2.3.1 Cheyenne Airport

The Cheyenne Airport is the center for aviation activity in the Area of Concentrated Study. Frontier Airlines and Rocky Mountain Airways presently serve Cheyenne Airport. In the fall of 1983, Frontier will discontinue jet service to Cheyenne. Preliminary indicators are that replacement service will be provided by Frontier Commuter with three to six flights daily using Convair 580 turboprops. There are two fixed-base operators at the Cheyenne Airport, Aero Ventures and Sky Harbor Air Service, which provide a variety of services including fuel, aircraft rental and sales, air taxi and air ambulance service, flight training, major maintenance, hangars and tiedowns. There are 14 multiengine and 69 single-engine general aviation aircraft based at Cheyenne with a total capacity of 108 tie-downs. Aviation fuel is stored in underground tanks and transferred to aircraft by tank trucks. Total fuel capacity is 142,000 gallons.

Table 2.1.9-1

ALL COUNTIES
TRANSPORTER ERECTOR ROUTES - SUMMARY OF PHYSICAL CONDITIONS

Code	Description	Mileage
A	Primitive Roads	0.00
B	Unimproved Roads	0.00
C	Graded and Drained Earth Roads	42.10
D	Soil Surface Roads	157.35
E1	Gravel or Stoned Roads Not Graded and Drained	3.70
E2	Gravel or Stoned Roads Graded and Drained	103.68
F	Bituminous Surface Treated Roads	0.00
G1	Low Type Mixed Bituminous Roads	4.12
G2	High Type Mixed Bituminous Roads	426.26
H1	Low Type Bituminous Penetration Roads	40.10
H2	High Type Bituminous Penetration Roads	21.59
I	Bituminous Concrete	1.14
J	Portland Cement Concrete Roads	169.71
M	Combination Type Roads	0.00
	Other	0.00
	TOTAL MILES OF ROAD	969.75

Code	Other Elements Description	
1	Substandard Curves[1]	62
2	Buried Pipeline	42
3	Overhead Cable	357
4	Buried Cable	22
5	Silo Entrance Road	111
6	Railroad Track	22
7	Overhead Sign	22

Code	Structures Description	
X	Bridges	282
1	Box Culverts	158
2	Reinforced Concrete Pipe	525
3	Corrugated Metal Pipe	1,067
4	Metal Pipe Arches	112
5	Other	0
6	R.C. Arch Culverts	23
7	Cattle Guards	105

Note: 1 Substandard curves - curves that would be unable to accommodate the required turning radius of the stage transporter vehicle.

The only Air Force operations at the airport are the Civil Air Patrol and the Transient Alert, which provide service for military aircraft. U.S. Air Force aircraft that occasionally use the airport include the T-39, C-141 four-engine jet transport, and the Boeing KC-135 four-engine jet tanker. Also based at Cheyenne Airport is the Wyoming Air National Guard, whose primary mission is to maintain aircraft proficiency in the Tactical Airlift Mission. The Air Guard operates eight C-130s. The unit also supports the Air Force in point-to-point airlift missions throughout the United States. The Air National Guard maintains crash, fire, and rescue equipment and staffs these operations jointly with the airport. Activities of the Wyoming Army National Guard at Cheyenne Airport include aircraft maintenance and individual and unit training. The Army Guard operates seven UH-1H helicopters, seven OH-58A helicopters, and one T42 Beechcraft Baron single-engine airplane.

From 1979 to 1982, the recorded number of aircraft operations at Cheyenne Airport decreased considerably. This was due to the poor economy, the air traffic controllers' strike, and the reduced hours of control tower operation. The largest affected category was general aviation, dropping from 39,565 operations in 1979 to 25,105 in 1982. Passenger traffic for 1981 and 1982 was very stable at about 25,900 for both years. Traffic for 1983 is well ahead of that pace, projecting to 32,700 passengers for the full year. This increase is primarily due to revisions to the airlines fare structures.

Operations have begun to increase in 1983, due to longer control tower operating hours and an improving economy. Projecting the operations total for the first half of 1983 to a full year, operations will have increased from 55,735 in 1982 to about 75,000 for 1983. Seasonal peaks occur in the months of July and August. Traffic drops off in the winter months with the low generally occurring in December.

Approximately 100,000 sq ft are available for three large commerical jet liners at the terminal. As many as 25 additional large aircraft may be parked at the airport when traffic is diverted to Cheyenne from other airports.

In recent years, pavement maintenance requirements have been increasing. The pavement of runways 12/30 and 16/34 is in poor condition and requires continuous patching in areas of spalling concrete. Taxiways are in good shape. In order to improve the pavement structure, the Federal Aviation Administration (FAA), in its Ten Year Plan (1980), recommended investments in paving and lighting of $3.7 million during the first 5 years and $2.4 million during the sixth through tenth years.

Parking in the terminal area has been a problem in recent years. In the area adjacent to the terminal, there are several commercial establishments which compete with the airport users for a limited number of spaces. Of the 280 parking spaces available in the terminal area, approximately 60 spaces are reserved for non-airport users, and 125 spaces are reserved for official and commercial users. Additional parking lots serve the military and commercial facilities at the airport, but they are located some distance from the terminal. The airport's management has identified the need for additional public parking facilities as a shortcoming of the present level of activity.

2.1.9.2.3.2 Area Airports

Other than Cheyenne Airport, the study area is dominated by small general aviation facilities. Only 2 airports, General Brees Field in Laramie, Wyoming, and Scotts Bluff County Airport in Scottsbluff, Nebraska, have scheduled commercial air carrier service. The remainder are in the basic utility and general utility categories.

The three general aviation airports in the Fort Collins-Greeley-Denver corridor are very active, with over 125,000 annual operations at each. Stapleton International Airport in Denver is a main air carrier hub with almost 500,000 annual operations.

2.1.9.2.4 Public Transit

Public transit in Cheyenne is provided by both buses and taxis. Jitney, Inc. currently operates two bus routes with one bus operating on each route at 60-minute intervals. The system currently carries 300 to 400 passengers per week, with increases expected as people become more aware of the transit system as a viable transportation alternative. In addition to the City system, the Air Force operates a transit system at F.E. Warren AFB which is intended to provide circulation within the base. Intercity bus service to the area is provided by Greyhound and Trailways.

Taxi service in Cheyenne is provided by Checker-Yellow Cab which operates 24-hours per day on a demand call basis. It utilizes 10 taxis during the day and 5 taxis at night, and averages 400 fares per day, with 1-passenger trips constituting approximately 90 percent of the fares. Peak hours are 7:00 to 9:00 AM and 3:00 to 6:00 PM.

2.1.9.2.5 Pedestrian and Bicycle Facilities

The City of Cheyenne has established a general development framework for a master bikeway network. These plans have been implemented as monies became available. However, bikeways are not a major priority of the City of Cheyenne. Recent sections of improvements have been constructed as a result of associated projects.

The majority of routes, paths, and lanes occur in the northern sections of the city, and are primarily due to the presence of large recreational facilities and major street renovation projects such as Dell Range, Pershing, 19th Street, and Logan. Major improvements in the south include the Interstate 180 Corridor project, which will include bike lanes, and Optimist Park.

The downtown area has an extensive pedestrian network consisting totally of sidewalks. The surrounding areas consist of a myriad of sidewalks and paved streets with intermittent areas of graveled streets and no sidewalks. Specific areas, particularly the southern and northeastern sections of Cheyenne, have concentrated areas void of formal pedestrian paths.

2.1.10 Land Use

The Land Use resource consists of two elements: urban and rural land use. Urban land use and planning focuses on population-induced indirect project effects and impacts on the amount and type of developed and undeveloped land in urban areas, and the impacts on or due to local land use plans and policies that regulate development. It also addresses direct land use impacts in urban areas of alternative staging areas and roads. Rural land use considers the direct impacts of project development of cable system, transporter erector road modifications, Launch Facility modifications, and establishment of required explosives safety Quantity Distance zones around the Launch Facilities.

2.1.10.1 Region of Influence and Data Sources

2.1.10.1.1 Region of Influence

2.1.10.1.1.1 Urban Land Use and Planning

The Region of Influence for urban land use coincides with the Region of Influence for Utilities (Figure 2.1.7-1). These nine counties contain all areas where population inmigration from the project is anticipated. The Area of Concentrated Study for urban land use includes the Cheyenne Urban Area and the city of Kimball, the two areas where housing, the primary urban land use, exhibits significant impacts.

2.1.10.1.1.2 Rural Land Use

The Region of Influence for rural land use (Figure 2.1.10-1) includes Platte, Goshen, and Laramie counties, Wyoming, and Scotts Bluff, Banner, and Kimball counties, Nebraska, which contain the areas where all direct land use impacts from the project could occur. The Area of Concentrated Study for rural land use includes the ten Flights and the areas between Flights A, B, C, D, P, R, and S where cable route, Launch Facility site, transporter erector road, and Quantity Distance zone modifications are proposed. See Section 3.1.10.1 for more detail.

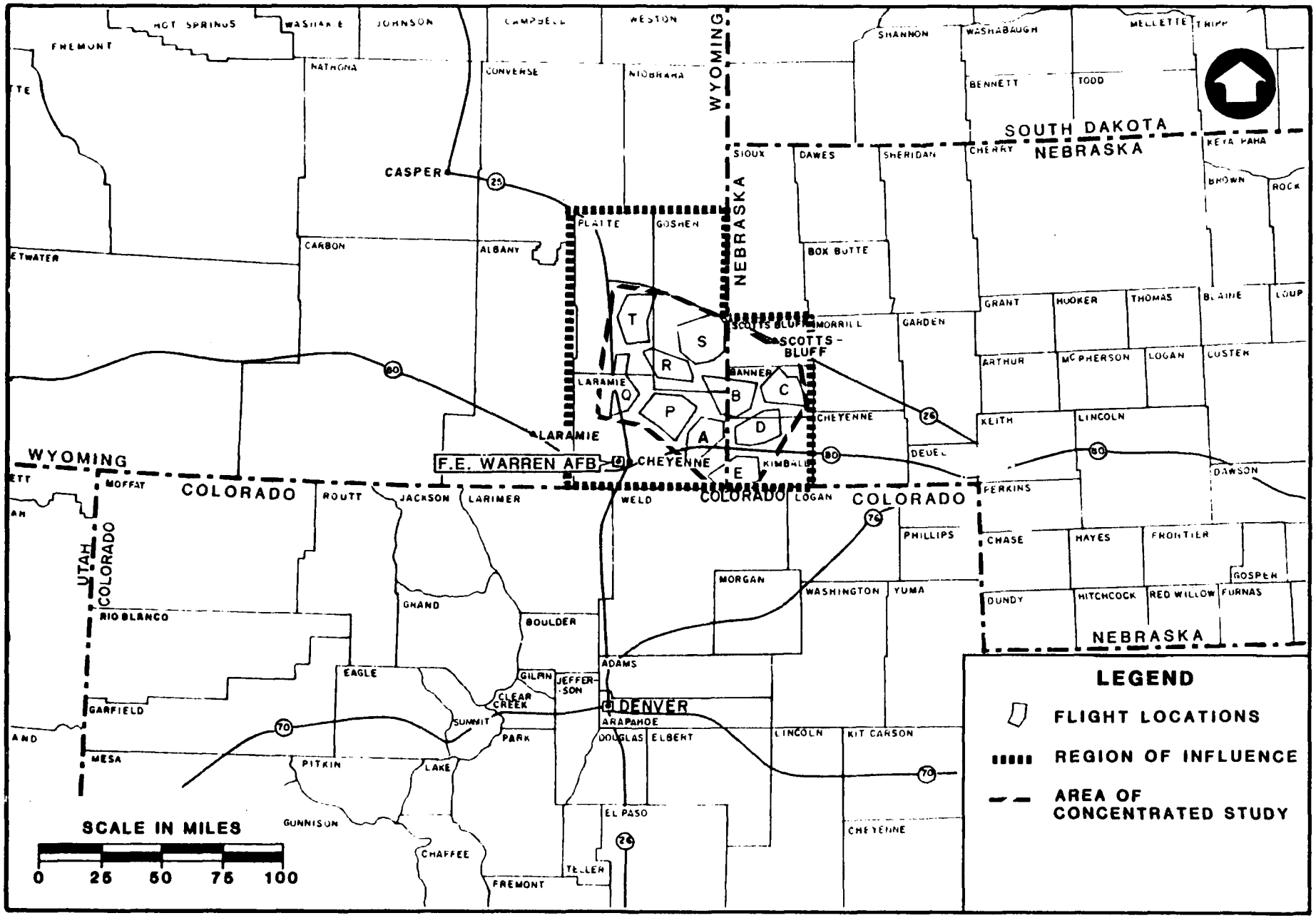
2.1.10.1.2 Data Sources and Analytic Methods

2.1.10.1.2.1 Urban Land Use and Planning

The following analytic methods were used to determine existing conditions for urban land use and planning: 1) comprehensive land use plans, land use surveys, and maps were analyzed to determine existing development patterns, the amount of vacant land within communities, and generalized development constraints; 2) local development regulations were analyzed; 3) existing per capita land acreages, by use category, were calculated and compared for different communities on the basis of land use standards; and 4) interviews were conducted with local planners and development officials to determine trends.

2.1.10.1.2.2 Rural Land Use

Rural land uses in the Region of Influence were analyzed through examination



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REGION OF INFLUENCE FOR RURAL LAND USE

(13-17)

FIGURE NO. 2.1.10-1

of census and map data, and satellite imagery. Site-specific agricultural land use data were obtained by interpretation of satellite and aerial photographs (with some groundtruthing), transferred to maps, and measured to provide an inventory of existing conditions. The primary data sources for rural land uses were Soil Conservation Service (SCS) soil surveys and Census of Agriculture data for the Region of Influence counties. Cable route analysis used LANDSAT 1:250,000 scale and Geographic Management Information System 1:158,400 scale satellite imagery, and Ertec 1:18,000 scale aerial photographs. Real estate data were analyzed to identify inhabited structures in the explosives safety zones.

2.1.10.2 Existing Conditions

2.1.10.2.1 Urban Land Use and Planning

2.1.10.2.1.1 Cheyenne, Wyoming

Existing utilization of developed land, amounts of vacant land, and adopted plans and policies regulating land use determine the capacity of urban areas to absorb growth in an orderly manner. These three areas of concern, therefore, comprise the urban land use analysis.

Land use maps for Cheyenne indicate that the urban area contained 42 percent developed residential land and 58 percent developed nonresidential land in 1982. There were almost 1,500 acres of vacant land within the city that year including over 1,000 vacant lots in singlefamily subdivisions. Per capita land use standards based upon the acres of existing developed land in Cheyenne generally indicate some underutilization of improved land and facilities. This includes commercial and industrial properties as well as vacant lots in subdivisions. New development has generally located north and east of the city. Expansion to the west is limited due to the location of F.E. Warren AFB and the lack of access and services. South Cheyenne is oriented toward industrial and mobile home development.

Cheyenne and Laramie County have adopted a zoning ordinance, a subdivision ordinance, and land use plans, as well as a recently developed annexation policy. Efforts are continuing to develop additional land use management tools.

2.1.10.2.1.2 Kimball, Nebraska

In Kimball, 35 percent of developed land is devoted to residential use and 65 percent to nonresidential use (Panhandle Resource Council 1976). The amount of vacant land estimated in an earlier survey was approximately 200 acres. Local per capita land use standards appear to exceed generally used planning standards indicating that currently developed land could be more than adequate since population declined between 1970 and 1980. Growth has generally located to the south. Utilities do not appear to be a constraint to future land development, and environmental conditions will not preclude development in most locations.

Kimball has adopted a zoning ordinance, a subdivision ordinance, and a land use plan. Opposition by 35 percent of property owners within 300 feet of a proposed mobile home park is grounds for permit denial. Until recently the City of Kimball and Kimball County had a joint planning commission. The County has not adopted any major land use controls.

2.1.10.2.2 Rural Land Use

Existing conditions for rural land use focus on a description of agricultural land uses in those areas potentially affected by location of the ten alternative cable routes (Figure 1.6.3-1). Of the ten routes, one will follow an existing road right-of-way and is assumed to include no agricultural land. Two additional routes will follow existing Minuteman cable routes which cross combinations of irrigated cropland, dry farmland, and rangeland. The remaining 7 routes will be located in 35-foot easements within several mile-wide corridors which connect with existing road rights-of-way. Percentages of agricultural land uses in the corridors are presented as existing conditions in Table 2.1.10-1.

The Air Force has, for planning purposes, established a required explosives safety distance for the project of 1,750 feet to inhabited buildings. Nine of the 100 Launch Facilities have inhabited structures within this stand-off distance. These include C-7 and C-10 in Banner County; D-4, D-9, and E-5 in Kimball County; E-9, E-11, and Q-5 in Laramie County; and T-5 in Platte County. All of the inhabited structures are associated with larger farm complexes which have additional uninhabited farm support buildings nearby.

Since all modifications to Launch Facilities will occur within existing fence lines and transporter erector road modifications will occur within existing rights-of-way, no land use analysis was conducted for these actions.

Table 2.1.10-1

CABLE LAND USES AND POTENTIAL CORRIDOR IMPACTS

Corridor	Existing Conditions					Potential Corridor Impacts			
	Total Acreage	% Irrigated	% Dry Farm	% Rangeland	Miles Following Existing Road Right-of-Way	Acres Irrigated	Acres Dry Farm	Acres Rangeland	Total Acres
PA2[a]	-	-	-	-	12.9	0	0	0	0
PA1[b]	5.5	0	61.0	39.0	-	0	3.4	2.1	5.5
PA4	2,078	0	11.0	89.0	17.8	0	2.7	15.2	17.9
PD1	3,394	0.6	0	99.4	20.4	0.1	0	23.9	24.0
RB1	4,722	0	14.0	86.0	17.5	0	4.2	25.8	30.0
PA3	6,100	0.3	0.6	99.0	3.3	0.1	0.3	44.6	45.0
PB1	5,570	0.3	11.0	88.0	11.0	0.1	6.0	35.6	41.7
SB1[b]	50	15.0	19.0	66.0	-	7.5	9.5	33.0	50.0
SC2	18,314	10.0	55.0	35.0	4.0	13.0	75.4	47.6	136.0
SB2	17,221	12.0	56.0	32.0	-	18.2	85.1	48.6	151.9

Notes: a Entire cable length follows existing road right-of-way.
b Route follows existing Minuteman cable location. Acreage calculated on 35' easement x length of cable.

The six remaining alternatives are combinations of routes that traverse cross-country corridors and connect with road rights-of-way. Acreages under existing conditions calculated for mile-wide corridor.

2.1.11 Recreation

This section addresses regional (resource-based) recreation which is related to federal, state, and other lands offering rural outdoor recreation opportunities; and local (user-based) recreation which is related to municipal and county-owned parks and facilities within urbanized areas.

2.1.11.1 Region of Influence and Data Sources

2.1.11.1.1 Region of Influence

2.1.11.1.1.1 Regional Recreation

The Region of Influence for the regional recreation analysis is a circle with a 150-mile radius from Cheyenne, the area forecast to receive the greatest influx of population attributable to the proposed project. The 150-mile radius, which includes parts of Wyoming, Colorado, and Nebraska, represents a reasonable upper limit that a person living in Cheyenne can be expected to travel for the purpose of participating in outdoor recreation during a 1 or 2-day period. This Region of Influence is shown in Figure 2.1.11-1. The Area of Concentrated Study, however, includes only Laramie, Albany, Platte, Goshen, and Carbon counties, where regional facilities exhibit impacts from project-related population influx. See Section 3.1.11.1 for further clarification.

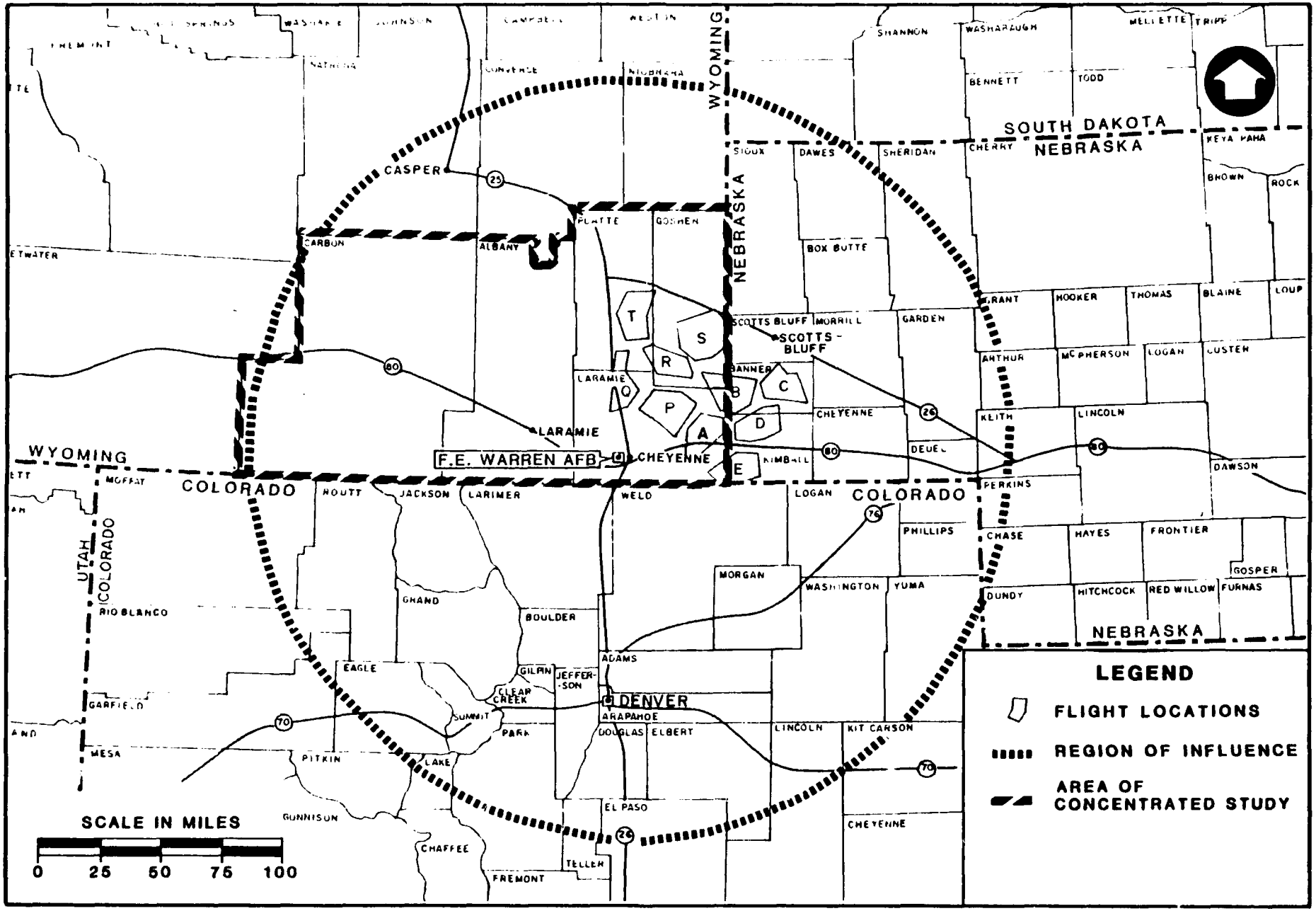
2.1.11.1.1.2 Local Recreation

The Region of Influence for local recreation coincides with the Region of Influence for Utilities (Figure 2.1.7-1). These nine counties contain all areas where inmigration from the project is anticipated. The Area of Concentrated Study for local recreation includes the Cheyenne Urban Area and the city of Kimball, those areas where the majority of project-induced population is projected to settle.

2.1.11.1.2 Data Sources and Analytic Methods

2.1.11.1.2.1 Regional Recreation

Data pertaining to existing visitation and capacities at the various recreation areas within the Region of Influence were collected from park master plans, statistics maintained by regional recreation agencies, and verbal estimates made by recreation planners. The quality and availability of these data vary by jurisdictional agency as well as by individual recreational area. Agencies contacted include the National Park Service, U.S. Forest Service, U.S. Fish and Wildlife Service, Bureau of Land Management (BLM), Wyoming Recreation Commission, Wyoming Game and Fish Department, Colorado Division of Parks and Outdoor Recreation, Colorado Division of Wildlife, Nebraska Game and Parks Commission, South Platte Natural Resource District, Cheyenne Parks and Recreation Department, and others with jurisdiction over recreational lands within the Region of Influence. Field observations were made to verify estimates and eliminate data gaps. Visitation estimates were collected



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REGION OF INFLUENCE FOR REGIONAL RECREATION

(13-1)

FIGURE NO. 2.1.11-1

for ten individual activities: camping, picnicking, skiing, swimming, fishing, hunting, boating, hiking/horseback riding, snowmobiling/ cross-country skiing, and off-road vehicle use.

2.1.11.1.2.2 Local Recreation

For the local recreation analysis, information was gathered from three primary sources: public documents, group and agency contacts, and field surveys. Documents used included parks and recreation master plans, and comprehensive plans developed for cities and counties in the Region of Influence. The primary agencies contacted were local parks and recreation departments or, in their absence, local officials. Field surveys were used to supplement and update data from local agencies and available documents.

The needs analysis for local recreation applied existing ratios, adopted standards, state standards from the Wyoming Statewide Comprehensive Outdoor Recreation Plan, and national standards from the National Recreation and Parks Association to estimated 1983 population figures for three separate categories: parkland, recreation facilities, and staffing. Current conditions in terms of the available supply and demand associated with these three components were evaluated.

2.1.11.2 Existing Conditions

2.1.11.2.1 Regional Recreation

Existing visitation levels at various recreational areas utilized by Cheyenne area residents are discussed in this section. These visitation levels, by recreational activity, form the basis upon which project-induced recreational demand is allocated to each area.

Approximately 100 publicly owned regional recreational areas were identified within the Region of Influence; only 34 are within the Area of Concentrated Study. These areas include all or portions of 1 national park, 10 national forests, 6 national wildlife refuges, 22 game and fish areas, 24 state parks and recreation areas, and a variety of other recreational area types. Of these, one national forest and two national wildlife refuges, as well as all of the Wyoming state parks and identified game and fish areas, are within the Area of Concentrated Study. In addition, there are several water-based recreation areas under the jurisdiction of the City of Cheyenne and other agencies, as well as significant BLM acreage.

Medicine Bow National Forest, which consists of four separate units, is the most heavily visited area within the Area of Concentrated Study. The most popular activities occurring at the Forest are camping, hunting, and fishing. In contrast, Bamforth and Hutton Lake national wildlife refuges receive very low visitation.

Of the four state parks, Glendo is the most popular overall, followed by Guernsey, Curt Gowdy, and Seminoe. Fishing is a popular activity at all areas except Guernsey, while boating is least popular at Curt Gowdy. Swimming is popular at Glendo and Guernsey. Camping exhibits relatively high use at all four areas. The game and fish areas generally receive much less use than the state parks

with Lake Hattie, Twin Buttes Reservoir, and Wheatland Reservoir exhibiting the highest visitation figures. Most of these areas emphasize fishing and hunting as recreational attractions, although the larger areas also offer boating, camping, picnicking, and swimming.

Sloans Lake in Cheyenne is an important resource primarily serving local residents. Swimming is by far the most popular activity at this area. Other recreational areas under the City's jurisdiction are Lake Absoracca and Upper North Crow Reservoir. The latter area receives low use since no developed facilities exist.

2.1.11.2.2 Local Recreation

Parkland, recreation facilities, and staffing for Cheyenne and Kimball were evaluated for surpluses and deficiencies to determine impacts to these components due to baseline and project-related populations.

2.1.11.2.2.1 Cheyenne, Wyoming

The major provider of recreational land, facilities, and staff in the Cheyenne Urban Area is the City of Cheyenne Parks and Recreation Department. Several other service organizations supplement the City's facilities. These include Laramie County School District No. 1, Laramie County, the YMCA, Laramie County Community College, and commercial recreation operations. None of the supplemental service organizations focus exclusively on providing recreation, and often their facilities are not available to the public on a regular basis. F.E. Warren AFB provides facilities for use by military personnel and Department of Defense (DoD) civilian employees.

Parks and recreation services were first offered by the City in 1973. The system is thus relatively new and is only beginning to necessitate replacement and increased maintenance of some facilities. The service area of the Cheyenne Parks and Recreation Department is within the city boundaries, although in actual practice the Department serves the Cheyenne Urban Area with a population of approximately 11,000 over the city population. There are no differential fees charged for services between city and county residents.

Cheyenne has 11 neighborhood parks, 4 community parks, 3 baseball complexes, and 2 golf courses. The City has, in its draft parks and recreation master plan, set a goal for 5 acres of parkland per 1,000 individuals within neighborhoods. The existing parkland base of 345.5 acres represents total acreage for all community and neighborhood parks and the developed baseball complexes. If the acreage standard adopted by the City is applied to its total existing population, the resulting need is 303.9 acres, indicating that the City currently has excess parkland. Much of this land is concentrated in a few parts of the Cheyenne Urban Area, however, creating an undersupply in certain neighborhoods. South Cheyenne, for example, is 30.2 acres short of developed parkland.

Parks in the Cheyenne Urban Area provide recreation facilities for baseball, softball, soccer, tennis, basketball, volleyball and swimming. The city contains one 18-hole and one 9-hole golf course. In the absence of identified City standards, standards provided by the National Recreation and Parks Association and the Wyoming

Statewide Comprehensive Outdoor Recreation Plan indicate that Cheyenne is deficient by 14 tennis courts, 9 volleyball courts, 8 softball fields, and 3 baseball fields. School facilities are excluded from this estimate since they are not available on a consistent basis.

The Parks and Recreation Department is staffed by 36 full-time persons assigned to 4 main divisions: recreation, parks, golf, and swimming. The number of part-time personnel varies by season. During the summer of 1983, 144 part-time staff members were employed by the Department. Using current budget information, the full and part-time personnel figures were converted to a total equivalent of 83.5 full-time employees. Based on that figure, Cheyenne has a current ratio of 1.38 parks and recreation employees per 1,000 population.

2.1.11.2.2.2 Kimball, Nebraska

The City of Kimball operates and maintains two parks within its boundaries. A number of service organizations also provide recreational programming and facilities. They include Kimball School District No. 1, the Senior Citizens Center, the public library, and commercial recreation operations.

The City has 2 parks totaling 21 acres, which include 2 basketball courts, 1 tennis court, and a swimming pool. Seven part-time employees maintain and operate the City's parks and facilities. In addition, the City of Kimball and the County work cooperatively to operate and maintain the parks and recreation facility located southeast of Kimball on Highway 30. It contains four ballfields, two tennis courts, an archery and trap shooting range, and a nine-hole golf course. The facility is operated and maintained by two full-time and four part-time employees. Using the national standards provided by the National Recreation and Parks Association, Kimball has adequate parks and recreation facilities to accommodate its existing population.

2.1.12 Cultural and Paleontological Resources

Cultural and paleontological resources include four major elements: prehistoric cultural resources, historic cultural resources, American Indian resources, and paleontological resources. These divisions recognize inherent differences among the elements both in their physical manifestations and in the treatment and protection afforded to each under existing statutes, regulations, and guidelines.

This section defines the region within which measurable impacts to cultural and paleontological resources might occur as a consequence of project deployment. It also summarizes existing baseline information relative to the four resource elements and reviews the information sources and analytic methods used in developing baseline resource characterizations.

2.1.12.1 Region of Influence and Data Sources

2.1.12.1.1 Region of Influence

The Region of Influence for Cultural and Paleontological Resources encompasses Albany, Goshen, Laramie, and Platte counties, Wyoming; Banner, Kimball, and Scotts Bluff counties, Nebraska; and Larimer and Weld counties, Colorado (Figure 2.1.12-1). Delineation of this area is based on analysis of the kinds and locations of impacts anticipated as a consequence of project construction and operation. In addition to direct, localized, ground-disturbing effects occurring during project construction, which will be controlled by facilities siting decisions, the Region of Influence encompasses sufficient geographic space to ensure that potentially significant indirect, population-induced effects (e.g., altered land use and recreational patterns) are included within its boundaries. The identification of areas potentially subject to measurable population growth and related effects is based on allocations of project-induced population.

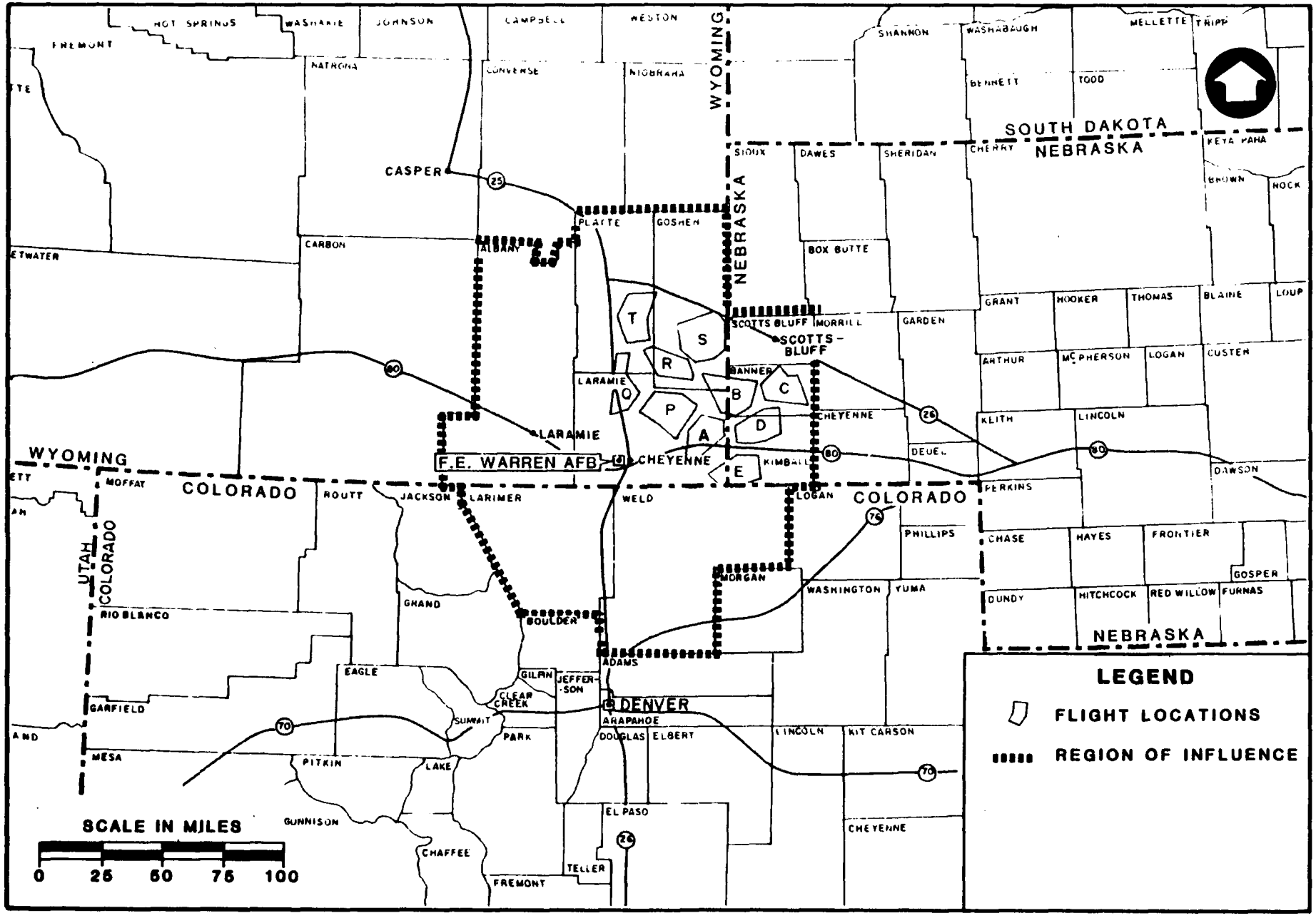
An Area of Concentrated Study requiring more detailed analyses of project impacts was recognized within the Region of Influence. The Area of Concentrated Study actually consists of a mosaic of relatively small, localized areas (e.g., the Launch Facilities, and Operating Base) and corridors (e.g., transportation and communications rights-of-way) where direct, project-related ground disturbances may take place (Figure 2.1.12-1). These areas are contained within Goshen, Laramie, and Platte counties, Wyoming; and Banner, Kimball, and Scotts Bluff counties, Nebraska. For a more detailed justification of Area of Concentrated Study, see Section 3.1.12.1.

2.1.12.1.2 Data Sources

Information important to the assessment of existing conditions, potential impacts, and future trends within the project Region of Influence and Area of Concentrated Study comes from a multitude of primary and secondary sources.

2.1.12.1.2.1 Secondary Data Sources

Over 1,000 individual documents were reviewed during the course of this study, including statewide inventories, histories, reports of explorations, newspaper clippings,



REGION OF INFLUENCE FOR CULTURAL AND PALEONTOLOGICAL RESOURCES

FIGURE NO. 2.1.12-1

ethnographies, scientific treatises, archaeological site reports, and similar documents requiring access to numerous libraries, archives, and repositories. A partial list of these facilities includes the Wyoming, Nebraska, and Colorado State Historic Preservation Offices; the Wyoming Division of Archives and History in Cheyenne; the Nebraska State Historical Society Archives in Lincoln; the Denver Public Library; the Coe Library at the University of Wyoming in Laramie; the University of Denver Library; the American Museum of Natural History in New York; the Peabody Museum at Harvard University; the U.S. National Museum in Washington D.C.; and the museums at the universities of Wyoming, Nebraska, and Colorado.

Perhaps the most important data sources among those listed above are the site inventory records and reports held by the State Historic Preservation Offices. Information contained within their files, which includes county-by-county listings and descriptions of virtually all known resources (particularly cultural properties), provides the basis for establishing current baseline characterizations and for assessing future trends in the resource with and without the project.

Interviews were conducted with knowledgeable professionals in both the academic and private sectors, amateur archaeologists and historians, and local landholders as a means of identifying possible resource localities not included in statewide inventories or other published sources. Contact also was made with several offices at F.E. Warren AFB, including the Civil Engineers' Office, Real Property Office, Base Historic Preservation Officer, Base Historian, and Base Museum, in order to collect information about the history of past military activity at this significant historical facility. Interviews with representatives of the Northern Cheyenne and Arapaho tribes were used to elicit contemporary cultural concerns potentially bearing upon the Region of Influence and its physical resources, particularly localities of present-day use. Several paleontologists having ongoing professional research interests in the Region of Influence were contacted to identify known and potential fossil localities in the area.

2.1.12.1.2.2 Primary Data Sources

Only a small fraction of the total area in the Region of Influence has been the focus of prior resource assessment, and systematic inventory programs were required in areas potentially subject to direct impact from project deployment. Pedestrian reconnaissance was used to identify and record previously unreported cultural sites at select locations on F.E. Warren AFB, around the immediate periphery of all proposed Launch Facilities, and along the Defense Access Roads that would be used to transport missiles between the Operating Base and their Launch Facilities. In addition, onsite inventory and evaluation of historic structures located within the F.E. Warren Historic District and National Historic Landmark were undertaken to assist in facilities planning. This effort included examination of exterior architectural characteristics for all standing structures within the Landmark/District, interior surveys of more than 30 structures, and evaluations of historic landscaping.

2.1.12.1.2.3 Analytic Methods

Analysis of information gained from literature research, personal interviews, and onsite reconnaissance inventory was undertaken to establish baseline existing conditions to a specifiable degree of accuracy and to identify those biases in

the record that could significantly affect later synthesis and interpretation. To a large degree, data processing and manipulation were similar for all constituent elements of the resource. All known sites and localities were first plotted onto standard topographic sheets to provide a common basis from which to assess resource dispersions. Records and reports pertaining to prehistoric cultural sites were reviewed to extract information about ages and types of sites, their geographic location, and surrounding environments. These data were keyed into a computer and the resultant data base used to develop summary accounts of existing conditions within the Region of Influence and to generate estimates for resources potentially subject to project effects.

Information currently available from statewide inventories and published accounts is vitally important to any understanding or appreciation of the region's cultural and paleontological record. At the same time, existing inventories are the cumulative result of over 50 years of prior research in this area and thereby incorporate significant historical bias in the level of detail reported for any particular locality. In addition, each state has a unique, highly variable recording system. For the overwhelming majority of recorded sites, however, relatively consistent data are available specifying geographic location and site type. The last category typically consists of a general descriptive term denoting resource context (e.g., rockshelter), structure (e.g., tipi ring), content (e.g., lithic scatter), or function (e.g., kill site).

Information contained within the existing documentary record not only permits qualitative judgments about the level of potential project-induced impacts but also provides the context for drawing conclusions about the significance of such effects and the appropriate mitigation measures for reducing or eliminating them.

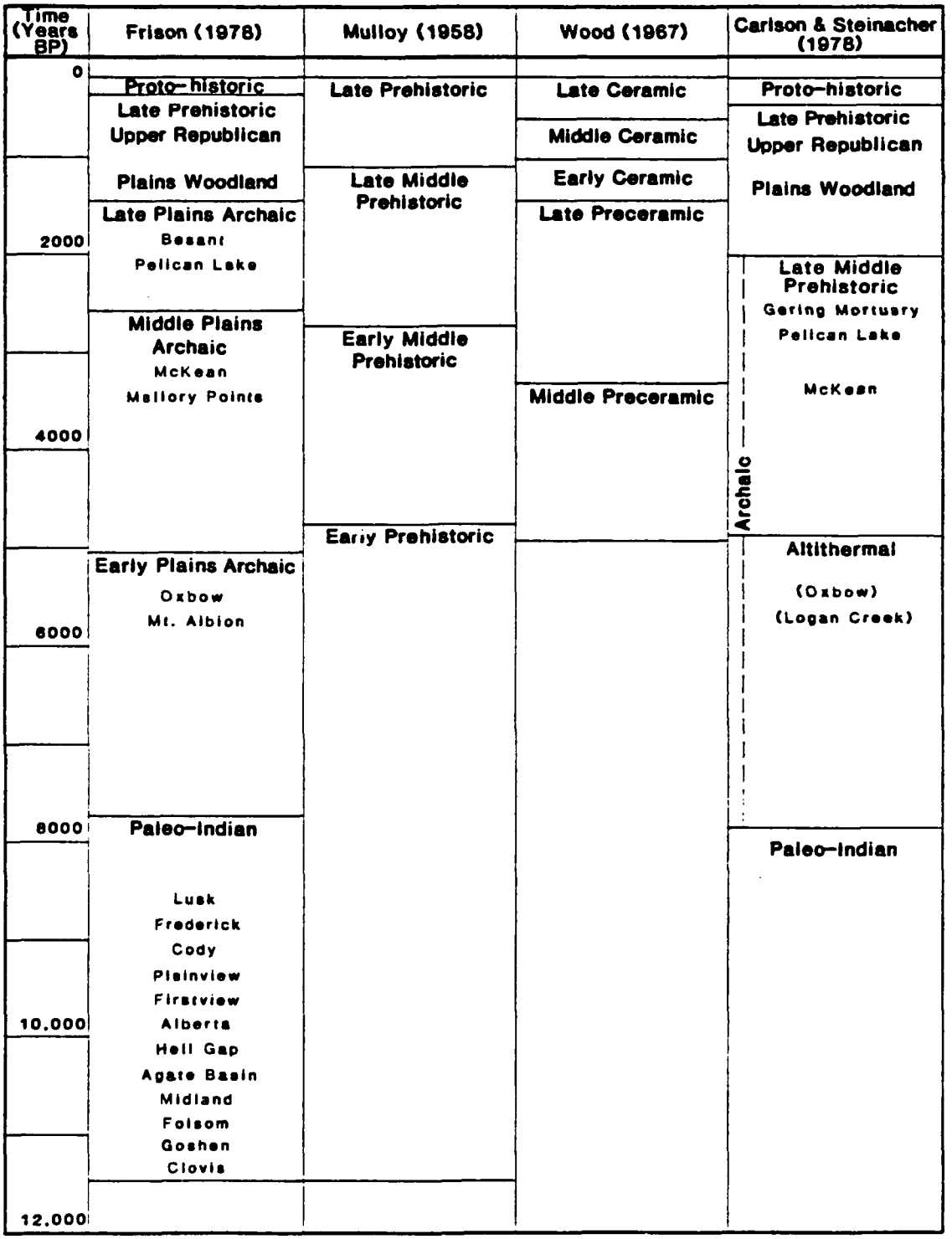
2.1.12.2 Existing Conditions

2.1.12.2.1 Prehistoric Cultural Resources

2.1.12.2.1.1 Summary of Known Resources

Previous archaeological research in the Region of Influence demonstrates that the cultural inventory of the region spans approximately 11,000 years of human occupation, ranging from the Paleo-Indian through the Protohistoric Periods (Figure 2.1.12-2). Included in the inventory of sites are several well-known, unique localities that have considerable importance to the archaeology of North America: the Hell Gap site in Wyoming, Signal Butte in Nebraska, and Lindenmeier site in Colorado. For example, the Dent site, also located in Colorado, provided the first concrete evidence establishing the contemporaneity of man and mammoth in the New World.

A review of inventories maintained by the Colorado, Nebraska, and Wyoming State Historic Preservation Offices determined that approximately 1,500 prehistoric archaeological sites and hundreds of additional isolated artifacts have been recorded within the Region of Influence. Table 2.1.12-1 provides a summary account of the number of recorded sites and their current status in terms of eligibility to the National Register of Historic Places (the Register) for each of the nine counties included in the Region of Influence. An examination of data in this enumeration points up the high degree of variability among the counties. It is



PROPOSED PREHISTORIC CULTURAL CHRONOLOGIES FOR THE REGION OF INFLUENCE

(10-3)

FIGURE NO. 2.1.12-2

likely, however, that the observed intercounty differences reflect variability in the extent of prior inventory work in these same areas rather than the actual densities of prehistoric sites.

The known resource inventory includes a wide variety of site "types" that may reflect potentially significant differences in the kinds of cultural activities that took place during their occupation/use. These include open camps, stone circles and alignments, lithic and ceramic scatters, rockshelters, cairns, burials, quarries, kill sites, and pictographs/ petroglyphs. A tabulation of relative frequencies among the various recognized site categories (Table 2.1.12-2) exhibits remarkable consistency from county to county, suggesting that the observed frequency distribution may be a relatively accurate reflection of the underlying cultural record.

Of the nearly 1,500 prehistoric sites currently recorded in the Region of Influence, only 5 are listed on the National Register of Historic Places, and an additional 35 have been formally determined to be eligible for listing on the National Register of Historic Places. Although 56 sites have been officially designated as "not eligible" for the Register, the overwhelming majority of sites have not been evaluated in terms of National Register of Historic Places criteria.

Finally, a recent resource inventory undertaken in support of facilities siting efforts at F.E. Warren AFB has identified eight previously unrecorded prehistoric sites. All of these resources could be classified as "lithic scatters", in terms of the categories presented above, and probably represent remains of short-term occupation/use of each locality at various times in the past. A systematic program of surface collection and limited-scale subsurface testing currently is being conducted at each site to establish the age and functional content of the cultural assemblages prior to making a determination of potential National Register of Historic Places eligibility and of the need for follow-on management consideration. Similar studies have been initiated in other areas potentially subject to direct project-induced impacts, but this work has not progressed to the point that accurate statements can be made about either the number or nature of prehistoric resources that might require further evaluation. As information becomes available, however, about the number and significance of sites in the Area of Concentrated Study, it will be incorporated into this assessment and used to refine impact projections and recommended mitigations.

2.1.12.2.1.2 Summary of Expected Resources

Based on the existing prehistoric inventory for the Region of Influence, it is expected that the relative frequencies of site types for as yet unknown archaeological resources will be similar to that noted for known sites and that such resources will occur in considerable abundance throughout the Region of Influence. In addition, isolated artifacts such as single projectile points or lithic waste flakes should be encountered frequently during any systematic survey program. Importantly, sites representing all recognized temporal divisions of the cultural record can be expected to occur.

The potential exists for finding prehistoric cultural remains throughout the Region of Influence. Nevertheless, the relative density of sites is not uniform in this area. The greatest densities can be expected to occur along watercourses and

Table 2.1.12-1

RECORDED PREHISTORIC SITES IN THE REGION OF INFLUENCE

	Location	Number of Sites	Status[1]				Comments
			R	E	D	N	
Wyoming	Albany Co.	108	-	6	-	9	
	Goshen Co.	52	-	10	-	11	Spanish Diggings; Hell Gap
	Laramie Co.	89	-	7	-	14	Seven Mile Point
	Platte Co.	142	-	9	-	18	Bowman Effigies
Nebraska	Banner Co.	19	-	-	-	-	
	Kimball Co.	31	-	-	-	-	
	Scotts Bluff Co.	17	1	-	-	-	Gering Burial; Scotts Bluff Bison Quarry; Signal Butte; Bisterfeldt site
Colorado	Larimer Co.	529	1	2	-	-	Lindenmeier; Lykins Valley Site, Spring Gulch; Johnson site
	Weld Co.	423	3	1	4	4	Dent site; Powars site; Keota District; Wilbur-Thomas

Note: 1 R = On Register; E = Eligible; D = In District; N = Not Eligible

Table 2.1.12-2

FREQUENCY OF RECORDED SITE TYPES IN THE REGION OF INFLUENCE

	Wyoming								Nebraska						Colorado					
	Albany		Goshen		Laramie		Platte		Banner		Kimball		Scotts Bluff		Larimer		Weld		Totals	
Site Type	#	%	#	%	#	%	#	%	#	%	#	%	#	%	#	%	#	%	#	%
Campsite	13	12	9	19	11	12	40	28	4	44	0	-	1	14	146	33	152	37	376	30
Tipi Ring	9	9	5	10	13	14	4	3	0	-	0	-	0	-	40	9	68	16	139	11
Tipi Complex	10	10	4	8	10	11	20	14	0	-	0	-	0	-	3	1	4	1	51	4
Lithic Scatter	38	36	12	25	23	24	46	33	0	-	0	-	0	-	213	48	129	31	461	36
Ceramic Scatter	0	-	0	-	18	19	1	<1	0	-	0	-	1	14	1	<1	5	1	26	2
Cer. + Lithics	1	1	1	2	0	-	0	-	1	11	0	-	0	-	8	2	7	2	18	1
Rock Shelter	4	4	0	-	3	3	7	5	0	-	0	-	3	43	16	4	12	3	45	4
FCR	15	14	4	8	8	8	1	<1	0	-	2	40	1	14	0	-	0	-	31	2
Quarry	5	5	5	10	6	6	13	9	1	11	1	20	0	-	3	<1	20	5	54	4
Kill Site	4	4	0	-	1	1	2	1	0	-	0	-	0	-	2	<1	3	<1	12	1
Burial	3	3	7	15	1	1	3	2	0	-	2	40	0	-	7	2	3	<1	26	2
Rock Alignment	1	1	1	2	0	-	0	-	3	33	0	-	0	-	2	<1	10	2	17	1
Cairn	1	1	0	-	1	1	4	3	0	-	0	-	0	-	0	-	1	<1	7	1
Rock Art	1	1	0	-	0	-	0	-	0	-	0	-	1	14	3	<1	1	<1	6	<1
Other	0	-	0	-	0	-	0	-	0	-	0	-	0	-	1	<1	1	<1	2	<1
TOTALS:	105	101	48	99	95	100	141	98	9	99	5	100	7	99	445	98	416	98	1,271	99

adjacent terraces as well as in areas of relative topographic and habitat diversity (e.g., bluff tops, breaks, badlands, and foothills). Site densities in dry, shortgrass uplands may be as low as one to two sites per square mile, while in other areas, such as adjacent to major stream courses or springs, densities can be expected to be considerably higher. A recent survey in the western portions of Laramie County by Blatchley and Welty (1980) found densities of approximately nine sites per square mile. Studies by Reher (1971, 1982), however, suggest that densities in some parts of the study areas may range as high as 20 to 30 sites per square mile.

2.1.12.2.2 Historic Cultural Resources

2.1.12.2.2.1 Summary of Known Resources

Previous historic research in the Region of Influence includes archaeological reconnaissance and excavations (e.g., Todd, Walker, and Zeimens 1977; Reiss 1979; Blatchley and Welty 1980; Rosenberg and Greer 1981), architectural inventories, and architectural and historic overviews (e.g., Jewell 1968, O'Neal 1981, Rosenberg 1983). Although these studies are by no means comprehensive, data collected thus far provide a fairly broad-based understanding of the types of historic resources that occur in the Region of Influence.

Cultural resource inventories maintained by the Wyoming, Nebraska, and Colorado State Historic Preservation Offices list over 1,100 historic sites within the Region of Influence (Table 2.1.12-3). Sixty-eight of these are listed on the National Register of Historic Places and an additional 136 have been determined officially eligible for listing on the Register. Seven sites have been declared officially "not eligible."

Known historic resources within the Region of Influence represent several themes pertinent to the history of the area, including mining (e.g., Gold Dust Mine in Albany County, Raw Hide Buttes Mining Area in Laramie County, Chicago Mine in Platte County) and transportation (e.g., the Overland, Oregon and Mormon trails, Denver to Fort Laramie Road). Evidence of early exploration and settlement of the region appears as campsites, rock signatures, and graves found along historic trails and numerous abandoned homesteads and farmstead sites. The railroad era is represented by abandoned railroad beds and trestles and by standing structures such as the Colorado and Southern Railroad Depot in Larimer County and the Union Pacific Railroad Depot in Cheyenne. Other developments in the history of the Region of Influence are represented by the Horse Creek Treaty Grounds in Scotts Bluff County, the Bay State Cattle Company in Laramie County, and the Larimer and Weld Canal.

Many of the architectural resources currently recorded for Cheyenne date from the city's late Victorian era and are included in the Downtown Cheyenne Historic District. A major portion of F.E. Warren AFB has considerable architectural significance due to its structures dating from the mid-1880s to World War II and has been accorded status as a National Register Historic District and a National Historic Landmark. Several other Historic Districts, which include multiple standing structures, also occur in the Region of Influence (e.g., the Laurel School and Old Town Historic Districts in Fort Collins and the 5th Street Neighborhood Area in Greeley).

Table 2.1.12-3

RECORDED HISTORIC SITES IN THE REGION OF INFLUENCE

	Location	Number of Sites	Status[1]				Comments
			R	E	D	N	
Wyoming	Albany Co.	213	11	27	-	8	Overland Trail; Natural Fort; Gold Dust Mine; Lodge Pole Creek Trail
	Goshen Co.	137	5	12	-	6	Cheyenne-Ft. Laramie Rd.; Oregon Trail; Rawhide Buttes Mining Area; Mormon Trail
	Laramie Co.	260	21	9	1	1	Denver-Ft. Laramie Rd.; Lodge Pole Creek Tr; Bay State Cattle Co.; Texas Trail; Cheyenne; F.E. Warren Historic District
	Platte Co.	87	1	23	-	-	Oregon Trail; Chicago Mine; Mormon Mail Station
Nebraska	Banner Co.	47	-	-	-	-	Historic house
	Kimball Co.	36	-	-	-	-	
	Scotts Bluff Co.	39	1	-	-	-	Fort Mitchell; Horse Creek Treaty Grounds; Robidoux Trading Post; Brown site
Colorado	Larimer Co.	156	23	9	-	2	Larimer & Weld Canal; Overland Tr.; Colorado and Southern RR Depot; Rocky Mountain Nat'l Park Historic District
	Weld Co.	176	6	56	6	-	Larimer & Weld Canal; Ft. Vasquez; Overland, Dodge, Cherokee Trails; Greeley

Note: 1 R = On Register; E = Eligible; D = In District; N = Not Eligible.

Source: Wyoming, Nebraska, and Colorado State Historic Preservation Offices.

2.1.12.2.2.2 Summary of Expected Resources

Based on results of archival and field research, the following types of resources are expected to occur in the Region of Influence:

- o Scattered remains of temporary camps associated with fur-trading activities;
- o Remnants of military-related activities, such as trails, camps, and skirmish sites;
- o Railroad-related sites, including construction camps, abandoned roadbeds, and trestles;
- o Overland emigrant trails and their associated telegraph, freight, and mail lines and camps;
- o Homesteads and farmsteads consisting of one or more of the following components:
  - Multiple foundations;
  - Outbuildings;
  - Hand-dug wells or enlarged springs;
  - Trash concentrations; and
  - Privies or cisterns.
- o Extant buildings, including schools, churches, commercial and military structures, and residences.

2.1.12.2.3 American Indian Cultural Resources

2.1.12.2.3.1 Summary of Known Resources

Several American Indian groups are believed or known to have occupied, used, or passed through the general area that includes the Region of Influence during the Protohistoric and Historic Periods. These groups include the Shoshone, Comanche, Crow, Plains Apache, Kiowa, Arapaho, and Teton Sioux. To date, however, researchers have been unable to assign physical cultural remains occurring within the Region of Influence unequivocally to specific tribal groups, and the tribes themselves have not identified any localities of concern to contemporary practice of traditional lifeways.

Interviews with the Northern Cheyenne indicate that they visit a medicine wheel located on Medicine Mountain in Big Horn County, Wyoming, and although they do not know the origin of this site, they recognize it as a spiritual place. None of the Northern Cheyenne or Arapaho informants were aware of any tribal members presently collecting plants or pigments from the Region of Influence nor were they aware of any burials or holy places within the area.

2.1.12.2.3.2 Summary of Expected Resources

American Indian resources that may be encountered in the Region of Influence

would include cultural phenomena such as stone circles and tribal burial locations. Natural and biological resources could include minerals and plants important in medicines and ceremonies. Nevertheless, the likelihood of encountering such resource localities is quite low.

2.1.12.2.4 Paleontological Resources

2.1.12.2.4.1 Summary of Known Resources

Quaternary, Tertiary, and Cretaceous geologic units are the most fossiliferous in the Region of Influence and have the widest areal distribution (Table 2.1.12-4). Older geologic units locally contain fossiliferous zones but have limited areal extent within the Region of Influence. Most exposures of pre-Tertiary units are found flanking the Laramie Mountains and Colorado Front Range.

Alluvial sediments are the source for most Quaternary mammalian fauna found in the Region of Influence. The majority of data relating to Quaternary fauna are concentrated in Late Pleistocene and Holocene sediments. Late Pleistocene bison, horse, and camel are fairly common throughout Wyoming, but there are no known localities containing ground sloths, mastodons, dire wolves, [illegible]r-toothed cats, although they have been found in neighboring states (Anderson 1974). In addition, mammoths, martins, wolverines, pikas, and lemmings inhabited the Region of Influence during this same period. Currently, no clear evidence has been found in Wyoming for pre-Wisconsinan or Wisconsinan bison species (Wilson 1974).

The dominant fossil-producing Tertiary geologic units include the Ogallala (Miocene/Pliocene), Arikaree (Miocene), White River (Oligocene), and the Wind River (Eocene). Tertiary geologic units crop out over the majority of the Region of Influence. In general, the White River Formation is considered highly productive while the Arikaree and Ogallala formations are considered low and moderate in productivity, respectively. The overall faunal assemblages are similar for each formation at the higher taxonomic levels; however, they differ considerably at the species level.

The spatial distribution of fossils within the Ogallala is quite different from the Arikaree and White River. The Ogallala Formation is largely composed of sands and gravels deposited in a braided stream environment. Concentrated pockets of fossils, often with broad faunal assemblages, are found in point bar deposits of paleochannels in the Ogallala Formation. Currently, it is not possible to predict the spatial distribution of point bar deposits, and areas between them are relatively nonfossiliferous.

Fossils are ubiquitous to the White River Formation and the fauna is highly varied. Geologic processes causing the deposition of the White River Formation were of much lower energy than those forming the Ogallala Formation. Consequently, the potential for fossil preservation is much greater in silts and sands common to the White River Formation than in the coarser deposits of the Ogallala.

Faunal assemblages in the Arikaree Formation are well known although they are not as abundant or varied as those of the Ogallala and White River formations. There is a lack of good Arikaree exposures within the Region of Influence. The

Table 2.1.12-4

REPORTED PALEONTOLOGICAL LOCALITIES BY COUNTY AND GEOLOGIC UNIT[1]

Formation	Wyoming				Nebraska			Colorado		Total	
	Albany	Platte	Goshen	Laramie	Scotts Bluff	Banner	Kimball	Weld	Larimer	#	%
Recent	-	1(1)	-	-	-	-	-	-	-	2	1
Quaternary	-	-	4(1)	-	2	1	-	1	3	12	6
Pliocene	-	-	-	1	-	-	-	-	-	1	<1
Ogallala	-	1	-	6	-	17	3	8(1)	-	46	21
Arikaree	-	18	33	-	2	5	-	(1)	-	59	26
White River	6	5	15(1)	-	3	1	-	23	-	54	24
Lance/Laramie	-	-	-	-	-	-	-	3	-	3	1
Wagon Bed	2	-	1	1	-	-	-	-	-	2	1
Wind River	2	-	-	-	-	-	-	-	-	2	1
Pierre Shale	-	-	-	-	-	-	-	-	1	1	<1
Morrison	3(15)	-	-	-	-	-	-	-	-	18	8
Unknown	7	2	1	2	10+	-	-	-	1	23+	10+
TOTAL:	35	28	55	9	17+	24	3	47	5	223	
Percent of Total	16	13	25	4	8	11	1	18	2	99	

Note: 1 Numbers in parentheses indicate localities with questionable formation assignments.

depositional environment of the Arikaree Formation is similar to the White River Formation, so the potential is great for the Arikaree to be at least a moderately productive unit. Exposures in Sioux County, Nebraska are highly productive.

The Wind River Formation crops out in Albany County. Faunal assemblages are varied and the overall productivity is considered moderate. The Wind River represents the southernmost extent of early Eocene sediments within the Region of Influence.

The dominant Mesozoic geologic units include the Laramie (Upper Cretaceous) and Morrison (Lower Cretaceous-Upper Jurassic). Extensive exposures of the Laramie Formation are found in Weld County. Recent investigations in Weld County have found rare, but productive localities that increase the paleontological importance of this unit. Recorded localities in the Morrison Formation in Albany County have provided significant fauna. Mammalian assemblages are the most taxonomically diverse known from Mesozoic sediments.

Each of the geologic units in Table 2.1.12-4 has been evaluated with respect to its paleontological productivity. A ranking of high, moderate, or low was assigned to each geologic unit based on the importance of the fossil content and the amount of surface exposure within the Region of Influence. As seen in the Table 2.1.12-5, ratings for a particular unit can vary from county to county due to differences in exposure, although Quaternary and Tertiary strata in Nebraska and adjoining areas of Wyoming in general are moderately productive.

2.1.12.2.4.2 Summary Of Expected Resources

Based on the review of literature and locality records, it can be expected that additional paleontological localities will be found within the Region of Influence. Localities in the Ogallala, Arikaree, or White River formations *could contain* representatives of all major vertebrate orders. In general, fossils will most likely be exposed in areas with a component of natural or man-made topographic relief: bluffs, escarpments, arroyos, and any heavily dissected terrain. Fossil resources are likely to be localized in the Ogallala Formation due to the correlation between Tertiary-age point bar deposits and paleontological localities. Because of the productive nature of the White River Formation, nearly any exposure, natural or man-made, is likely to contain fossils.

Table 2.1.12-5

PALEONTOLOGIC SENSITIVITY RANKINGS[1]

	WYOMING				NEBRASKA			COLORADO	
GEOLOGIC UNIT	Albany	Platte	Goshen	Laramie	Scotts Bluff	Banner	Kimball	Weld	Larimer
Quaternary	L	L	L	L	L	L	L	L	L
Ogallala	---	---	---	M	---	M	M	M	L
Arikaree	L	L	M	L	L	L	---	L	---
White River	L	M	L/M	L/M	L/M	---	---	L/M	L/M
Wind River	L/M	---	---	---	---	---	---	---	---
Laramie	---	---	---	---	---	---	---	M	---
Morrison	M	L	---	L	---	---	---	---	L

Note: 1 Key To Sensitivity Rankings: L - very low to low sensitivity; M - moderate sensitivity; H - high sensitivity.

2.1.13 Visual Resources

An assessment was conducted to identify, map, and evaluate the scenic resources and visual quality of the region.

2.1.13.1 Region of Influence and Data Sources

2.1.13.1.1 Region of Influence

The Region of Influence for Visual Resources coincides with that for rural land use (Figure 2.1.10-1). These six counties contain the Deployment Areas, F.E. Warren AFB, and those urban communities in which the majority of population influx will occur. The Area of Concentrated Study is synonymous with the Region of Influence because direct impacts will be concentrated at F.E. Warren AFB and the Deployment Areas. For further clarification refer to Section 3.1.13.1.

2.1.13.1.2 Data Sources and Analytic Methods

2.1.13.1.2.1 Data Sources

Primary data for the Visual Resources assessment were derived from field surveys conducted from major transportation routes and interconnecting state and county roads throughout the six-county Region of Influence.

Literature sources for the Visual Resources analysis included publications developed by the U.S. Bureau of Land Management (BLM), the U.S. Forest Service, and private corporations and consultants in support of visual analysis systems for both open rangeland and forestland.

2.1.13.1.2.2 Analytic Methods

To assess the scenic resources and quality of the visual environment within the Region of Influence, a modified version of the BLM Visual Resource Management Program was used.

The Visual Resource Management system is an analytical process that identifies and sets objectives for the maintenance of scenic value and visual quality. The system is based on research that has established ways to assess the aesthetic qualities of a landscape in objective terms. The Visual Resource Management system evaluates three major components which include inventory/evaluation, visual resource management classification, and contrast rating.

The inventory/evaluation process consists of scenic quality assessment, use volume determination, and designation of viewing distance zones. Scenic quality assessment assigns a point system that rates the importance of specific landscape components, calculates values, and determines an overall scenic quality class rating for various landscape segments. This step identifies areas that warrant protection and opportunities for improvement.

Use volume examines the frequency of travel along major transportation routes and visitor-days at recreational areas, and assigns a high, medium, or low rating. Viewing distance zones are field-determined.

Visual Resource Management class designations are derived from an overlay process that combines the scenic quality, use volume, and viewing distance zones inventory/evaluation results to identify areas with a similar combination of factors. These management classifications serve as an overall index to visual resource values and describe guidelines for acceptable levels of modification to the basic elements of the landscape. The classifications range from unique areas, such as wilderness or wild and scenic rivers where few man-induced activities are acceptable (Class I), to areas where the natural character of the landscape has been disturbed to the point where rehabilitation is necessary (Class V).

2.1.13.2 Existing Conditions

2.1.13.2.1 Project Area Description

2.1.13.2.1.1 Natural Features

The landscape of the region is widely varied. The majority of the area consists of treeless, semiarid lands of relatively flat to gently or moderately rolling terrain. In most of Laramie and Kimball counties, the landform is generally flat to gently rolling, with agriculture serving as the primary land use. The landscape of Goshen County consists of low rolling hills intermixed with steep buttes and mesas in the south and highly dissected, strongly rolling mountains in portions of the north.

Along the extreme western edge of Laramie and Platte counties, the foothills of the Laramie Mountain Range rise to the highest elevations within the Region of Influence. They are exemplified by rugged, strongly dissected sloping mountains containing a variety of landforms. Vegetation varies from crop and rangeland species throughout most of the region to aspen and pine forest in the higher elevations. In the northeastern edge of the Region of Influence, Scotts Bluff and Banner counties, prominent rock outcrops and cliffs of high vertical relief rise to the south of the broad agricultural valley of the North Platte River.

2.1.13.2.1.2 Man-Made Features

Ranching activities throughout the Region of Influence have given the landscape an overall pastoral setting. The use of the landscape varies but is primarily devoted to agricultural land uses, including irrigated and dry-farmed cropland and open rangeland.

Larger residential communities within the Region of Influence include Cheyenne, Wheatland, and Torrington in Wyoming, and Scottsbluff, Gering, and Kimball in Nebraska. F.E. Warren AFB, located directly west of Cheyenne, has grown from an historic fort to a strategic base with all of the requisite support facilities.

Industrial activity within Laramie and Platte counties has created intrusions which reduce the visual quality of the immediate surrounding area. Visual intrusions are defined as man-caused alterations that introduce discontinuity. Within Cheyenne, the Husky Oil Refinery changes the southeast section of town into an industrial setting which transcends the residential character of the landscape. In central Platte County, the Laramie River Station of the Missouri Basin Power Project dominates the local landscape.

2.1.13.2.2 Visual Resource Management System

2.1.13.2.2.1 Scenic Quality Inventory/Evaluation

Scenic quality is the overall impression retained after driving or walking through or flying over an area of land. The Region of Influence was divided into separate landscape segments which were evaluated for landform, vegetative, and water variety. Each area was then rated by the factors of landform, vegetation, water, color, influence of adjacent scenery, scarcity, and cultural modification. A standardized point system assigned importance to each factor. The values for each category were totaled and, according to points, three scenic quality class designations were derived. Scenic quality classes according to the BLM are Class A, which combines the most outstanding characteristics of each rating feature; Class B, which combines some outstanding features and some that are fairly common to the physiographic region; and Class C, which contains features fairly common to the region.

All three scenic quality classifications are found within the Region of Influence. Most of the land in the southern half of the Region of Influence falls within a Scenic Class C designation. The northern and extreme western portions combine all three classifications. Most of Scotts Bluff County and the northern half of Banner County are Scenic Class B. Scotts Bluff National Monument, located directly south of the city of Scottsbluff, is Scenic Class A. In the western portion of the Region of Influence, where the foothills of the Laramie Mountains rise from the high plains, all three classifications occur.

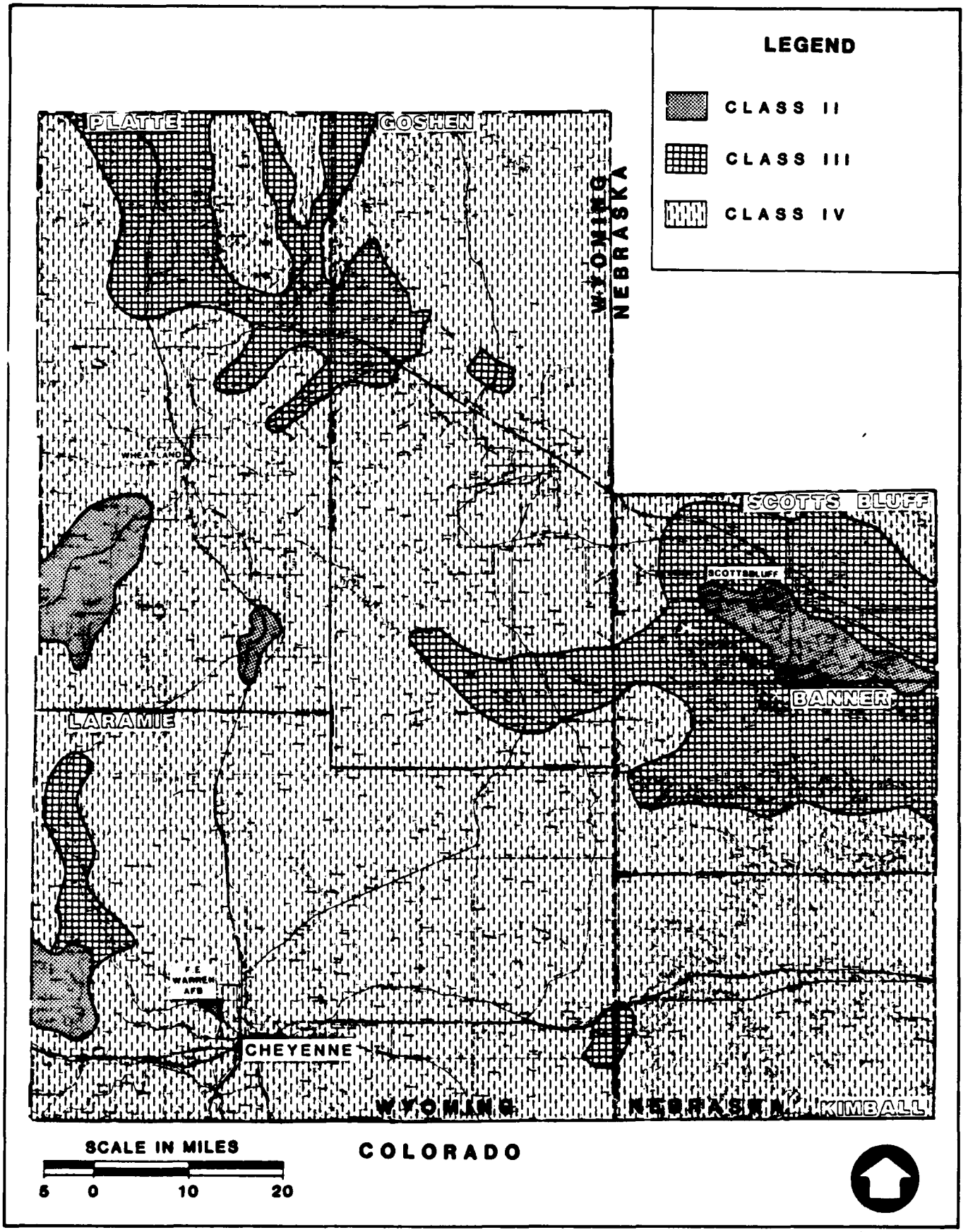
2.1.13.2.2.2 Visual Resource Management Classification

Visual Resource Management class designations are derived by combining scenic quality and use volume overlays with distance zone inventory information. This process produces a map which outlines areas with a similar combination of inventory/evaluation elements. By using the Visual Resource Management Class Matrix reproduced in this paragraph (Figure 2.1.13-1), class designations are determined.

	USE VOLUME						
	high			medium			low
special areas	I	I	I	I	I	I	I
SCENIC QUALITY A	II	II	II	II	II	II	II
SCENIC QUALITY B	II	III	III/IV	III	IV	IV	IV
SCENIC QUALITY C	III	IV	IV	IV	IV	IV	IV
DISTANCE ZONES	fg-mg	bg	ss	fg-mg	bg	ss	ss

FIGURE NO. 2.1.13-1

As an example, areas deemed Scenic Quality Class A, or Scenic Quality Class B areas combined with high use volume and foreground/middleground distance zones, result in a Visual Resource Management Class II designation. Three management classes occur within the Region of Influence - Visual Resource Management Classes II, III, and IV. These are shown in Figure 2.1.13-2.



VISUAL RESOURCE MANAGEMENT CLASSES

(13-24)

FIGURE NO. 2.1.13-2

2.2 Natural Resources

2.2.1 Water Resources

Water resources consist of groundwater and surface water. This analysis considers man's use of those resources, and man's control of that use as it affects water quantity and quality. The analysis is divided into four elements. The water use and demand element addresses municipal, industrial, commercial, and agricultural water use and water supply sources. The constraints on water use element addresses water rights, other controls on water use, and laws and regulations that protect water quality. The surface water hydrology and quality element addresses streams, lakes, and reservoirs and their flow characteristics and water quality conditions. The groundwater hydrology and quality element addresses aquifers, recharge to and discharge from them, and water quality conditions in the aquifers.

2.2.1.1 Region of Influence and Data Sources

2.2.1.1.1 Region of Influence

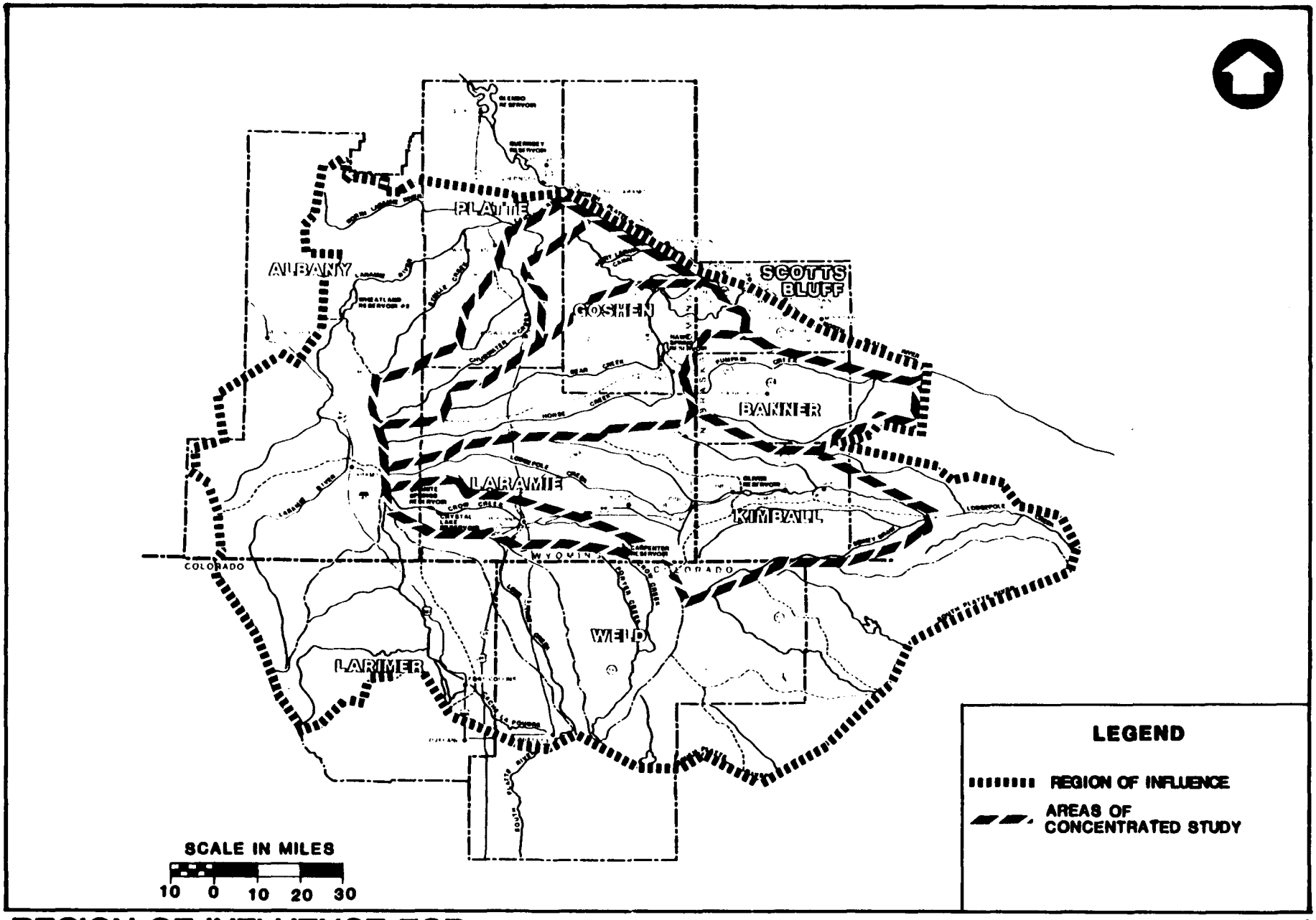
The Region of Influence for Water Resources includes the watersheds of all tributaries on the south side of the North Platte River from the confluence of the Laramie River to the confluence of Pumpkin Creek, and all tributaries of the South Platte River north of this river from the Greeley area to the confluence of Lodgepole Creek. The Region of Influence is shown in Figure 2.2.1-1.

The Region of Influence includes all locations where additional water will have to be provided to serve the direct and indirect project-induced population or land use changes arising from project construction. Watershed boundaries were superimposed over direct project sites and the Employment Damand Region of Influence to form the outermost Water Resources Region of Influence.

The Water Resources analysis was conducted in several Areas of Concentrated Study within the overall Water Resources Region of Influence. The Area of Concentrated Study includes all locations where potentially significant impacts could occur and includes areas around Launch Facilities, Launch Control Facilities, cables, and Defense Access Roads in the Deployment Area and in municipalities where induced population is allocated by the Socioeconomics model. For a more detailed justification of the Area of Concentrated Study, see Section 3.2.1.1.

The Area of Concentrated Study for water demand and water use includes the Crow Creek watershed upstream of Carpenter, Wyoming, and portions of Banner, Kimball, and Scotts Bluff counties, Nebraska, and Laramie, Platte, and Goshen counties, Wyoming.

The Area of Concentrated Study for constraints on water use includes Nebraska and Wyoming requirements and constraints relative to water use and water quality that apply in the Region of Influence.



REGION OF INFLUENCE FOR WATER RESOURCES

(04-24)

FIGURE NO. 2.2.1-1

The Area of Concentrated Study for surface water hydrology and quality includes the Crow Creek watershed upstream of Carpenter and the Lodgepole, Horse, Pumpkin, and Chugwater Creek watersheds.

The Area of Concentrated Study for groundwater hydrology and quality includes the Crow Creek watershed area upstream of Carpenter and areas in the vicinity of municipal wells and wells, if any, developed for project construction.

2.2.1.1.2 Data Sources and Analytic Methods for Existing Conditions

2.2.1.1.2.1 Data Sources

Data sources for the Water Resource analysis included literature, group and agency contacts, and primary data collection. Several meetings were held in the Region of Influence to collect data or review proposed analytical methodologies. These included meetings with staff of the Wyoming State Engineer's Office, Wyoming Department of Environmental Quality, Wyoming Water Development Commission, Nebraska Department of Water Resources, Nebraska Department of Health, Nebraska Department of Environmental Control, U.S. Geological Survey (USGS), Environmental Protection Agency (EPA), U.S. Forest Service, Soil Conservation Service (SCS), U.S. Department of Agriculture, Cheyenne Board of Public Utilities, and municipal officials. These agencies supplied literature and data to describe existing conditions and future trends in the Areas of Concentrated Study. The public scoping process provided additional opportunities to comment on data base availability and applicability of proposed analysis methodologies.

A separate water acquisition program for the project is being developed in conjunction with the Nebraska Department of Water Resources, Wyoming State Engineer's Office, and Cheyenne Board of Public Utilities that describes methods and procedures to acquire water for project construction and operation (Ertec 1983). Data collected as part of that analysis were used for the Water Resources analysis.

Primary data were collected in the Crow Creek watershed Area of Concentrated Study to evaluate water supply capability, stormwater effects, and the Cheyenne Board of Public Utilities raw water delivery system operation.

2.2.1.1.2.2 Analytic Methods for Existing Conditions

Existing water use patterns and the capability of water supply sources were summarized based on existing data and water development plans and programs. Unit water demand factors (i.e., gallons per capita per day-gpcd) were calculated. The existing water supply potential of the Crow Creek watershed Area of Concentrated Study was calculated based on precipitation/runoff relationships.

Existing legal restrictions related to water quality and the process for obtaining water rights were reviewed and summarized for Wyoming and Nebraska.

Existing surface water flow and quality records, and the impact of existing wastewater discharge were summarized for the Area of Concentrated Study based on literature sources. Existing flood potential was calculated for the Crow Creek Area of Concentrated Study using SCS and EPA methods (SCS 1975; EPA 1982), and checked against methods used in the area (Lowham 1976). Drainage areas of the various Area of Concentrated Study watersheds were calculated and a gross assessment of existing erosion and sedimentation potential from current land uses was made assuming typical erosion rates (Fly et al. 1982).

Existing groundwater flow patterns, regional aquifer characteristics, and water quality data were summarized for the Crow Creek watershed Area of Concentrated Study (Crist 1980) and other Areas of Concentrated Study based on literature sources.

2.2.1.2 Existing Conditions

This section describes the water resources of the areas potentially affected by the proposed project.

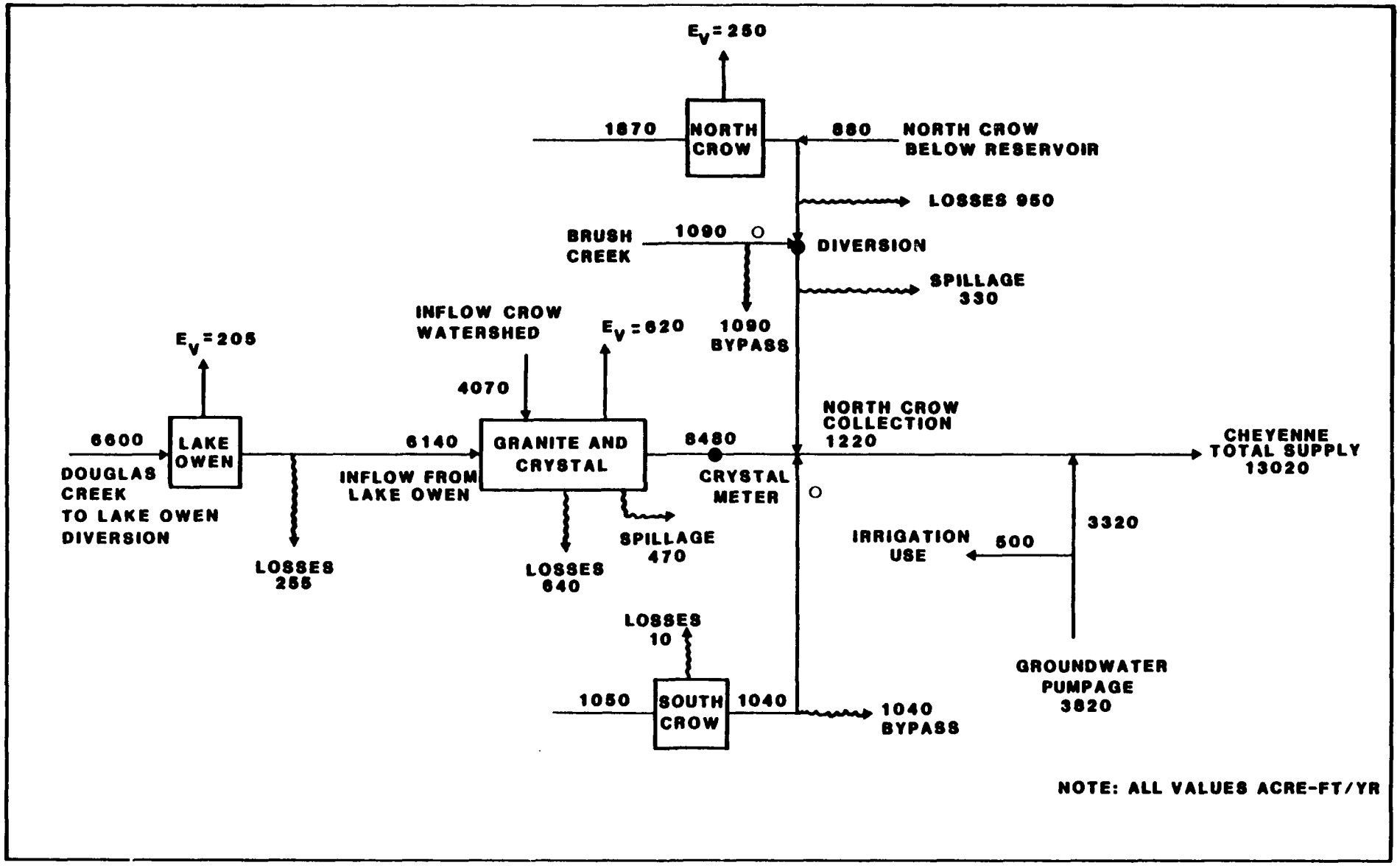
2.2.1.2.1 Water Demand and Water Use

2.2.1.2.1.1 Crow Creek Watershed

Current water use in the Crow Creek watershed Area of Concentrated Study is estimated at about 32,000 acre feet per year (acre-ft/yr) with about one-half used for agricultural purposes. Water use in the Cheyenne Urban Area (Cheyenne Division of the Census plus F.E. Warren AFB) is about 14,000 acre-ft/yr, with about 93 percent supplied by the Cheyenne Board of Public Utilities. Nonindustrial municipal use in the Cheyenne Board of Public Utilities service area averaged 180 gpcd in 1980. Municipally supplied industrial water use was 2,200 acre-ft in 1980. F.E. Warren AFB was supplied 1,070 acre-ft by the Cheyenne Board of Public Utilities in 1980.

Water supply availability to the Cheyenne Board of Public Utilities includes Crow Creek drainage, municipal well fields, and imports to the area from Douglas Creek through the Cheyenne Stage I facilities. Figure 2.2.1-2 is a schematic of the average supply from each of these sources for the period 1976 to 1982. Cheyenne Stage II facilities presently under construction will provide a potential Douglas Creek diversion of up to 12,400 acre-ft/yr by 1986. Capacity of the system is limited by the pipeline capacity from Lake Owen to Middle Crow Creek. Construction of a second pipeline would allow full supply of 23,000 acre-ft/yr from Cheyenne Stage I and II facilities (U.S. Department of Agriculture 1981). Figure 2.2.1-3 provides a schematic of the water resource system for the Cheyenne Urban Area as it will exist after initial Stage II construction.

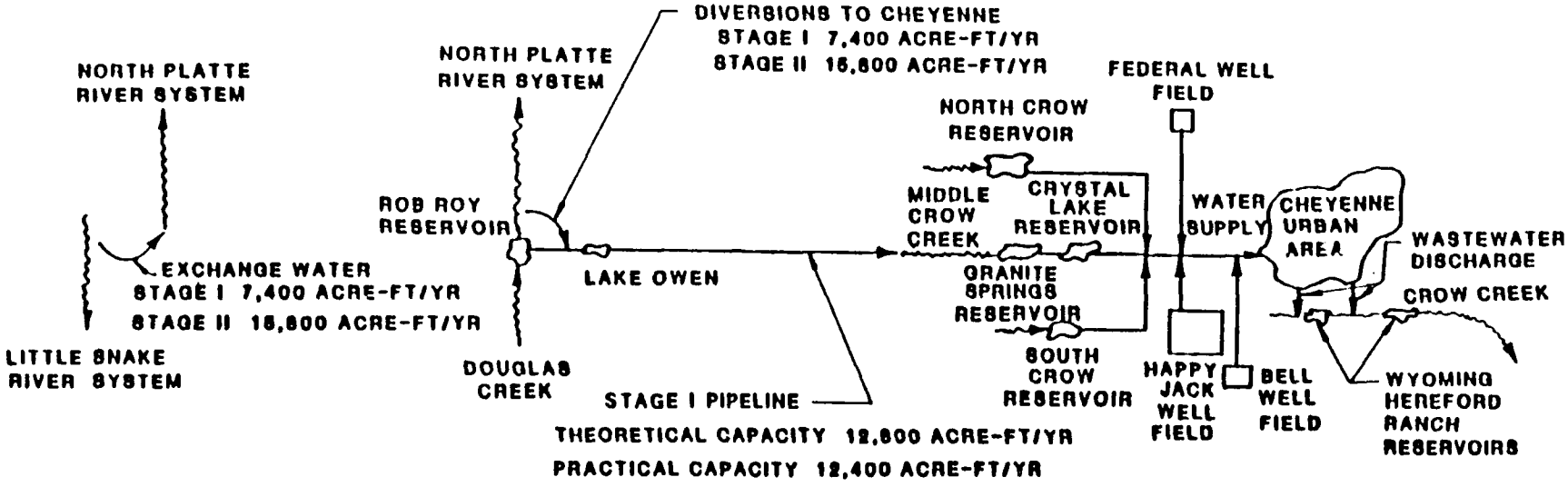
Water development planning for the Crow Creek watershed has included consideration of upgrading reservoirs and constructing new facilities (Banner 1983), water conservation programs, and reducing reliance on municipal well fields.



(04-6)

RAW WATER DELIVERY TO CHEYENNE

FIGURE NO. 2.2.1-2



NOTE:

DIVERSIONS TO CHEYENNE FROM NORTH PLATTE RIVER SYSTEM CANNOT EXCEED EXCHANGE WATER FROM THE LITTLE SNAKE RIVER SYSTEM TO THE NORTH PLATTE RIVER SYSTEM

SCHEMATIC OF WATER RESOURCE SYSTEM FOR CHEYENNE URBAN AREA

(04-3)

FIGURE NO. 2.2.1-3

The total inflow from Crow Creek above current diversion facilities is estimated at 9,000 acre-ft/yr of which 4,600 acre-ft/yr is currently used with the remainder evaporating, bypassing diversion points, or spilling over dams at diversion facilities. Spillage and bypass help to recharge the groundwater basin from which municipal wells obtain their supply.

A variety of water conservation programs have been proposed in the Area of Concentrated Study. They include measures to reduce outdoor irrigation use, meter all users, adopt accelerated rate schedules, and encourage use of water saving devices (Cheyenne Water Conservation Advisory Group 1982). A plan to reuse wastewater to irrigate the F.E. Warren AFB golf course has also been proposed (Baker, Swee ıey and Associates 1981).

A goal of using 2,000 acre-ft/yr for municipal supply from the Cheyenne well fields has been established (Cheyenne Board of Public Utilities 1983). The true production capability of the well fields is unknown, but a program has been established to better define this capability (Ertec 1983).

2.2.1.2.1.2 Other Areas

Water use in Platte, Goshen, Laramie, Banner, Kimball, and Scotts Bluff counties is about 760,000 acre-ft/yr with about 88 percent used for agricultural purposes. Existing Minuteman Launch Control Facilities in the Deployment Area use 12 acre-ft/yr. Table 2.2.1-1 summarizes current water supply and water use in communities potentially impacted by increases in demand due to population inmigration.

Total municipal use in these areas averages about 250 gpcd but there is considerable variation depending on the extent of industrial use. Water supply sources for all communities in the Area of Concentrated Study except for Cheyenne is from wells.

Table 2.2.1-1

WATER SUPPLY CAPACITY AND WATER USE IN POTENTIALLY IMPACTED COMMUNITIES

Community	Current Capacity (Acre-Ft/Year)	Current Use (Acre-Ft/Year)
Greeley	50,000	21,400
Fort Collins	38,000	16,800
Laramie	11,800	6,000
Scottsbluff	11,000	4,400
Torrington	8,500	4,800
Gering	6,500	3,100
Wheatland	3,800	2,000
Pine Bluffs	2,700	500
Kimball	2,100	1,000

2.2.1.2.2 Constraints on Water Use

2.2.1.2.2.1 Wyoming

Use of water is controlled by the Wyoming State Engineer and Board of Control who administer the Wyoming Water Law. The right to beneficially use water is granted under the doctrine of prior appropriation. Procedures have been developed to control initial appropriations, changes in the point of diversion and type and place of beneficial use, changes in rights under purchase or lease of an adjudicated or unadjudicated right, and acquisition of a temporary right by either appropriation or by lease/purchase. Groundwater control areas have been established in Platte County and in Laramie County where groundwater advisory boards are also involved in controlling water use. Water acquisition efforts for the project are being coordinated with the Wyoming State Engineer's Office. Groundwater rights are issued by the Wyoming State Engineer's Office in terms of peak discharge with actual discharge rates determined after review of actual pumping capacity. The discharge rates (gallons per minute - gpm) have, in some cases, been translated into annual withdrawal (acre-ft/yr) amounts by decisions of the State Board of Control. The amounts are based on review of acreages irrigated (1.2 to 1.5 acre-ft/acre/yr) and historic use period (irrigation season) with an assumed total consumptive use. If the point or type of use of a groundwater right is changed there is no assumed impact on return flow but the rate of discharge of the right can only be used during the historic use period. The supply may be used throughout the year if rates are reduced to match allowable annual diversions.

Surface water rights are based on 1 cubic foot per second (cfs) of flow per 70 irrigated acres with 60 percent assumed to be consumptively used (Wyoming State Engineer's Office 1983). There are no legal requirements for delivery of Lodgepole or Crow Creek water to Nebraska or Colorado, and these streams are typically dry as they near state boundaries.

Water rights to Cheyenne's wastewater effluent (that portion representing historic Crow Creek flow) have been appropriated. Appropriation has not been made of the additional effluent that will result from Stage II water imports.

In general, adjudicated and unadjudicated water rights exceed actual water use and water availability.

The Wyoming Department of Environmental Quality administers laws, regulations, and guidelines related to water quality. Surface streams and reservoirs are divided into four classifications with water quality standards developed for each. Discharges to a surface stream are controlled by a permit process. Groundwater resources are similarly divided into separate classifications, although groundwater in the Area of Concentrated Study has not yet been classified by the Wyoming Department of Environmental Quality. Discharges to the groundwater must be such that they do not make the affected water unsuitable for its use or potential use at any point of withdrawal or natural discharge to the surface water system. Nonpoint sources of pollution such as stormwater runoff are also controlled by the Wyoming Department of Environmental Quality. Wastewater treatment facilities

serving the Cheyenne Urban Area discharge to Crow Creek which has been classified as a Class IV stream requiring no more than secondary treatment and disinfection prior to discharge (Wyoming Department of Environmental Quality 1979).

2.2.1.2.2.2 Nebraska

Use of water is controlled by the Nebraska Department of Water Resources which administers the Nebraska Water Law. The right to beneficially use water is granted under a mixed riparian-appropriative system of water law. Groundwater use permits are only required in groundwater control areas except for industrial use exceeding 3,000 acre-ft/yr. No control areas have been established in the Area of Concentrated Study (Nebraska Department of Water Resources 1983). The right to use groundwater is acquired by owning the land overlying a groundwater reservoir. Procedures have been developed to control appropriations, require registration of wells, permit public water suppliers to transfer water from a remote source for use, and recently to allow changes in place of use of permitted rights if the type of use is unchanged. All nondomestic wells must be registered whether a permit is required or not. Water acquisition efforts for the project are being coordinated with the Nebraska Department of Water Resources. Groundwater rights are issued in terms of peak discharge.

Surface waters in the Area of Concentrated Study are generally under the appropriative system and are considered fully appropriated for Pumpkin and Lodgepole creeks. Surface water rights are limited to 1 cfs per 70 acres and no more than 3 acre-ft per acre of land. A U.S. Supreme Court decree apportioned the natural flow of the North Platte River between Colorado, Wyoming, and Nebraska. In general, total appropriated surface water rights and registered well discharge capacities exceed actual water use in the Area of Concentrated Study.

The Nebraska Department of Environmental Control administers laws, regulations, and guidelines related to water quality with the Nebraska Department of Health responsible for public water supply. Surface streams are divided into five general beneficial use categories with specific criteria for each based on the designated beneficial use of a stream segment. Discharges to a surface stream are controlled by a permit process. Groundwater resources are protected by anti-degradation policies and specific water quality standards which control wastewater discharges to groundwater.

2.2.1.2.3 Surface Water Hydrology and Quality

Stream flow in the Area of Concentrated Study watersheds is extremely variable with peak flows occurring in the spring or early summer and low flows occurring in late summer and winter (U.S. Geological Survey 1981, 1982). Peak flows are a combination of snowmelt runoff and seasonal precipitation in the spring. Low flows are derived primarily from groundwater inflow. The chemical quality of surface waters is dependent on groundwater quality and irrigation return flow practices whereas biological quality is primarily influenced by wastewater discharges.

2.2.1.2.3.1 Crow Creek Watershed

The Crow Creek watershed has a drainage area of about 460 square miles (sq

mi) from its headwaters to the Carpenter Reservoir. Human activities have influenced the natural water resource system of Crow Creek. Water supply reservoirs have been constructed on the North Fork of Crow Creek (1,868 acre-ft), on Middle Crow Creek (Granite Springs, 5,320 acre-ft and Crystal Lake, 3,410 acre-ft) and the South Fork of Crow Creek (18 acre-ft). Middle Crow Creek reservoirs receive water from watershed runoff and from Cheyenne Stage I imports and deliver water via pipeline to the Cheyenne water treatment facilities. Pumpage at the Cheyenne Federal, Happy Jack, and Bell well fields has reduced or eliminated base flow in some reaches of Crow Creek. Crow Creek loses essentially all flow to the groundwater system before reaching the Colorado state line. Water quality data collected over the past several years at F.E. Warren AFB indicates Crow Creek quality is good upstream of Cheyenne. The Cheyenne Urban Area discharges about 8,000 acre-ft/yr of wastewater to Crow Creek downstream of Cheyenne. This is about 90 percent of typical Crow Creek flow. Water quality conditions in Crow Creek and the two Wyoming Hereford Ranch reservoirs (about 880 acre-ft each), as well as the groundwater system downstream of the Cheyenne Urban Area, have been influenced by these discharges. Water quality conditions near discharges include high levels of oil and grease, low dissolved oxygen, high nutrients, toxic ammonia, and elevated levels of chloride, sulfate, cadmium, chromium, and zinc. Crow Creek water quality is similar to groundwater quality in most other areas of the basin.

High flows due to snow melt and precipitation runoff have caused flooding problems from Crow Creek, Dry Creek, and Clear Creek in the Cheyenne Urban Area. Flooding is seen as a major problem in the Cheyenne Urban Area, but only the Dry Creek area has been studied in detail (BRW/Noblitt et al. 1979) although 100-year floodplains have been designated in all areas (Federal Emergency Management Agency 1982). Peak flows from various drainage areas were calculated and routed through the urban area for this study. The runoff for a 10 year, 3 hour storm event (1.7 inches of rainfall) was determined to be 7,900 cfs where Diamond Creek joins Crow Creek upstream of Cheyenne. This increases to 8,500 cfs by contributions in Cheyenne before reaching the Wyoming Hereford Ranch Reservoir No. 1. A similar analysis was conducted for runoff from a 50 year, 6 hour storm event (2.9 inches of rainfall) where peak flows were 6,200 cfs upstream of Cheyenne and 6,700 cfs at the reservoir. Several bridges and culverts do not have capacity to transmit this flow through the area (Banner 1983).

Using representative erosion rates of 3 tons per acre (T/acre) for cropland, 4.3 T/acre for rangeland, and 2.2 T/acre for other land (Fly et al. 1982), existing erosion upstream of Cheyenne was calculated at 730,000 tons per year (T/yr), and between Cheyenne and Carpenter Reservoir at 480,000 T/yr. Sediment delivery to streams was calculated at 122,000 T/yr and 88,000 T/yr for the two areas, respectively.

2.2.1.2.3.2 Other Areas

Other watersheds potentially impacted by project construction include Lodgepole, Horse, Pumpkin, and Chugwater creeks.

Lodgepole Creek has a drainage area of about 2,550 sq mi upstream of Sidney with about 1,160 sq mi upstream of Oliver Reservoir, 610 sq mi between Oliver Reservoir and Sidney Draw, and 780 sq mi in Sidney Draw. It is an intermittent stream that alternately gains flow from and loses flow to the groundwater basin. Groundwater pumpage in eastern Laramie County and western Kimball County has resulted in decreased base flow as measured at Bushnell, Nebraska, from about 13 cfs, prior to extensive development, to about 5 cfs at present. Lodgepole Creek has historically had flooding problems resulting from snowmelt and precipitation runoff. Oliver Reservoir (2,678 acre-ft) and Bennett Reservoir (970 acre-ft) are used for recreational and/or irrigation storage purposes and both have had sedimentation problems. Bushnell and Kimball operate wastewater treatment facilities that discharge to the creek with flows of 0.02 and 0.66 million gallons per day (mgd), respectively. Surface water quality is suitable for most uses but total dissolved solids are higher in downstream reaches than upstream. Three Launch Control Facilities and 33 Launch Facilities proposed for use in the program are located in the watershed. Existing erosion and sedimentation are estimated as follows:

Area	Erosion	Sediment Delivery (1,000 T/year)
Upstream of Oliver Reservoir	2,510	410
Between Oliver Reservoir and Sidney Draw	920	250
Sidney Draw	1,000	290

Horse Creek has a drainage area of about 1,700 sq mi upstream of its confluence with the North Platte River with about 660 sq mi upstream of the Hawk Springs Reservoir. It is a perennial stream. Base flow is about 15 to 20 cfs near Hawk Springs Reservoir and flow averages about 70 cfs near Lyman, Nebraska. Arnold (1,140 acre-ft), Goshen Hole (4,950 acre-ft), Sinnard (1,540 acre-ft), and Hawk Springs (16,700 acre-ft) are major reservoirs used for irrigation storage. No municipalities discharge to Horse Creek. Surface water quality is suitable for most uses with water in the lower reaches somewhat more mineralized than upper reaches. Four Launch Control Facilities and 33 Launch Facilities lie within the Horse Creek watershed. Existing erosion and sedimentation were estimated at 4,000,000 T/yr with 610,000 T/yr reaching streams with 1,740,000 T/yr erosion and 250,000 T/yr sediment delivery upstream of the Hawk Springs Reservoir.

Pumpkin Creek has a drainage area of about 1,020 sq mi upstream of its confluence with the North Platte River. It is an intermittent stream in upper reaches becoming perennial in lower reaches. Base flow has been reduced by increasing groundwater irrigation. Flow averages about 30 cfs near Bridgeport, Nebraska. There are no major reservoirs and no municipal wastewater discharges to Pumpkin Creek. Surface water quality is generally suitable for most purposes. Two Launch Control Facilities and 17 Launch Facilities are located in the basin. An estimated 2,370,000 T/yr erosion occurs in the watershed with 340,000 T/yr reaching streams.

Chugwater Creek has a drainage area of about 680 sq mi upstream of its confluence with the Laramie River. It is a perennial stream. Average flow near Wheatland is about 27 cfs. There are no major reservoirs in the watershed. Wheatland discharges about 0.24 mgd to a tributary and industrial discharges have caused

water quality problems near Wheatland. High total dissolved solids levels restrict use for drinking water purposes, but surface quality is acceptable for other uses. One Launch Control Facility and 13 Launch Facilities are in the watershed. Existing erosion is estimated at 1,770,000 T/yr with 251,000 T/yr reaching the stream.

Four Launch Facilities are located in the Goshen Hole area that drains about 560 sq mi to the North Platte between the confluence of the Laramie River and the confluence of Horse Creek with the North Platte River. Average flow of the North Platte in this area is about 780 cfs with flow primarily controlled by Wheatland, Glendo, and Guernsey reservoirs. Wastewater discharges include Scottsbluff (2.6 mgd) and Terrytown (0.24 mgd). Water quality is typified by high total dissolved solids that increases significantly in the downstream direction as a result of irrigation return flow. Existing erosion in the 560 sq mi area is estimated at 1,200,000 T/yr with 220,000 T/yr reaching streams or irrigation ditches in the area.

2.2.1.2.4 Groundwater Hydrology and Quality

Groundwater used in the Area of Concentrated Study is derived from alluvium along stream channels and the Ogallala, Arikaree, White River (Brule and Chadron), Pierre, and Lance/Fox Hills aquifers. A confined aquifer (Casper Formation) occurs at depth but has not been developed as a water supply source. Groundwater flow is typically west to east trending northeast north of Lodgepole Creek tending to parallel surface drainage patterns. Groundwater quality is highly variable with nitrate exceeding primary drinking water standards in some areas and iron, sulfate, sodium, and total dissolved solids exceeding secondary drinking water standards in other areas.

2.2.1.2.4.1 Crow Creek Watershed

The Ogallala is the most developed aquifer in the Crow Creek watershed and provides most of the water pumped from the Cheyenne well fields. Average values for wells are 330 gallons per minute (gpm) yield, 6.6 gallons per minute per foot (gpm/ft) specific capacity, 2,100 square feet per day (sq ft/day) transmissivity, 65 feet per day (ft/day) hydraulic conductivity, and 2.5×10^{-4} for storativity. The Ogallala is the surficial formation in much of the watershed. The Brule Formation has large yields only in areas of secondary permeability. The Arikaree has been removed by erosion in most of the watershed. Large quantities of water are pumped from wells in the Crow Creek alluvium in the Carpenter area where 1,000 gpm wells are common. Some springs (one of about 900 gpm) west of Cheyenne contribute to surface water flow. Recharge to the groundwater basin underlying the Crow Creek watershed above Carpenter is estimated at 21,100 acre-ft/yr (precipitation 16,600; underflow from other areas 500 acre-ft/yr; and streamflow infiltration 4,000 acre-ft/yr). Discharge is estimated at 19,600 acre-ft/yr (irrigation 9,400 acre-ft/yr; municipal/industrial use 3,800 acre-ft/yr; groundwater discharge 2,400 acre-ft/yr; and groundwater outflow to other areas 4,000 acre-ft/yr) resulting in a net gain in groundwater storage. Water levels have been decreasing upstream of Cheyenne and increasing downstream of Cheyenne. Water quality from aquifers in the area is typically good with total dissolved solids less than 500 milligrams per liter (mg/l), but nitrate levels in the Cheyenne vicinity frequently

exceed the primary drinking water standard of 10 mg/l. There are 52 wells with capacities greater than 100 gpm and about 2,200 wells with capacities typically 10 to 25 gpm in 4 townships around Cheyenne (T13 and 14N, R66 and 67W).

2.2.1.2.4.2 Other Areas

The Ogallala is the most developed aquifer in the Lodgepole Creek basin where well yields average 900 gpm. The Brule, where fractured, yields an average of 800 gpm to wells. Few wells use the Arikaree. Alluvium wells along the creek yield an average of 800 gpm. The Arikaree is the major aquifer in the Horse Creek area where well yields average 250 gpm. The Brule, where fractured, yields an average of 550 gpm. Few wells use the Ogallala. The Lance aquifer yields an average of 200 gpm in the basin. Alluvium wells are not extensive except along the North Platte River. Yields up to 1,000 gpm and 500 gpm are obtained from the Chadron and Arikaree aquifers in the Pumpkin Creek area. Some wells use the Pierre aquifer. Alluvial deposits and the Arikaree yield up to 700 gpm in the Chugwater Creek area, but typical yields from the Brule are less than 10 gpm.

Groundwater quality is generally good, but high levels of total dissolved oxygen, fluoride, sulfate, nitrate, and chloride have been detected in the Goshen Hole area and in some wells in the Lance aquifer. Total dissolved solids levels in all aquifers range from 100 to over 2,000 mg/l depending on locations. Up to 18 wells are situated within a 1-mile radius of Launch Facilities and Launch Control Facilities, but typically less than 3 are within this radius. The number of wells with capacities exceeding 100 gpm within 2 miles of potentially impacted communities is 45 for Kimball, 89 for the Gering-Scottsbluff area, 108 for Torrington, 71 for Wheatland, and 38 for Pine Bluffs.

2.2.2 Biological Resources

Biological Resources discussed in this report include vegetation, wildlife, fisheries, unique/sensitive habitats, and threatened and endangered species. The discussion of each of these elements of Biological Resources is included under each respective topic heading.

2.2.2.1 Region of Influence and Data Sources

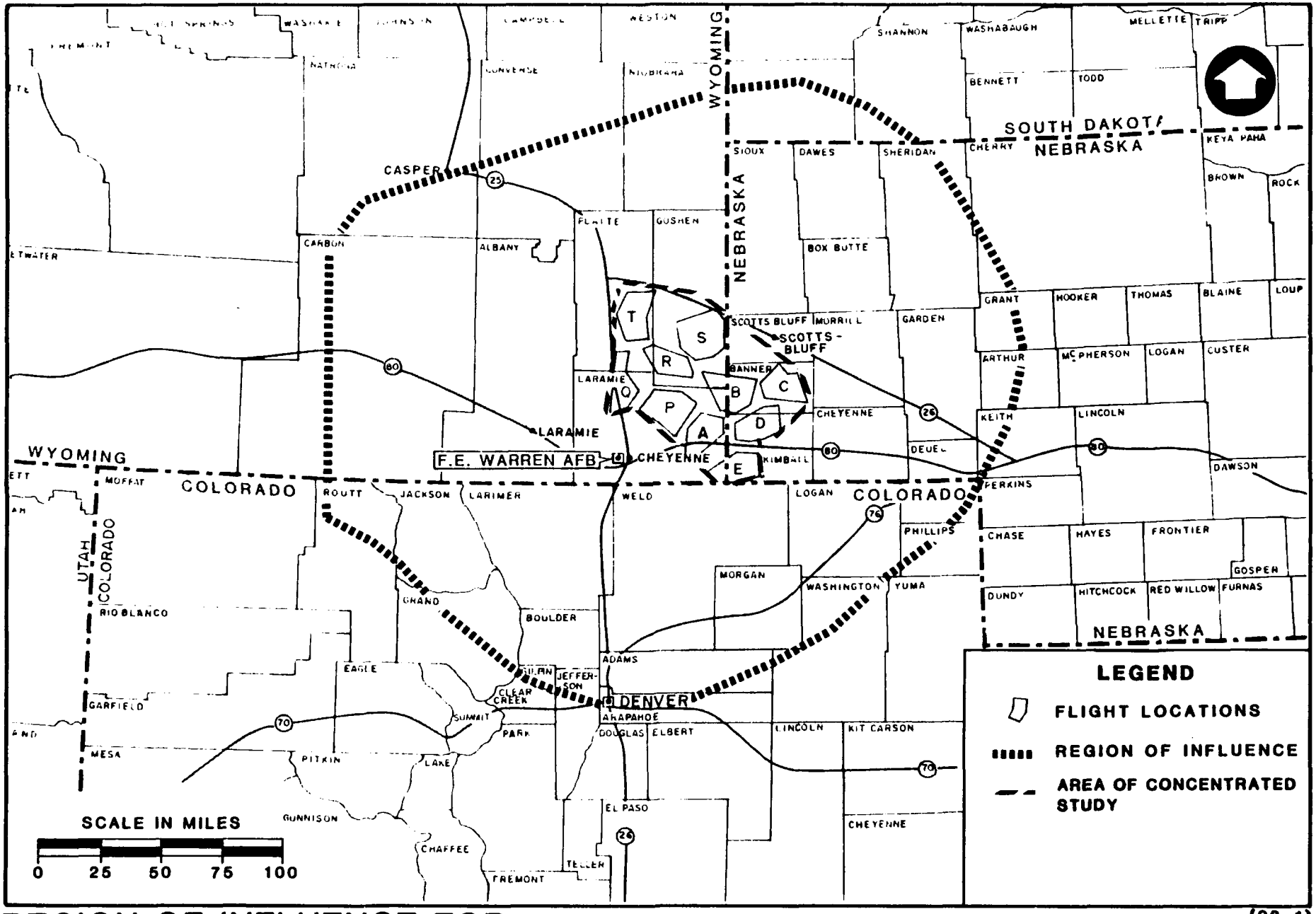
2.2.2.1.1 Region of Influence

The Region of Influence for Biological Resources is defined to include those areas where resources may be directly or indirectly affected by deployment of the project. The Region of Influence is defined as an irregularly shaped polygon generated by extending 100-mile radii from Cheyenne, Wyoming, and the Scottsbluff/Gering area of Nebraska. These two locations were selected because they are projected to receive the largest numbers of project-generated inmigrants. The Region of Influence includes portions of four states: Wyoming, Nebraska, Colorado, and South Dakota (Figure 2.2.2-1).

The shape and boundaries of the Region of Influence are based on input obtained through discussions with public agency personnel, concerns expressed by the public during the scoping process for the environmental impact statement, and a review of the data generated by the recreational resources component of the Land Use task group. This input provides the basis for establishing Region of Influence borders about 100 miles from population centers. This distance includes highway distances the majority of hunters and fishermen will be expected to travel for the resources available. However, to include resources for which hunters and fishermen might be expected to travel longer distances, the Region of Influence is expanded an additional 50 miles to the west.

Within this broad Region of Influence, an Area of Concentrated Study is defined by the irregular polygon formed by a line linking the outermost perimeters of the ten missile Flights. This is termed the Flight portion of the Area of Concentrated Study. Existing Minuteman silos, roadways designated for project use, and the disjunct F.E. Warren AFB will be considered as site-specific areas within the Area of Concentrated Study.

The Flight boundaries were used to delineate the Flight portion of the Area of Concentrated Study (Figure 2.2.2-1). The F.E. Warren AFB portion of the Area of Concentrated Study includes those areas of the base where facility modifications, upgrade, or construction will take place, as well as closely adjacent roadways and/or interchanges that may be affected by the proposed project. For a more complete justification of the Area of Concentrated Study, see Section 3.2.2.



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REGION OF INFLUENCE FOR BIOLOGICAL RESOURCES

(08-1)

FIGURE NO. 2.2.2-1

2.2.2.1.2 Data Sources and Analytic Methods for Existing Conditions

2.2.2.1.2.1 Primary Data Sources

Primary data sources included helicopter overflights of the 100 Minuteman silos, potentially impacted stream crossings, and the proposed overland communication cable routes. In addition, field reconnaissance surveys were conducted along potentially impacted road corridors and silo locations. Helicopter overflights and field surveys were also conducted at F.E. Warren AFB. Aerial photography was used as a primary data source with ground validation conducted in some locations.

2.2.2.1.2.2 Secondary Data Sources

The secondary data necessary for preparation of this report were gathered from the available literature, environmental analysis documents (environmental impact reports, environmental impact statements, and Wyoming industrial siting applications), management and regulatory agency files, and university research files. Contacts (visits, telephone, and written correspondence) with state and federal agency personnel, university researchers, and other nongovernmental organizations provided additional unpublished but valuable background data pertinent to the Region of Influence and the more site-specific areas included within the biological Area of Concentrated Study.

Principal agency and interest group data sources included the Wyoming Game and Fish Department, Wyoming Natural Heritage Program, Wyoming Department of Environmental Quality, and the Wyoming Industrial Siting Administration. Other sources included the Colorado Division of Wildlife, the Colorado Natural Heritage Program, the U.S. Fish and Wildlife Service, U.S. Forest Service, Soil Conservation Service, Bureau of Land Management, the Nebraska Game and Parks Commission, South Dakota Game, Fish and Parks Department, and the South Dakota Department of Water and Natural Resources.

In addition, a variety of other groups was contacted regarding their concerns and any appropriate and useful data held in their files. These included the Nature Conservancy, Wyoming Wildlife Federation, Audobon Society, and the Sierra Club, among others.

2.2.2.1.2.3 Summary of Analytic Methods for Existing Conditions

Data from the overflights, reconnaissance surveys, literature, and communications were qualitatively evaluated, integrated, and used to develop the description of existing conditions.

2.2.2.2 Existing Conditions

2.2.2.2.1 Vegetation

Vegetation within the Region of Influence is variable, dominated by coniferous forests in the Rocky Mountain region to the west, and by prairie grasslands

on the eastern plains of Wyoming, northern Colorado, western Nebraska, and South Dakota (Laycock 1979). The dominant native vegetation throughout the majority of the Region of Influence is short-grass prairie. This vegetation type is composed of a variety of sod-forming grasses and forbs with shrubs occurring infrequently (Weaver 1954). The dominant native grasses are blue grama and buffalo grass (Laycock 1979). Pockets of mid or mixed grasses occur where topography and soils provide greater moisture or where there is little or no grazing pressure. Short-grass prairie within the Region of Influence is currently used for rangeland or has been converted to agricultural use, particularly irrigated and dryland farming (University of Wyoming 1982). Unique plant communities occurring within the Region of Influence include portions of the Sandhills prairie in Nebraska and Pawnee National Grasslands in northern Colorado. Native vegetation described for the Area of Concentrated Study includes vegetation types occurring adjacent to road corridors, within communication (cable) paths, and adjacent to silos. The dominant vegetation type within the Area of Concentrated Study is grassland with large acreages committed to agriculture. Shrubland, woodland, rock outcrop, meadow, and riparian vegetation types are also present as minor components. Grasslands within the Area of Concentrated Study are composed of three types (mixed and short-grass prairies, and introduced grassland). The majority of the grasslands in the Area of Concentrated Study exhibit a short-grass prairie character where blue grama and buffalo grass are dominant, and bunch grasses occur less frequently. Introduced plant species including crested wheatgrass and smooth brome are used in portions of the short-grass prairie for pasture grasses, for grazing and hay operations, and for reclaiming disturbed roadsides.

Mixed-grass prairie occurs in small portions of the Area of Concentrated Study, particularly where there is little or no grazing pressure. Species composition of the mixed-grass prairie within the Area of Concentrated Study is typical of mixed-grass prairie vegetation prior to human perturbations. Short-grasses including blue grama and buffalo grass generally persist below an overstory of taller grasses such as western wheatgrass and needle-and-thread grass.

Shrubland is also limited in distribution within the Area of Concentrated Study. Three common shrub types (mountain mahogany, silver sagebrush, and sand sagebrush) are typical of shrubland in the region. Mountain mahogany generally occurs on rocky slopes at higher elevations. It is restricted to the northwestern portion of the Area of Concentrated Study and along the southern border of the Pine Bluffs in Wyoming. The dominant species present are mountain mahogany and skunkbush.

The sand sagebrush type occurs in pockets throughout the Area of Concentrated Study where it is restricted to areas with loose sandy soils. Sand sagebrush is the dominant species, and common associates include Indian rice-grass and muhly.

The silver sagebrush type is common in the western portion of the Area of Concentrated Study and is associated with disturbed areas including draws, alluvial fans, and areas of intensive grazing pressure. Species composition includes silver sagebrush as a dominant, as well as fringed sagewort and fleabane.

Ponderosa pine and introduced woodlands occur within the Area of Concentrated Study. Ponderosa pine woodlands occur on some of the highest elevations in the Area of Concentrated Study, particularly where caprock and other exposed rock outcrops occur. Shrubs including mountain mahogany and skunkbush are common in this vegetation type. Grasses and forbs such as needle-and-thread grass and copper mallow also occur frequently in the ponderosa pine type. Introduced woodlands, planted as windbreaks, occur at scattered locations within the Area of Concentrated Study and are usually associated with both active and abandoned farmsteads. The rock outcrop vegetation type is restricted to areas with hard caprock and is present as a very minor component of the vegetation within the Area of Concentrated Study.

Meadow vegetation is limited within the Area of Concentrated Study to drainages near the major creeks and around margins of ponds. Riparian vegetation in the Area of Concentrated Study, typical of riparian vegetation in the region, is found along the major streams and associated oxbows. Plant species with more mesic habitat requirements dominate the riparian areas including box elder, willows, cattails, rushes, and sedges.

Native vegetation types on F.E. Warren AFB are characteristic of those found in southeastern Wyoming and the Area of Concentrated Study. However, because of the restricted land use associated with base activities, vegetation, particularly on the southern portion of the base, is relatively undisturbed. This represents a unique situation in contrast to human-related disturbances in the surrounding area including urban development in Cheyenne, and countywide grazing and agricultural activities. Four vegetation types occur on F.E. Warren AFB: grassland, meadow, riparian, and disturbed. A majority of the planned project facilities occur in disturbed areas. However, certain segments of existing roads and new road alignments cross riparian vegetation along the Diamond and Crow Creek drainages. This vegetation includes Colorado butterfly plant (a federal Category One species) habitat, mixed-grass prairie, and meadow vegetation.

Vegetation types present within the Area of Concentrated Study are also likely to occur at other potentially disturbed areas, such as the potential quarry sites and staging areas outside of the Area of Concentrated Study.

2.2.2.2.2 Wildlife

2.2.2.2.2.1 Big Game

Seven big game species commonly occur within the Region of Influence and include pronghorn, mule deer, white-tailed deer, elk, bighorn sheep, black bear, and mountain lion. In addition, the Colorado Division of Wildlife has reintroduced a small population of moose to the Illinois River drainage in north central Colorado.

Drainages and topography influence the general location of big game habitats within the Area of Concentrated Study. Pronghorn, mule deer, and white-tailed deer commonly occur where suitable habitat is present. The nearest elk habitat occurs approximately 1 to 2 miles northwest of Flight Q (Wyoming Game and Fish Department 1982-a). The eastern terminus of a pronghorn migration route is located in the northern portion of Flight Q (Wyoming Game and Fish Department

1982-b). Critical-winter-yearlong habitat for mule deer is located along Horse and Chugwater creeks west of Interstate 25 in Flight Q (Wyoming Game and Fish Department 1980-a). In the Nebraska portion of the Area of Concentrated Study, high deer densities (both mule deer and white-tailed deer combined) occur in the Wildcat Hills and in west central Banner County (Nebraska Game and Parks Commission 1972, Nebraska Game and Parks Commission 1983). Although there have been recent sightings of black bear and mountain lion within the Area of Concentrated Study, neither species is considered commo.. in the area.

Pronghorn, mule deer, and white-tailed deer occur year-round on F.E. Warren AFB. Pronghorn tend to prefer the grassland habitats in the northern and southwestern portions of the base, while both deer species utilize Crow and Diamond Creek drainages.

Since the locations of aggregate quarries and staging areas for the Proposed Action are not presently specified, the big game habitat composition of these sites is unknown.

2.2.2.2.2.2 Furbearers

Twenty-one species classified as furbearers may occur in different portions of the Region of Influence and Area of Concentrated Study. The location and numbers of these populations depend primarily on habitat availability. The grasslands and agricultural areas within the Region of Influence support a variety of species. Aquatic habitats within these areas support muskrat and beaver. Species using riparian habitats include mink, skunk, and raccoon; weasel, jackrabbit, fox, badger, and coyote use a variety of more widespread habitats. These species can be expected to occur in the Flight portion of the Area of Concentrated Study and in appropriate habitats within F.E. Warren AFB.

2.2.2.2.2.3 Nongame Mammals

Sixty-seven species of nongame mammals occur within the Region of Influence. Most of these species are common or abundant in their preferred habitats. In addition, species of nongame mammals within the Area of Concentrated Study have limited distributions and/or low population densities. Ten of these species have been observed within the Flight portion of the Area of Concentrated Study or F.E. Warren AFB (Wyoming Natural Heritage Program 1983, Wyoming Game and Fish Department 1983-a). One of the species, the meadow jumping mouse, is on the Wyoming Game and Fish Department list of rare mammal species (Wyoming Game and Fish Department 1977).

2.2.2.2.2.4 Upland Game

Twenty-one species of upland game birds and mammals utilize areas within the Region of Influence. Due to habitat limitations, several of the upland game species, including the white-tailed ptarmigan, gray partridge, chukar, and sandhill crane, are restricted to relatively small areas of the Region of Influence; other species such as the mourning dove and cottontail rabbit have relatively wide distribution within the Region of Influence. The majority of upland game within the Region of Influence are considered common or abundant (Strickland 1979,

1980, 1981, 1982; Colorado Division of Wildlife 1978-a, 1979, 1980, 1981, 1982; Mitchell 1978, 1979, 1980, 1981). However, only small populations of turkey and sharp-tailed grouse have limited distributions within the Area of Concentrated Study. Additional species that may occur in the Area of Concentrated Study include the ring-necked pheasant, mourning dove, and cottontail rabbit.

2.2.2.2.2.5 Waterfowl

Twenty-seven waterfowl species occur in the Region of Influence. Major concentration areas include lakes, wildlife refuges, North and South Platte rivers, Niobrara River, and a portion of the Sandhills area in Nebraska (Nebraska Game and Parks Commission 1972, Colorado Division of Wildlife n.d., Wyoming Game and Fish Department 1972). Waterfowl populations within the Region of Influence fluctuate from year to year, depending upon nesting success (Wyoming Game and Fish Department 1972; Wyoming Game and Fish Department n.d.-a). Springer Wildlife Management Unit and Table Mountain are the two major areas within the Area of Concentrated Study that contain high-quality waterfowl habitat (Bellrose 1980). Both areas are located within Flight S of the Area of Concentrated Study. Waterfowl habitat on F.E. Warren AFB is limited to Crow and Diamond creeks, Lake Pearson, scattered sinks, and potholes. These areas provide limited amounts of breeding habitat for waterfowl. Waterfowl habitat may exist at the potential aggregate quarries.

2.2.2.2.2.6 Raptors

Twenty-five species of raptors are known to occur within the Region of Influence (Nebraska Game and Parks Commission 1972, Kingery and Graul 1978, Oakleaf et al. 1982). The species composition within the Region of Influence varies with habitat and season. Most of the raptor populations are either stable or increasing (Oakleaf 1983-a).

Raptor species occurring within the Area of Concentrated Study are those typically associated with grassland, agricultural, and riparian habitats. Forty-seven raptor nests are known to occur within 1 to 2 miles of access roads and silos within the Area of Concentrated Study (Wyoming Game and Fish Commission 1983-b, Nebraska Game and Parks Commission 1983). In addition, a Swainson's hawk nest was observed at F.E. Warren AFB. Raptors may also occur at the potential aggregate quarries and staging areas.

2.2.2.2.2.7 Other Birds

More than 200 species of other birds (birds that are not raptors, waterfowl, or upland game) occur within the Region of Influence (Nebraska Game and Parks Commission 1972, Kingery and Graul 1978, Oakleaf et al. 1982). Species expected within the Area of Concentrated Study and F.E. Warren AFB are primarily associated with grassland, agricultural, and riparian habitats. Approximately one-half of these species are considered common or abundant (Kingery and Graul 1978, Oakleaf et al. 1982).

2.2.2.2.2.8 Reptiles and Amphibians

Reptiles and amphibians are generally restricted to lower elevations within the

Region of Influence. Approximately 12 species of amphibians and 28 species of reptiles may be expected to utilize the Region of Influence. One amphibian species, the Wyoming (Baxter's) toad, has recently been proposed for possible endangered status by the U.S. Fish and Wildlife Service (U.S. Fish and Wildlife Service 1983). The pale milk snake, western smooth green snake, and wood frog have special state status within Wyoming and Colorado and occur within the Region of Influence. Reptiles and amphibians occurring in the Area of Concentrated Study and other potentially disturbed areas are typical of those inhabiting the region; the pale milk snake may occur in the northern portion of the Area of Concentrated Study in Flights T, S, R, Q, B, and P (Baxter and Stone 1980).

2.2.2.2.3 Fisheries Resources

2.2.2.2.3.1 Physical Conditions

The Region of Influence includes a major portion of the Platte River drainage basin in Wyoming, Nebraska, Colorado, and South Dakota, as well as a portion of the Colorado River drainage basin. Water features in the Region of Influence are numerous and diverse and include high alpine lakes, lowland streams, lakes, and reservoirs.

Aquatic resources in the Area of Concentrated Study are contained within the Platte River drainage basin. The Flights are drained by a number of perennial and intermittent streams. Flights P, Q, R, S, and T contain the largest number of aquatic resources, including Chugwater, Horse, and Bear creeks. The remaining Flights are drained by several perennial and intermittent streams including Horse and Lodgepole creeks. Aquatic resources within F.E. Warren AFB include Crow Creek and Diamond Creek in addition to the Lake Pearson system. These streams are contained in the Platte River drainage system.

The physiochemical conditions of the aquatic resources in the Region of Influence and Area of Concentrated Study vary according to geographical diversity and differential water uses. In general, the physiochemical variability increases downstream, varying with substrates and localized conditions.

2.2.2.2.3.2 Biological Conditions

Because of the variety of water features and physiochemical conditions present in the Region of Influence, the streams, lakes, and reservoirs support diverse cold water and warm water communities of plankton, invertebrates, and fishes. Generally, the types of aquatic organisms found in a particular area are indicative of the elevation, water quality, flow, substrate type, and intraspecific competition present. Approximately 60 species of fish are found in the Region of Influence.

Available data on the aquatic resources in the Area of Concentrated Study in Wyoming suggest that most of the streams are small and shallow with minimum cover, resulting in relatively low fish productivity (Wyoming Game and Fish Department 1983-b). The most diverse fish populations occur in Richeau, Chugwater, and Horse creeks (Wyoming Game and Fish Department 1983-b). Streams flowing through F.E. Warren AFB support a warm water rough fishery. The only game species

observed was the green sunfish. Although trout have reportedly been caught in Crow Creek (USAF 1983), physical and biological conditions may not provide satisfactory habitat on a year-round basis.

2.2.2.2.3.3 Fisheries

The wide variety of habitats in the Region of Influence provides a number of cold and warm water angling opportunities. Several rivers, streams, lakes, and reservoirs in the Region of Influence are considered valuable fisheries (U.S. Fish and Wildlife Service 1978-a,b,c,d). Important fisheries in the Region of Influence include Angostura Reservoir in South Dakota; the Big Thompson and Cache La Poudre rivers in Colorado; Oliver Reservoir, and Lakes McConaughy and Minatare in Nebraska; and Glendo, Seminoe, and Pathfinder reservoirs, as well as the Laramie Plains Lakes in Wyoming (U.S. Fish and Wildlife Service 1978-a,b,c,d). Game fish in the Region of Influence include rainbow, brook, and brown trout, walleye, small and largemouth bass, and yellow perch.

Limited creel census data on the aquatic resources in the Area of Concentrated Study indicate that Horse and Richeau creeks receive the greatest amount of fishing pressure with values of 441 and 80 user days per mile, respectively (Wyoming Game and Fish Department 1983-b). Creel census or species composition data are not available for several other streams present in the Area of Concentrated Study.

Rainbow and brown trout are stocked annually in the Lake Pearson system. Although Crow Creek within F.E. Warren AFB is not stocked, trout have reportedly been caught at the southern end of the base (USAF 1983). In 1982, a total of 1,261 base fishing permits were issued (McConnell and Cormier 1982).

2.2.2.2.4 Unique and Sensitive Habitats

2.2.2.2.4.1 Vegetation

Several limestone quarries east of Laramie, Wyoming provide unique habitat for Laramie false sagebrush (Wyoming Natural Heritage Program 1983), a federally proposed endangered species occurring within the Region of Influence. Riparian vegetation and associated wetland habitat is present along the major drainages. The riparian areas along the Crow and Diamond Creek drainages, in particular, are considered sensitive habitats because of the presence of the Colorado butterfly plant, a federal proposed endangered species.

2.2.2.2.4.2 Wildlife

Critical-winter-yearlong habitat for mule deer occurs within the Area of Concentrated Study along Horse and Chugwater creeks west of Interstate 25 in Flight Q (Wyoming Game and Fish Department 1980-a). A pronghorn migration route has its eastern terminus in the northern portion of Flight Q (Wyoming Game and Fish Department 1982-b). Pronghorn migrate into winter-yearlong habitat in Flight Q from summer range located to the west. No lambing, fawning, or calving grounds are presently known to occur in the Area of Concentrated Study (Wyoming Game and Fish

Department n.d.-b,c; 1978; 1979-a,b; 1980-a,b; 1982-a,b). No unique or sensitive wildlife habitat is known to occur on F.E. Warren AFB or in the vicinity of the proposed staging areas.

2.2.2.2.4.3 Fisheries

No unique or sensitive aquatic habitats are found in the Region of Influence or Area of Concentrated Study.

2.2.2.2.5 Endangered Species

2.2.2.2.5.1 Vegetation

Within the Region of Influence, one plant taxa, the Northpark phacelia, found in Jackson County, Colorado, is a federally listed endangered species (Colorado Natural Heritage Program 1983). Two plant species listed under federal Categories One and Two also occur within the Region of Influence (U.S. Fish and Wildlife Service 1983). The present distribution of the Laramie false sagebrush, a Category One species, is restricted to limestone quarries near Laramie, Wyoming (Wyoming Natural Heritage Program 1983). Hayden's penstemon, a Category Two species of concern, is a successional endemic that is confined to wind-formed blowouts in the Nebraska Sandhills (Wyoming Natural Heritage Program 1983, Weedon and Norton 1982). The Colorado butterfly plant, a federal Category One species, occurs within F.E. Warren AFB along the Crow and Diamond Creek drainages and along an unnamed drainage south of Diamond Creek in the vicinity of Cheyenne Road and Parade Avenue.

Distributions of 14 other plant species considered rare in either Wyoming or Nebraska include the Area of Concentrated Study; however, only the woolly *milkvetch* was observed growing on a silo site, within a few meters of the security fence.

2.2.2.2.5.2 Wildlife

Four species of federally endangered wildlife, the bald eagle, peregrine falcon, whooping crane, black-footed ferret, and one proposed species, the Wyoming toad, may occur within the Region of Influence. The bald eagle is primarily a winter resident of the Region of Influence and is most common along lakes and rivers. Two nest locations known to occur within the Region of Influence are along the North Platte River in the western portion of the Region of Influence. Peregrine falcons and whooping cranes may occur primarily as migrants within the Region of Influence. Prairie dog colonies (a major food source of the black-footed ferret) are scattered throughout the Region of Influence. However, the occurrence, distribution, and abundance of the black-footed ferret is not known. The known distribution of the Wyoming toad includes only the Laramie Basin. Only the bald eagle is known to occur within the Area of Concentrated Study. Concentration areas are in Flight S (Wyoming Game and Fish Department 1983-b, Wyoming Game and Fish Department 1983-a). The peregrine falcon and whooping crane may occur as infrequent migrants. Prairie dog colonies occur within the Area of Concentrated Study but the occurrence of the black-footed ferret is not known. None of the five species are known to occur at F.E. Warren AFB. The bald

eagle and peregrine falcon may occur as infrequent migrants. The whooping crane and black-footed ferret are not likely to occur because of the lack of suitable habitat.

Several species of special concern to the states (defined by the states as endangered, threatened, or rare) occur within the Region of Influence, and potentially occur within the Area of Concentrated Study. These species include: the mountain plover and swift fox in Nebraska and burrowing owl, meadow jumping mouse, and pale milk snake in Wyoming.

2.2.2.2.5.3 Fisheries Resources

Five species listed as threatened and one species listed as endangered by the South Dakota Game Fish and Parks Commission occur in the drainages within the South Dakota portion of the Region of Influence. These species include the sturgeon chub, northern red belly dace, longnose sucker, and plains topminnow. The pearl dace is listed as endangered by the South Dakota Game Fish and Parks Commission (Sharps South Dakota Game Fish and Parks Commission personal communication, 1983).

The greenback cutthroat trout is federally listed as endangered and state listed by Colorado as threatened. It is found in the Colorado portion of the Region of Influence in the drainages of the Cache La Poudre and Big Thompson rivers (Colorado Division of Wildlife 1978-b).

There are no federally listed, threatened, or endangered fish species in the Area of Concentrated Study. The suckermouth minnow is listed as rare by the Wyoming Game and Fish Department. Historically it has been recorded in Lodgepole Creek in Laramie County, although recent collections have been only near the mouth of the Laramie River (Baxter and Simon 1970). The northern pearl dace and finescale dace are considered rare by the Wyoming Game and Fish Department. They occur in the Niobrara River near the Wyoming-Nebraska border.

The orangethroat darter has an undetermined status in Wyoming, but because there is evidence of declining populations, maintenance or increase of the current populations is a priority (Wyoming Game and Fish Department 1977). The species was recorded in 1969 in Lodgepole Creek near the Wyoming-Nebraska border. That population was eliminated during a stream poisoning for rough fish. Attempts to reintroduce the species into Lodgepole Creek seem to have been unsuccessful. Some specimens were recorded recently in Nebraska (Wyoming Game and Fish Department 1983), and the species may potentially occur upstream in Wyoming.

The common shiner occurring in Crow and Diamond Creeks is listed as rare by the Wyoming Game and Fish Department. Agency management concern has been low because populations appear to be stable and may occur in various streams throughout southeastern Wyoming (Wyoming Game and Fish Department, personal communication, 1983).

2.2.3 Geologic Resources

This section presents the Region of Influence, data sources, and existing conditions for geologic resources for the project. Geologic resources include geologic hazards (with emphasis on regional seismicity and faulting), energy and mineral resources (with emphasis on aggregate), and soil resources (with emphasis on agricultural and erosional processes).

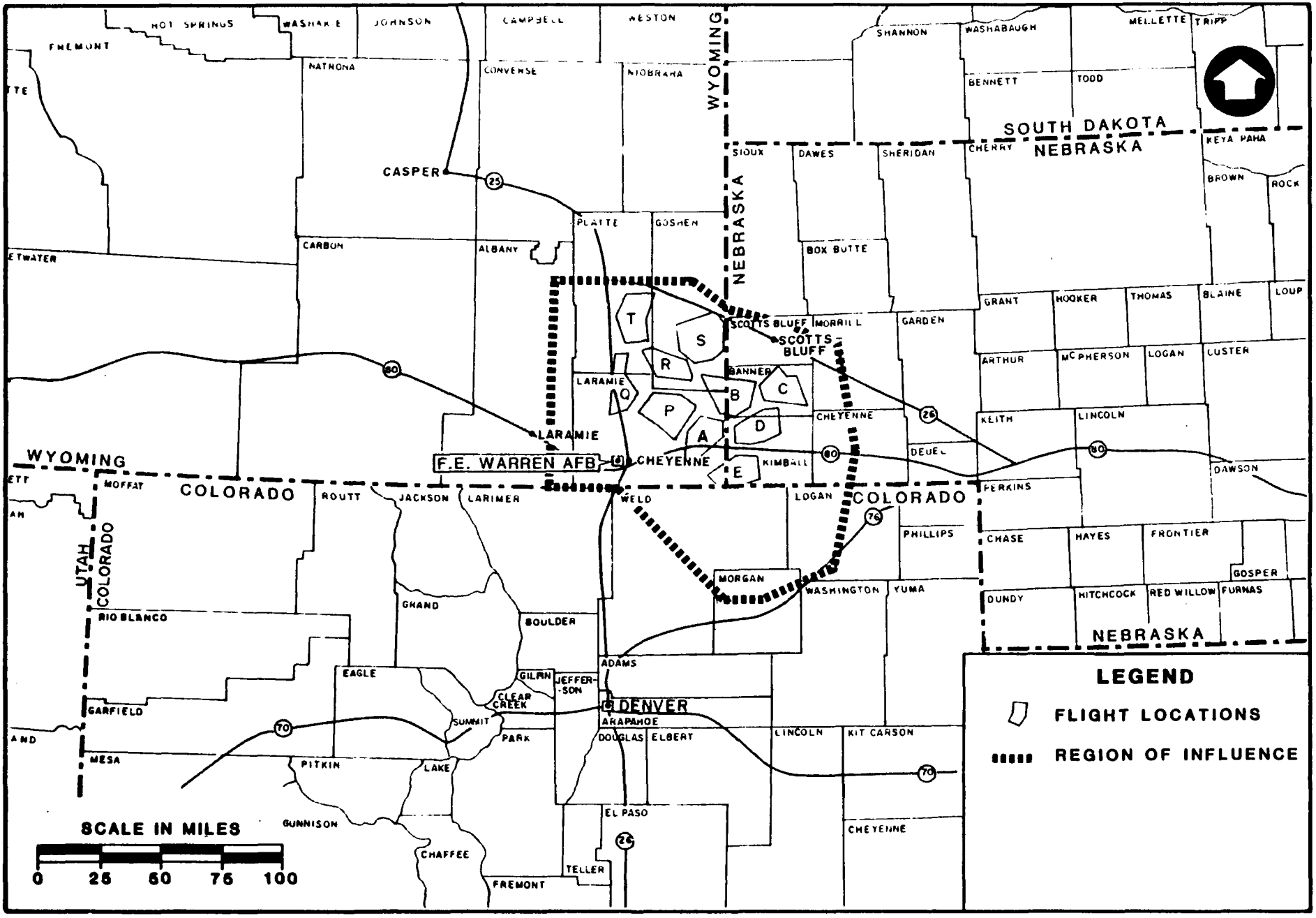
2.2.3.1 Region of Influence and Data Sources

2.2.3.1.1 Region of Influence

The Region of Influence adopted for Geologic Resources includes Laramie County, Wyoming; Kimball and Banner counties, Nebraska; portions of Albany, Platte, and Goshen counties, Wyoming; Cheyenne, Morrill, Scotts Bluff, and Sioux counties, Nebraska; and Logan, Morgan, and Weld counties, Colorado (Figure 2.2.3-1). The Region of Influence is an irregularly shaped area bounded on the north by an east-west line from the divide of the Laramie Range to Guernsey, Wyoming, and then southeastward along the northern extent of the valley of the North Platte River to near Bridgeport, Nebraska. The eastern boundary is formed by a north-south line extending from the North Platte River south to Sidney, Nebraska, primarily along Highway 385, and then south and southwest from Sidney along Road 113 to the southern extent of the valley of the South Platte River. The southern boundary follows westward along the southern extent of the South Platte River Valley to Goodrich, Colorado, then in a straight line northwest to the intersection of Interstate 25 and the Colorado/Wyoming state line. It then continues westward along the state boundary and terminates at the divide of the Laramie Range. The nearly north-south trending western boundary is delineated by the divide of the Laramie Range. This large Region of Influence is defined primarily for energy and mineral resources, specifically aggregate, and is also applicable to geologic hazards. Smaller Areas of Concentrated Study within the Region of Influence are defined specifically for faulting investigations and soil resources.

2.2.3.1.1.1 Geologic Hazards

The Region of Influence for geologic hazards is defined to include those areas in which implementation and operation of the project may be affected by naturally occurring geologic phenomena, or project activities may accelerate or initiate geologic processes. Normally, the Region of Influence for geologic hazards is smaller than the Region of Influence for energy and mineral resources because considerations of geologic hazards are often site-specific, i.e., individual landslides. Since regional seismicity can impact a broad area, the Region of Influence for geologic hazards was expanded to coincide with the overall Region of Influence. However, even though faulting was studied throughout the Region of Influence, the Wheatland-Whalen Fault Zone has been defined as an Area of Concentrated Study because of its direct importance to the project.



REGION OF INFLUENCE FOR GEOLOGIC RESOURCES

(06-1)

FIGURE NO. 2.2.3-1

2.2.3.1.1.2 Energy and Mineral Resources

The Region of Influence for energy and mineral resources, specifically aggregate, coincides with, and is the basis for, the overall Geologic Resources Region of Influence. Other elements of energy and mineral resources are addressed according to site-specific locations within the Region of Influence. The Region of Influence for energy and mineral resources, specifically aggregate, encompasses known regional sources of aggregate and areas likely to serve as additional sources if needed. These areas lie within economic haul distances to the potential construction sites throughout the Deployment Area.

2.2.3.1.1.3 Soil Resources

The Areas of Concentrated Study for soil resources are restricted to specific locations such as construction sites and support areas directly disturbed by the project. These site-specific locations are justified because of the direct relationship between specific construction locations and areas of likely soil disturbance. The current planning information for the project indicates disturbance will be confined to narrow corridors for transportation, communication routes, and construction at F.E. Warren AFB. For a more complete justification for the Areas of Concentrated Study see Section 3.2.3.1.

2.2.3.1.2 Data Sources and Analytic Methods for Existing Conditions

The major literature sources used in developing the profile of existing geologic resources include: U.S. Geological Survey-U.S. Bureau of Mines Mineral Classification; Wyoming Oil and Gas Conservation Commission; U.S. Department of Agriculture (USDA) Soil Conservation Service (SCS); Conservation and Survey Division, Institute of Agriculture and Natural Resources, University of Nebraska, Lincoln; Wyoming Geological Survey; Nebraska Department of Roads; and Colorado Geological Survey. Specific references from these sources are cited in this section and are detailed in Appendix E.

The following are state and county groups and agencies contacted to gather input and suggestions for this project: Wyoming Geological Survey; Wyoming Oil and Gas Conservation Commission; Wyoming State Engineers' Office; Wyoming Office of the Soil Conservation Service; University of Nebraska, Conservation and Survey Division; Nebraska Oil and Gas Conservation Commission; Nebraska Office of the Soil Conservation Service; Nebraska Department of Roads; and state offices of the U.S. Geological Survey (USGS).

Primary data were collected by other subcontractors. These include:

- Energy and Mineral Resources Map for the technical report;
- Preliminary Field Investigations Report: M-X Closely Spaced Basing; and
- Regional Aggregate Resources Evaluation, F.E. Warren AFB Candidate Suitable Area, Wyoming.

Primary data were also supplied as preliminary estimates of available aggregate resources from a report being actively prepared on construction materials for the Deployment Area.

2.2.3.2 Existing Conditions

2.2.3.2.1 Geologic Hazards

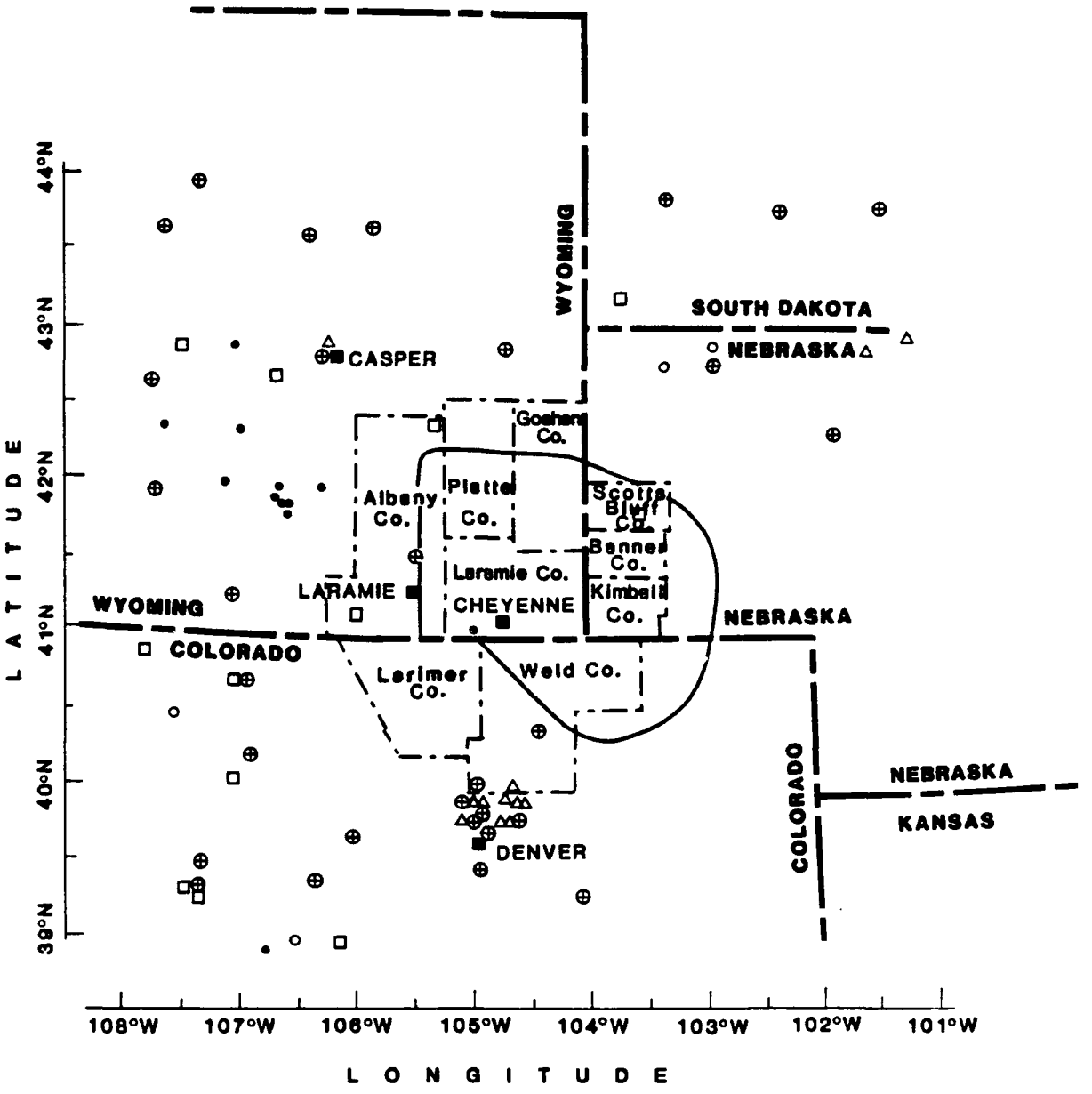
Potential geologic hazards which were evaluated in the Region of Influence consisted of regional seismicity, faulting, ground subsidence, landslides, and liquefaction.

Geologic conditions in the Region of Influence are sufficiently described in the literature and maps, previous Peacekeeper Closely Spaced Basing studies, and in communication with local experts to adequately assess the hazards and identify the issues most pertinent to this study. Based on this evaluation, geologic hazards are not considered issues for impact by the project. The potential impact of geologic hazards on the project is presented in section 1.6.10.2.

2.2.3.2.1.1 Regional Seismicity

A plot of recorded earthquakes within about 200 miles of the F.E. Warren AFB is shown on Figure 2.2.3-2 (National Earthquake Information Service 1982). Few natural earthquakes (i.e., not induced) above the microearthquake level, magnitude (M) equals three, have been reported in the vicinity of the Deployment Area. Magnitude is a measure of the total energy released by an earthquake, expressed on an open-ended, logarithmic scale. The largest known magnitudes are near 8.9. National Earthquake Information Service data show only 3 earthquakes within 63 miles of Cheyenne. The largest magnitude listed, M_L=3.5, occurred 62 miles west of Cheyenne. Simon (1972) suggests that the filling of Lake Hattie Reservoir near this shock may have induced the seismic activity. A Modified Mercalli Intensity (MMI) of MMI=V occurred 50 miles northwest of Cheyenne in 1954. Modified Mercalli Intensity is a numerical index describing the effects of an earthquake on the earth's surface, on man, and on structures. Modified Mercalli Intensity values range from I (not felt or only rarely felt) to XII (total destruction). MMI=V represents very slight damage to conventional structures which are not designed or constructed to resist earthquakes. The listed earthquake closest to the Deployment Area was a 1967 earthquake of unidentified magnitude about 17 miles southwest of Cheyenne. Small instrumentally recorded earthquakes (M_L=3 or less) are typically not listed in the National Earthquake Information Service. Such shocks may be felt at the epicenter but would be well below the damage-causing threshold. Not all seismicity has been reported in the National Earthquake Information Service; small earthquakes in the range of Intensity III to VI have been reported in western Nebraska (Reagor et al. 1981, Figure 2.2.3-2) near the Chadron Arch. Although the numbers and magnitudes of these events are sparse, a general southeast trend of several events has led some researchers to speculate an association with the Chadron Arch.

In summary, based on the historic record, seismic activity in the Deployment Area is very low. Algermissen and Perkins (1976) and Algermissen et al. (1982) indicate that the 475-year return period (10 percent chance of exceeding in 50



SCALE IN MILES

0 40 80

LEGEND

- • MAGNITUDE <2
- ○ MAGNITUDE 2.1 TO 3
- □ MAGNITUDE 3.1 TO 4
- ⊕ MAGNITUDE 4.1 TO 5
- △ MAGNITUDE 5.1 TO 6

Refer to Section 2.2.3.2.1.1 for a discussion of earthquake magnitudes.

EARTHQUAKES AROUND CHEYENNE, WYOMING THROUGH MAY 1981

(05-2)

FIGURE NO. 2.2.3-2

years) design acceleration would be about 0.04g for the Cheyenne area. A similar study for the Rocky Mountain states by Liu and DeCapua (1975) indicates a design value of about 0.02g for a 200-year period. These studies are based on historic seismicity distributed over judgmentally determined seismic source zones usually corresponding to physiographic or seismotectonic provinces.

2.2.3.2.1.2 Faulting

The Wheatland-Whalen Fault Zone (Morris and Babcock 1960) has been classified as active based on an early USGS field study of a single exposure using one age date to establish the last age of fault movement (McGrew 1962, Figure 2.2.3-3). The criteria for recognizing an active fault, as summarized by Cluff et al. (1972) include, but are not limited to, the presence of fault scarps, offset streams, fault valleys, or folding or warping of young deposits. Usually a combination of these and other features is generated by fault movements at the surface. Stratigraphic offset of Quaternary sediments by faulting is indicative of an active fault.

Spatial alignment of instrumentally located earthquakes may indicate an active fault, although absence of earthquakes is not sufficient to preclude an active classification. Historical accounts of large earthquakes can sometimes be used to document past earthquakes.

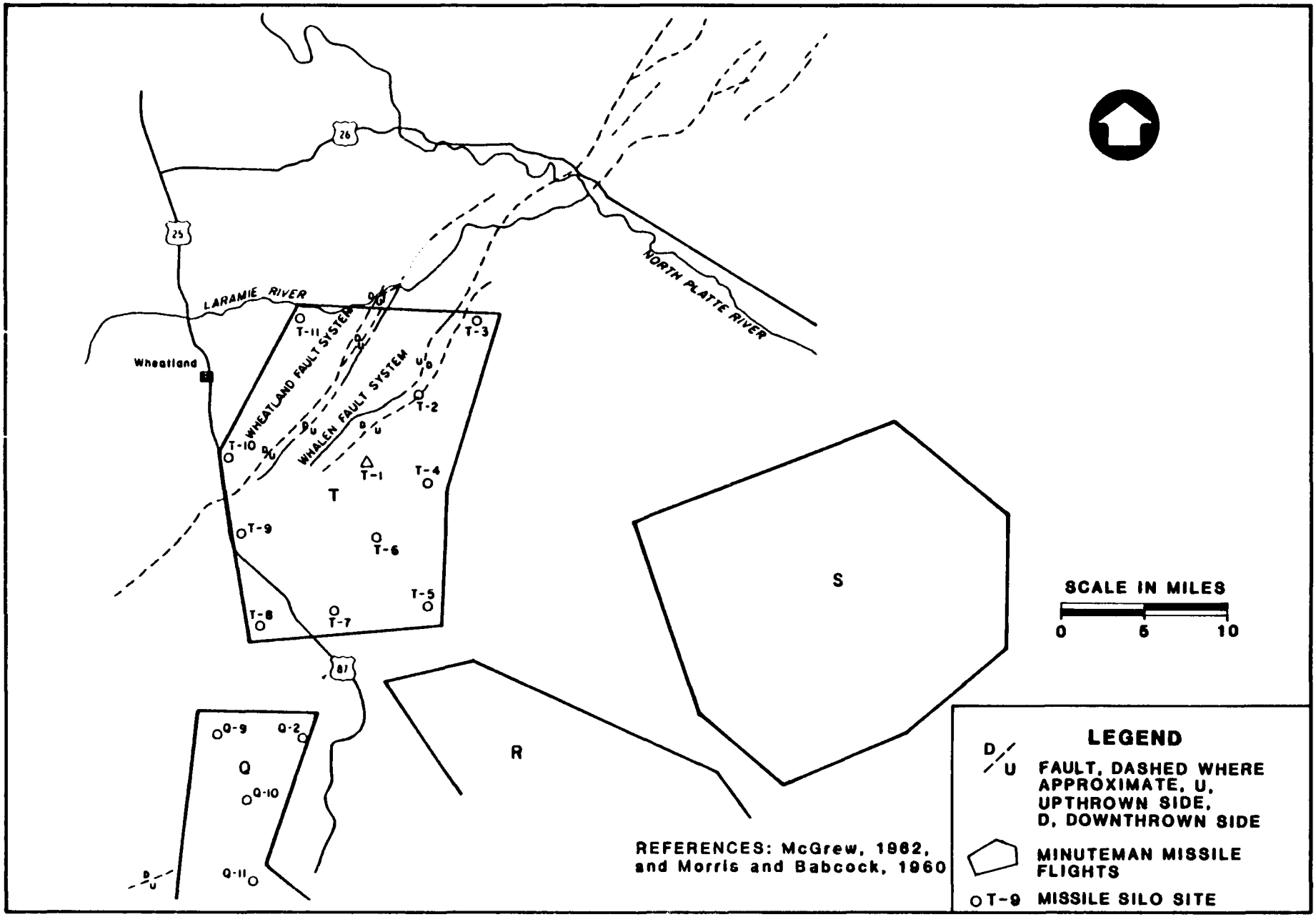
The trace of the Wheatland-Whalen Fault Zone trends northeast through T-flight and Silo T-2 lies within the fault zone itself while Silo T-3 is located close to the zone and T-9 lies along its projection. If active, there will be potential for ground rupture in the area of the fault zone.

2.2.3.2.2 Energy and Mineral Resources

This study evaluated the project impact on a number of energy and mineral resources: oil, gas, uranium, aggregate, coal, base and precious metals, and geothermal. With the exception of aggregate, all the remaining energy and mineral resources within the Region of Influence were not affected by the project for one or more of the following reasons: they are not known to exist within the Region of Influence or, if they exist, are in uneconomic quantities; they are already being produced and successfully coexist within the current Deployment Area configuration; and they are capable of being produced with little or no loss due to the project. Aggregate in the Region of Influence is an abundant resource but is identified as an impact because considerable quantities will be required for construction.

Aggregates must meet established standards of abrasion resistance, chemical compatability, and soundness to be suitable for use in concrete. The requisite characteristics of aggregates for use in roadbeds are less rigorous, but resistance to abrasion is nevertheless important.

Sand and gravel deposits are present in the floodplains of the major drainages and are found in the southeastern portion of Laramie County, along Lodgepole Creek in Kimball County, Spring Canyon in Banner County, along the North Platte River in Platte, Goshen, and Scotts Bluff counties, along the South Platte River



LOCATION OF THE WHEATLAND-WHALEN FAULT SYSTEMS

(05-3)

FIGURE NO. 2.2.3-3

in Colorado, and in the Ogallala Formation. Crystalline rocks suitable for crushing are present. These include granite and metamorphic rocks found in the core of the Laramie Range, and limestone and dolomite beds which occur in the Laramie Range.

Current aggregate production in the Deployment Area is largely on an as needed basis and comes from several small sand and gravel pit operations and limestone quarries. The active granite quarry at Granite, Wyoming, is the primary source of crushed rock aggregate in the region.

Preliminary estimates of project sand and gravel requirements are 1,097,131 tons or approximately 625,365 cubic yards (cy). It is estimated there are approximately 9,580,000 cy of available sand and gravel within the Region of Influence.

2.2.3.2.3 Soil Resources

The predominant topography of eastern Wyoming and western Nebraska is undulating to rolling. The relief has influenced the soil development through control of moisture and the rate of erosion. The similarities and differences of soil in this area can often be related to the underlying parent material and position of soil on the landscape. Even considering these variations, several major soil associations are widespread, such as the Mitchell-Keith-Epping and the Valentine-Dwyer associations in western Nebraska, and the Vetal-Valent-Otero and Ascalon-Altvan-Treon associations in eastern Wyoming.

The baseline soil erosion rates for eastern Wyoming and western Nebraska were estimated on a generic basis by application of the Universal Soil Loss Equation and the Wind Erosion Equation (SCS 1982). The application of these equations yielded baseline values of 0.02 tons/acre/year for water erosion and 5.2 tons/acre/year for wind erosion in eastern Wyoming. Estimates from an identical analysis for the soils in western Nebraska are 0.02 tons/acre/year for baseline water erosion and 4.1 tons/acre/year for baseline wind erosion.

The SCS defines eight land capability classes ranging from Class I soils which have slight limitations on usage as compared to Class VIII soils which have limitations that nearly preclude their use for commercial crop production. For a detailed listing of the eight classes refer to U.S. Department of Agriculture (1975). The limitations can take any of several typical forms such as shallowness, droughtiness, climate, and erosiveness. In areas where sufficient data for such an evaluation exist, the predominant limitation for soil in the Areas of Concentrated Study is susceptibility to erosion.

Eastern Wyoming has no Class I soils in the survey area and the most prominent soil series range from Class III-VII (nonirrigated) to Class II-VI (irrigated). Many of the soils are considered suitable for dryland wheat farming and, when irrigated, are suitable for a variety of other crops also. All soils in the area generally support native grasses which provide a feed source for cattle and sheep.

The soils of western Nebraska in the vicinity of the Deployment Area are primarily Class III soils which have a potential for Class I if irrigated. Nearly all the soils in the survey area are cropped in wheat. The main limitation to these soils is susceptibility to erosion and lack of natural moisture.

Northeastern Colorado has numerous soil series and soil associations within Weld and Logan counties. These numerous soil types range widely from Class I and II (irrigated) to Class VI-VII (nonirrigated). The current deployment plan does not encroach into this section of northeastern Colorado.

General soil characteristics in the vicinity of F.E. Warren AFB indicate that the dominant classes are II through VI and that the primary limitation is susceptibility to erosion. There are no data available to suggest the presence of Class I soils in the area and some Class III soils may have the potential to be Class II soils if irrigated.

2.2.4 Noise

Noise is defined as any sound (rapid change of air pressure waves) considered undesirable. The noise sources analytically evaluated for this EIS are vehicular, air, and railroad transportation, and construction.

2.2.4.1 Region of Influence and Data Sources

2.2.4.1.1 Region of Influence

The Region of Influence for Noise is broadly defined as that part of the project area in which noise level increases can potentially occur. These locations include project construction sites at F.E. Warren AFB, affected silos, access roads, and cable trench routes within the Deployment Area, interstate highways, and traffic arterials within the city of Cheyenne. In determining more precise locations of potentially impacted areas, the results of noise assessment analyses are compared to applicable federal and/or state standards and regulations. Primary concern is with residences, parks, schools, and other land uses where people prefer quiet environments. Figure 2.2.4-1 presents the Region of Influence for Noise.

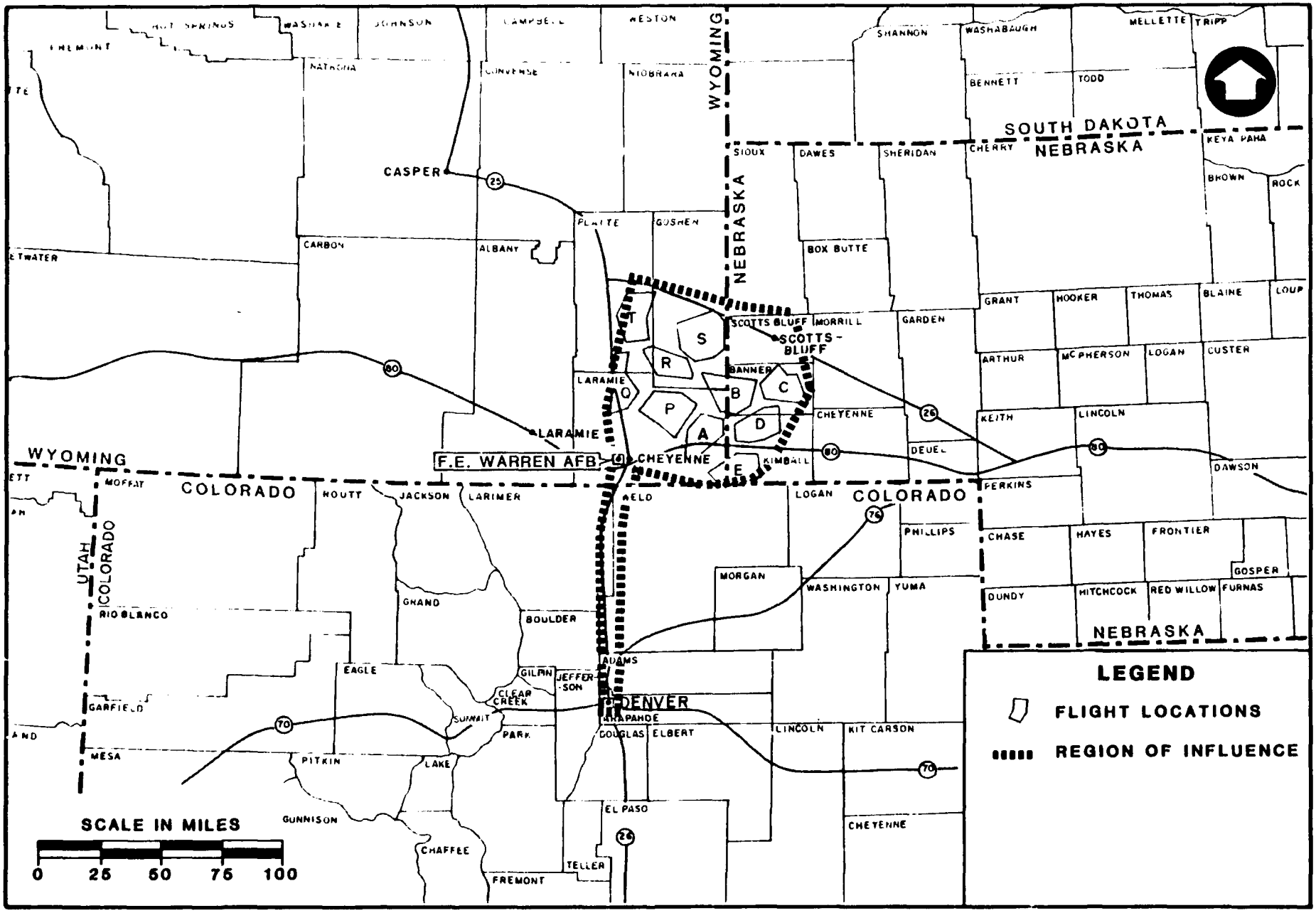
The Area of Concentrated Study within the Region of Influence includes F.E. Warren AFB; Cheyenne, Wyoming; Kimball, Nebraska; and areas where existing, expected future trends, and/or project-related noise levels exceed or were projected to exceed federal and/or state standards and regulations. A more detailed justification for the Area of Concentrated Study is provided in Chapter 3.

The criteria used to define the Region of Influence are as follows: the Environmental Protection Agency (EPA) and Federal Highway Administration have defined noise level increase limits from vehicular traffic in residential areas and noise-sensitive areas, such as around nursing homes, schools, hospitals, churches, and other areas where the preservation of reduced noise levels is important. These noise level limitations are described in terms of L_{eq} values. The Federal Aviation Administration (FAA) has established noise standards for airport operations at the airport boundary. Noise from railroad operations is compared to EPA L_{dn} standards, since these standards were designed to minimize intrusive residential noise levels. For purposes of comparing various existing and predicted noise level indices, it should be noted that for peak traffic periods, the L_{eq} is approximately equivalent to the L_{dn} (U.S. Department of Housing and Urban Development 1979).

2.2.4.1.2 Data Sources and Analytic Methods for Existing Conditions

2.2.4.1.2.1 Data Sources

Information and data relevant to all aspects of the noise analysis were acquired from the following sources: EPA, Federal Highway Administration, Department of Housing and Urban Development, FAA, Wyoming Department of Environmental Quality, Wyoming State Highway Department, Nebraska Department of Health, Nebraska



2-125

REGION OF INFLUENCE FOR NOISE

(08B-1)

FIGURE NO. 2.2.4-1

Department of Roads, Colorado Department of Health, City of Cheyenne, Cheyenne Airport, Union Pacific Railroad, Wyle Laboratories and Bolt, Beranek and Newman, Inc.

To determine existing noise levels in the project area, ambient noise levels were monitored in the vicinity of the Cheyenne airport and railroad station yard, and at traffic arterials and intersections in Cheyenne and in the Deployment Area.

2.2.4.1.2.2 Analytic Methods for Existing Conditions

Vehicular Noise. The Federal Highway Administration's STAMINA 2.0 computerized noise model was used to predict existing noise levels caused by motor vehicles (Federal Highway Administration 1982). This EPA-accepted model predicts noise levels from light-duty vehicles (autos and light trucks), medium-duty vehicles (two-axle, six-tire trucks) and heavy-duty vehicles (trucks with more than two axles).

STAMINA 2.0 incorporates data on vehicle volumes, vehicle speeds, and the physical characteristics of the roadway and surrounding environment in calculating noise level values. Calculations for roadway grade, reflective and absorptive barriers, ground cover, and adjustments for noise levels as they may vary over distances are also components of this model. The primary data collected as part of the ambient noise monitoring program were used to calibrate the STAMINA 2.0 model prior to prediction of roadway noise levels. Calibration serves as a check to assure proper and accurate simulation modeling of the roadway geometries and site topography. This type of calibration was used with the STAMINA 2.0 model by comparing predicted output with actual noise values monitored in the project area.

Air Traffic Noise. The only major airport in the project area is Cheyenne Airport. Existing noise levels for Cheyenne Airport were evaluated using an FAA airport noise exposure contouring procedure developed by Bolt, Beranek and Newman, Inc. in 1975 and updated in 1982 (Bolt, Beranek and Newman, Inc. 1975, 1983). This procedure bases determination of airport noise on total operations of jet and propeller aircraft, exclusive of helicopters, during an annual period. Use of this procedure enabled L_{dn} noise level contours to be developed, which were in turn overlaid onto an aerial map of the airport.

Railroad Noise. The only major railroad station in the project area is located in Cheyenne. The procedure used to estimate the L_{dn} noise contours in the vicinity of the railroad yard was developed by Wyle Laboratories for use by railroad companies (Wyle Laboratories 1973). Separate sets of noise contours were derived from mainline operations and yard operations. Calculations for noise due to mainline operations take into account train length, train speed, number of trains per day, use of helper engines, and proportion of operations taking place at night.

Noise contours for yard operations account for hump yard classifications, flat yard switching, engine repair, mechanical refrigerator car servicing, and areas for train arrival, makeup, and departure. These activities are assigned to known noise centers within the yard.

Construction Noise. Standard references were reviewed to define noise levels generated by various types of construction activities, and various categories of construction equipment (EPA 1971).

2.2.4.2 Existing Conditions

2.2.4.2.1 Vehicular Noise

Noise associated with road traffic is generally considered to be more or less constant. It varies in this respect from the intermittent peak noise levels from air and rail traffic. Road traffic noise is also a more ubiquitous 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 by particular vehicle types. Automobiles are usually a relatively minor source of roadside noise. In contrast, 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 whenever these vehicles are carrying a heavy load, traveling uphill or accelerating from a stopped position.

The monitored noise level data were used to calibrate the STAMINA 2.0 noise model, which in turn was used to predict existing noise levels from motor vehicles. Predicted 1983 noise levels for key roadway segments are shown in Table 2.2.4-1 for varying distances from the roadway right-of-way boundary and are reported as equivalent level (L_{eq}) values.

The analysis indicates that only about 37 dwelling units (along Interstate 25 between Central Avenue and Pershing Boulevard) with an estimated population of 96 people, fall within those calculated 65 dBA L_{eq} noise level contours which extend beyond the right-of-way of these roads.

2.2.4.2.2 Air Traffic Noise

Noise levels for Cheyenne Airport were estimated using the FAA airport noise contouring procedure. Annual operations data were estimated for 1983 on the basis of historical records and information provided by the Cheyenne Airport Manager. Figure 2.2.4-2 shows the calculated 1983 65 dBA L_{dn} noise level contour superimposed over the Cheyenne Airport. This contour results primarily from jet aircraft using runways 26/8 and 12/30.

The analysis indicates that about 976 dwelling units (south, east, and northwest of the airport) with an estimated population of 2,538 people, fall within the calculated 65 L_{dn} noise level contour which extends beyond the airport boundary.

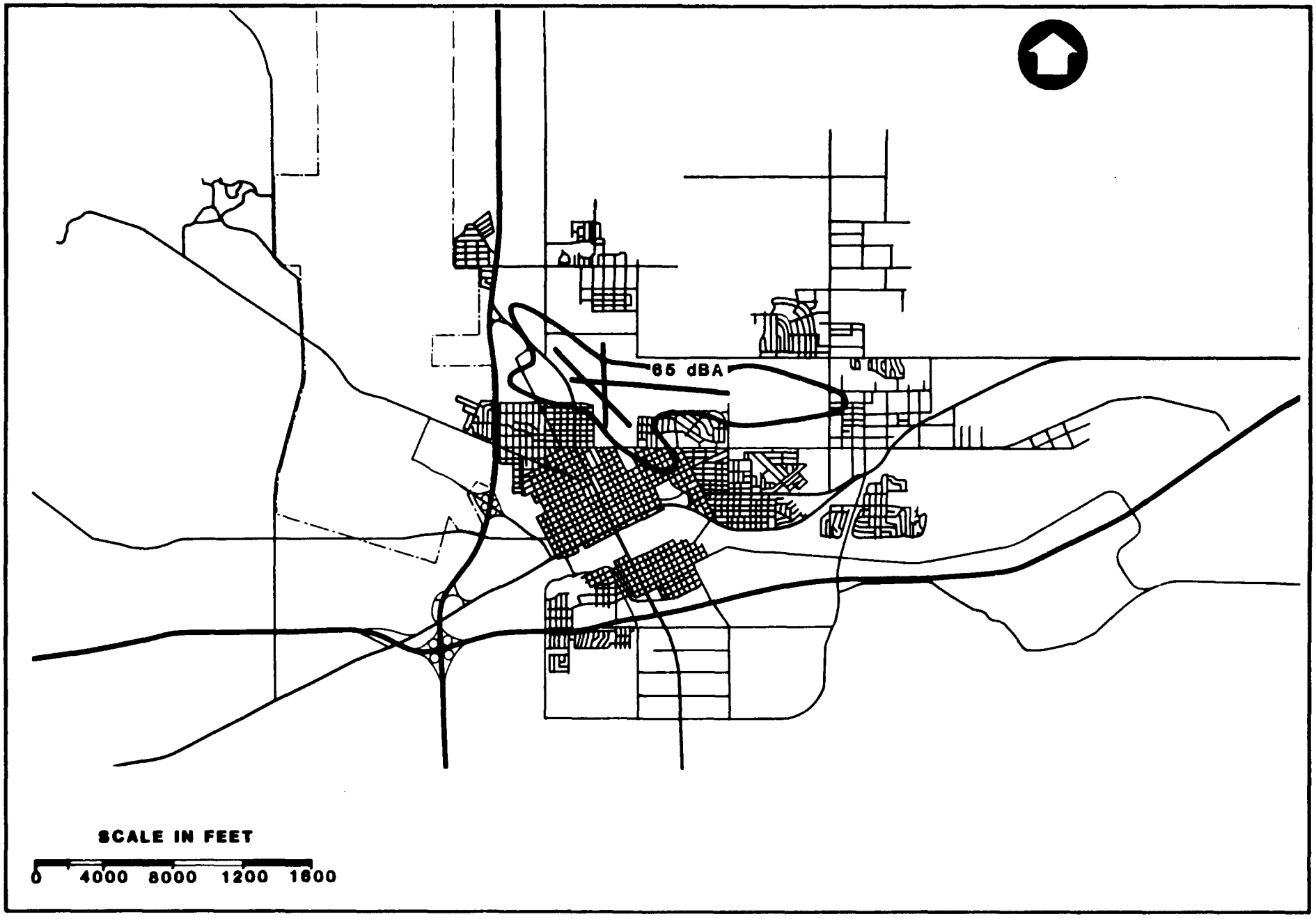
Table 2.2.4-1

PREDICTED L_{eq} NOISE LEVELS (dBA) AT SELECTED RECEPTORS FOR 1983

Roadway Segments	Right-of-Way Boundary	Distance From Right-of-Way Line (ft) 100	200
Cheyenne, Wyoming			
I-25 (Central Avenue to Pershing Boulevard)	68.4	65.2	63.0
I-25 (Pershing Boulevard to Missile Drive)	68.4	65.2	63.0
I-25 (Missile Drive to I-80)	67.1	63.8	61.7
I-25 (I-80 to College Drive)	67.4	64.0	61.5
Prairie Avenue (Yellowstone Road to Dell Range Boulevard)	66.2	57.8	54.1
Dell Range Boulevard (Prairie Road to Powder House Road)	62.9	57.0	54.1
Central Avenue (I-25 to Yellowstone Road)	65.4	58.1	54.6
Central Avenue (Yellowstone Road to Warren Avenue)	67.1	59.8	56.3
Central Avenue (Warren Avenue to Pershing Boulevard)	63.6	56.3	52.8
Warren Avenue (Central Avenue to Pershing Boulevard)	63.6	56.3	52.8
Pershing Boulevard (I-25 to Snyder Avenue)	63.0	55.7	52.2
Pershing Boulevard (Snyder Avenue to Central Avenue)	63.8	56.5	53.0
Pershing Boulevard (Central Avenue to Warren Avenue)	64.6	57.3	53.8
I-80 (I-25 to College Drive)	65.0	62.3	60.4
College Drive (I-25 to Railroad Tracks)	63.1	55.8	52.3
College Drive (Railroad Tracks to Parsley Boulevard)	64.1	54.2	51.9

Table 2.2.4-1 Continued
PREDICTED L_{eq} NOISE LEVELS (dBA) AT SELECTED RECEPTORS
FOR 1983

Roadway Segments	Right-of-Way Boundary	Distance From Right-of-Way Line (ft) 100	200
Cheyenne, Wyoming			
College Drive (Parsley Boulevard to Walterscheid Boulevard)	65.0	57.4	53.9
College Drive (Walterscheid Boulevard to U.S. 85)	64.2	56.9	53.4
Fox Farm Road (U.S. 85 to Avenue C)	63.8	56.3	52.8
Fox Farm Road (Avenue C to College Drive)	63.1	55.8	52.3
Kimball, Nebraska			
U.S. 30	59.9	52.6	49.1
Route 71	63.1	55.9	52.4



(08B-2)

1983 CHEYENNE AIRPORT 65 dBA
NOISE LEVEL CONTOURS (Ldn)

FIGURE NO. 2.2.4-2

2.2.4.2.3 Railroad Noise

Noise level determination associated with railroad operations in Cheyenne was based upon both yard and mainline operations. However, the noise centers associated with the yard operations dominate the size and location of the noise contours. Railroad operations in Cheyenne consist of a maximum 600 cars per day processed at the railroad yard with peak activity occurring between 7:00 AM and 3:00 PM.

Yard operations consist entirely of flat yard switching, with most switching activities occurring on tracks south of the train tower concentrated in an area approximately 1,000 feet west of and 1,600 feet east of the Interstate 180 viaduct. The locomotive servicing, repair, and self-load testing activities adjacent to the turntable constitute another major noise center.

The results of the Wyle Laboratories analytical procedure indicates that about 61 dwelling units (south of the railroad yard) with an estimated population of 159 people, fall within the calculated 65 dBA L_{dn} noise level contour which extends beyond the railroad boundary.

2.2.4.2.4 Construction Noise

Typical ranges of noise levels, associated with the various phases of the proposed project construction activities and from the various types of construction equipment that will be used, will be no different than that of existing general construction activities within the city of Cheyenne.

2.2.5 Air Quality

Air quality is defined as a descriptive measure of the cumulative quantity of pollution in the air. The pollutants analytically evaluated, based on expected increases in emission quantities for the level of activity associated with the project, are carbon monoxide (CO), resulting primarily from transportation (mobile) sources, and fugitive dust, resulting primarily from such activities as vehicular travel on unpaved surfaces, overburden disturbances, and erosion. The impact of air pollution on regional visibility has also been evaluated.

2.2.5.1 Region of Influence and Data Sources

2.2.5.1.1 Region of Influence

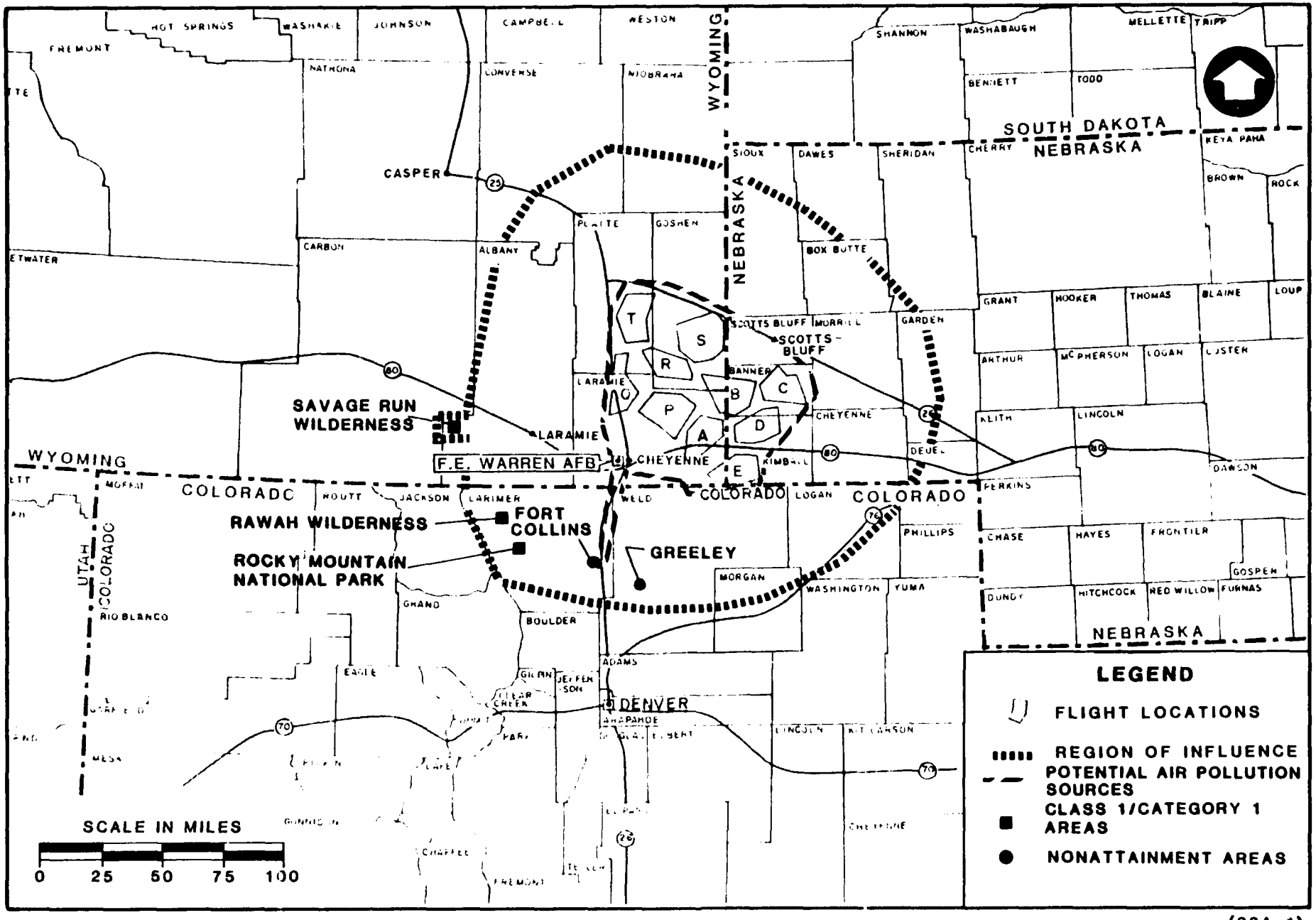
The Region of Influence for Air Quality includes those surrounding areas in which air quality may be affected directly (by construction activities) or indirectly (by project-induced transportation traffic and housing development). It centers on F.E. Warren AFB, the city of Cheyenne, interstate highways, traffic arterials, and affected silos, access roads, and cable trench routes within the Deployment Area. Outer boundaries of the Region of Influence were conservatively set at 50 miles from the pollution sources.

In addition, the Region of Influence includes federal and state-mandated areas of study; nearby nonattainment areas (Fort Collins and Greeley, Colorado), nearby federal Prevention of Significant Deterioration Class I areas (Rocky Mountain National Park and Rawah Wilderness, Colorado), and nearby state Category I areas (Savage Run Wilderness, Wyoming.) The total Region of Influence for Air Quality is presented in Figure 2.2.5-1.

The Area of Concentrated Study within the Region of Influence includes F.E. Warren AFB; Cheyenne, Wyoming; Kimball, Nebraska; and areas where pollutant concentrations resulting from the Proposed Action are expected to exceed minimum threshold levels. A more detailed justification for the Area of Concentrated Study is provided in Chapter 3.

The criteria used for defining the Region of Influence are based upon Environmental Protection Agency (EPA) minimum levels for air quality impacts (Federal Register 1978). The source of air pollution is defined as the "envelope" containing all of the sites of construction activity and the principal traffic routes.

The Region of Influence boundary is determined for each analyzed pollutant as the distance from any point on the circumference of that pollution source envelope equivalent to the maximum distance, predicted by dispersion modeling, from a pollution source to a location at which minimum threshold increment concentrations are indicated (EPA Area of Impact criteria) (EPA 1980). This distance was not expected to exceed 50 miles for 1-hour, 8-hour, 24-hour, or annual-averaging time periods for the level of activity expected to be generated by the project.



(08A-1)

REGION OF INFLUENCE FOR AIR QUALITY

FIGURE NO. 2.2.5-1

Study area classifications (nonattainment, Prevention of Significant Deterioration Class I and Prevention of Significant Deterioration Category I) are determined by the EPA, the Wyoming Department of Environmental Quality, the Nebraska Department of Environmental Control, and the Colorado Department of Health. Nonattainment areas are those areas which have been designated as violating one or more of the ambient air quality standards. Mandatory Class I/Category I areas are those areas where practically no deterioration of air quality is allowed. Such deterioration of air quality includes increases in atmospheric concentrations of pollutants and impairment of visibility within a reasonable distance from the source(s) of atmospheric emissions (Federal Register 1980, Wyoming Department of Environmental Quality 1982, Nebraska Department of Environmental Control 1982, Colorado Department of Health 1982).

2.2.5.1.2 Data Sources and Analytic Methods for Existing Conditions

2.2.5.1.2.1 Data Sources

Information and data relevant to all aspects of the air quality analysis have been acquired from the following sources: EPA, National Climatic Data Center, National Weather Service, Department of Agriculture, Department of the Interior, Wyoming Department of Environmental Quality, Wyoming State Highway Department, Nebraska Department of Environmental Control, Nebraska Department of Roads, Colorado Department of Health, City of Cheyenne, and Midwest Research Institute.

2.2.5.1.2.2 Analytic Methods for Existing Conditions

Carbon Monoxide. Carbon monoxide (CO) is the primary pollutant associated with transportation sources. In order to determine vehicular CO concentrations on selected roadway segments and intersections, the EPA mobile source emissions program, MOBILE 2 (EPA 1981), was used in conjunction with the CALINE 3 dispersion model (Federal Highway Administration 1979).

MOBILE 2 was used to determine composite vehicular emission source strengths for CO. Specific vehicular mixes (i.e., percentages of lightduty gas/diesel cars and trucks, medium-duty gas/diesel trucks and heavyduty gas/diesel trucks), percent hot/cold start operations, inspection/ maintenance criteria, and ambient temperature were incorporated into the program. This model is an accepted EPA procedure for emissions development.

CALINE 3 is a Gaussian diffusion program used for the estimation of CO concentrations from line (i.e., roadway) sources. The model incorporates vehicular emission factors from MOBILE 2, vehicular volumes, worst-case meteorological parameters (i.e., wind speed and direction, and atmospheric stability class) and roadway configuration (based upon a Cartesian coordinate system) to estimate 1 and 8-hour CO concentrations for selected signed or signaled intersections (interrupted flow) and freely flowing roadway segments (uninterrupted flow). This model is an accepted EPA procedure for dispersion analysis.

Sensitivity tests were performed for the selected intersections and roadway segments in the project area where high volumes of traffic and/or increases in volumes were anticipated in order to determine the wind angle which would produce maximum CO levels at the designated receptor locations. Receptors were located along the roadway rights-of-way to determine maximum CO levels associated with human exposure. Roadways were modeled as infinite links to include impacts at the theoretical receptors from distant sources. Highway links were set at 2 miles in length, since sensitivity tests showed that vehicular sources beyond 2 miles had no impact at the receptors. The assigned link lengths for residential roadways were slightly longer than the actual link lengths to approximate the impact of vehicular emissions along adjacent roadway links.

Fugitive Dust. Existing levels of total suspended particulates were determined from monitored data collected by the Wyoming Department of Environmental Quality and Nebraska Department of Environmental Control. Monitored measurements of total suspended particulates at representative rural sites were used to define existing levels of fugitive dust concentrations in the Deployment Area.

Visibility. Existing levels of regional visibility were based on visual range distances determined from review of existing documentation.

2.2.5.2 Existing Conditions

2.2.5.2.1 Climatology/Meteorology

Surface meteorological data collected by the National Weather Service at the Cheyenne Airport and upper air data from Denver are considered representative of the project area.

The climate in the vicinity of Cheyenne and the Deployment Area is influenced primarily by air masses moving in from the Pacific. The climate is distinctively semiarid, since the mountain ranges to the west act as an effective moisture barrier. The mean annual precipitation, approximately 15 inches, occurs primarily between the months of March and October (U.S. Department of Commerce 1982).

The region experiences large diurnal and annual temperature ranges. The daily range averages about $30^{O}F$ in the summer and $23^{O}F$ in the winter. The monthly mean temperature ranges from about $69^{O}F$ in July to about $27^{O}F$ in January. The area experiences about 10 days per year with maximum temperatures exceeding $90^{O}F$ and about 12 days per year with minimum temperature of $0^{O}F$ or below. The area is occasionally affected by warm Chinook winds blowing down the slopes of the Laramie Mountains 30 miles to the west of Cheyenne. This effect is most frequently noticeable during the winter months (U.S. Department of Commerce 1982).

The prevailing winds are from the west to west-northwest. Average surface wind speeds are quite high, averaging about 13 miles per hour (mph). Windy days are particularly frequent in the winter and spring months, when monthly mean wind speeds can exceed 15 mph. Minimum monthly average wind speeds of about 10.5 mph occur during July and August (U.S. Department of Commerce 1982).

The atmospheric dispersion potential in the area is usually good. The mean morning mixing depth, measured at 5:00 AM local standard time, is approximately 1,000 feet and the mean afternoon mixing depth, calculated for 5:00 PM local standard time, is approximately 8,000 feet (Holzworth 1972). More recent data from the Wyoming Department of Environmental Quality show the mean afternoon mixing depth to be 6,600 feet; this value will be used in this analysis. Surface-based inversions occur about 40 percent of the time, primarily during nighttime hours (Hosler 1961). The atmospheric stability is generally neutral to slightly stable 82 percent of the time (Wyoming Department of Environmental Quality October 1982). Stable, stagnant conditions occur infrequently. These conditions usually occur during nighttime hours when radiational cooling produces surface-based temperature inversions (Hosler 1961).

2.2.5.2.2 Regional Emissions

The latest annual (1980) regional air quality emission inventory, extracted from the EPA National Emission Data System, is provided in Table 2.2.5-1. Emission data were available for total suspended particulates (TSP), oxides of sulfur (SO_X), oxides of nitrogen (NO_X), carbon monoxide (CO), and volatile organic carbons (VOC), a measure of hydrocarbons (HC).

Based on the air quality inventory, emissions of NO_X, CO, and HC are attributable primarily to transportation-related sources. Evaporation of petroleum products and solvents is an additional source of hydrocarbons (HC). Electrical generation is an additonal source of NO_X. Emissions of SO_X are mostly from coal and oil combustion and petroleum industry processes. Total suspended particulate emissions occur primarily from fugitive dust 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 in Laramie County, and the Laramie River Power Station in Platte County.

Table 2.2.5-1

REGIONAL AIR QUALITY INVENTORY (1980)

(Tons/Year)

County	TSP	SO_X	NO_X	CO	VOC[1]
Wyoming					
Laramie	44,286	9,276	17,630	72,819	12,380
Platte	14,221	3,455	12,350	10,275	1,578
Goshen	14,498	1,490	4,569	14,767	2,322
Nebraska					
Kimball	11,378	43	530	5,226	741
Banner	5,153	11	147	1,298	163
Scotts Bluff	15,474	589	3,017	27,151	3,314

Note: 1 Volatile organic carbons are a measure of reactive hydrocarbons (HC).

Source: EPA Annual Report, National Emission Data System (EPA 1983).

2.2.5.2.3 Existing Air Quality

The project area lies within the Metropolitan Cheyenne and Nebraska Intrastate Air Quality Control Regions (Code of Federal Regulations 1982) These regions are classified as attainment areas with respect to state and federal air quality standards. The closest nonattainment areas, Greeley and Fort Collins, Colorado, are approximately 50 miles south and 40 miles south-southwest, respectively, of Cheyenne, Wyoming. Both Greeley and Fort Collins are designated nonattainment for the primary 8-hour CO standard and the secondary annual total suspended particulate standard (Colorado Department of Health 1982). The closest Prevention of Significant Deterioration Class I areas, Rocky Mountain National Park and Rawah Wilderness (Colorado) are located approximately 60 miles from Cheyenne. The closest state (Wyoming) Category I area, Savage Run Wilderness, is located approximately 80 miles west of Cheyenne.

The project area currently experiences excellent air quality due to the following conditions favorable for atmospheric dispersion of air pollutants: neutral atmospheric stability, extensive mixing heights, high wind speed, and relatively few sources of air pollutants in the immediate area.

Based on 1982 air quality measurements in Cheyenne, the annual average concentration of SO_2 was less than 1 microgram per cubic meter (ug/m^3), which is almost negligible compared to the Wyoming Ambient Air Quality Standard of 60 ug/m^3 and the Nebraska Ambient Air Quality Standard of 80 ug/m^3. The annual average NO_2 concentration was 23 ug/m^3, compared to the Wyoming Ambient Air Quality Standard and Nebraska Ambient Air Quality Standard of 100 ug/m^3.

2.2.5.2.3.1 Carbon Monoxide

Key roadway intersections and segments in the project area were selected for evaluation on the basis of present and projected vehicular volumes. A total of six intersections and nine roadway segments in the project area were modeled with CALINE 3. For both the intersection and roadway segment analysis, CO concentrations were predicted to adjacent receptors representing sidewalk locations or near the edge of pavement. Intersections typically represent a worst case for CO, since the relationship between vehicular speed and emissions of CO is such that CO emissions are greatest at low speeds and are maximized during deceleration, idling, and acceleration modes. These operational modes are characteristic of signalized intersections.

Since no CO monitored data were available in the project area, CO background concentrations were determined through coordination with state environmental agencies. Background levels are defined as those residual levels of a pollutant that are present in the project area exclusive of the roadway(s) under study and are added to predicted levels in order to determine total CO concentrations. Values of 1.0 parts per million (ppm) for 1 hour and 0.5 ppm for 8 hours have been used in this report. These values were added to the respective 1 and 8-hour concentrations of CO predicted from the CALINE 3 modeling.

The results of the CALINE 3 roadway segment and intersection analysis for the base year, 1983, are provided in Table 2.2.5-2. No National, Wyoming or Nebraska Ambient Air Quality Standard was shown to be either equalled or exceeded at any receptor.

2.2.5.2.3.2 Fugitive Dust

Fugitive dust emissions are a major contributor to the total suspended particulates inventory. The National, Wyoming, and Nebraska Ambient Air Quality Standards address primary and secondary standards of total suspended particulates. The annual (1980) inventory of fugitive dust is provided in Table 2.2.5-3.

Table 2.2.5-2

PREDICTED CARBON MONOXIDE (CO) CONCENTRATIONS (ppm)
AT SELECTED RECEPTOR LOCATIONS FOR 1983[a]

Roadway Configuration	1-Hour	8-Hour
Intersections		
Cheyenne, Wyoming		
16th Street/Warren Avenue	28.8	4.7
Pershing Boulevard/Central Avenue	20.1	3.4
Pershing Boulevard/Warren Avenue	23.4	3.9
Yellowstone Road/Prairie Avenue	30.3	5.4
Pershing Boulevard/Randall Avenue	9.4	1.9
Kimball, Nebraska		
Chestnut Street (Route 71)/U.S. 30	13.4	2.9
Roadway Segments		
Cheyenne, Wyoming		
I-25 (Central Avenue to Pershing Boulevard)	2.6	0.8
I-25 (Pershing Boulevard to Missile Drive)	2.6	0.8
I-25 (Missile Drive to I-80)	2.2	0.7
I-25 (I-80 to College Drive)	2.2	0.7
I-80 (I-25 to I-180)	1.6	0.7
I-80 (I-180 to College Drive)	1.6	0.7
College Drive (I-25 to Parsley Boulevard)	2.5	0.8
College Drive (Parsley Boulevard to Walterscheid Boulevard)	2.9	0.9
College Drive (Walterscheid Boulevard to U.S. 85)	2.9	0.9

Notes: a Includes 1.0 ppm and 0.5 ppm background CO levels for 1-hour and 8-hour periods, respectively.

Table 2.2.5-3

FUGITIVE DUST EMISSION INVENTORY (1980)
(Tons/Year)

	TSP	Fugitive Dust	Percent Fugitive Dust
Wyoming			
Laramie County	44,286	39,147	88.4
Platte County	14,221	13,561	95.4
Goshen County	14,498	13,557	93.5
Nebraska			
Kimball County	11,378	11,038	97.0
Banner County	5,153	5,114	99.2
Scotts Bluff County	15,474	13,772	89.0

Source: EPA Annual Report, National Emission Data System (EPA, 1983).

The 1982 annual geometric mean total suspended particulate concentrations measured in Cheyenne, Wyoming and Scottsbluff, Nebraska were 30 and 67 ug/m^3, respectively. The maximum recorded 24-hour total suspended particulate measurements were 60 and 152 ug/m^3 in Cheyenne and Scottsbluff, respectively. The rural annual geometric mean total suspended particulates concentration considered representative of the Deployment Area was 17.5 ug/m^3 (Wyoming Department of Environmental Quality 1982, Nebraska Department of Environmental Control 1982). It should be noted that the measured total suspended particulate concentrations probably include fugitive dust from agricultural activities and from natural windblown surfaces.

2.2.5.2.3.3 Visibility

Visibility in the vicinity of the project area tends to be excellent. The annual frequency of windblown dust restricting visibility to less than 7 miles is 0.2 percent. These conditions occur most frequently during the spring months (Orgill and Sehmel 1975). The Wyoming Department of Environmental Quality and Nebraska Department of Environmental Control indicate greatest visibility impairment potential to exist between November and March. Median yearly visual range tends to be high, approaching an average of 64 miles (EPA 1979).

ENVIRONMENTAL CONSEQUENCES, MITIGATION MEASURES, AND UNAVOIDABLE IMPACTS

3.0 ENVIRONMENTAL CONSEQUENCES, MITIGATION MEASURES, AND UNAVOIDABLE IMPACTS

This chapter presents the impacts, mitigation measures, and unavoidable impacts associated with the Proposed Action and its alternative options for each of the major environmental resources addressed in this EIS. The types and levels of impacts are discussed and shown in narrative and graphic form within each section.

The area of study initially encompassed that area in which project effects of any magnitude, both direct and indirect, might be expected to occur. Direct impacts are those which are directly attributable to the project itself. Indirect impacts result from the induced population locating in a community related directly or indirectly to the Proposed Action. The study area is termed the Region of Influence in this document. Its size varies by Resource and is defined at the beginning of each resource subsection in Section 2.0. Data on existing conditions within the Region of Influence were collected.

Following this, a preliminary impact analysis was conducted to determine which area(s) within the Region of Influence would experience potentially important impacts. This area(s) is defined as the Area of Concentrated Study. Section 2.0 contains descriptions of the Areas of Concentrated Study for the various Resources while Section 3.0 contains explanations of the methodology used to determine the Area of Concentrated Study for each Resource. Further data collection was conducted, if needed, for the Area of Concentrated Study. A detailed impact analysis was then conducted.

Analysis was conducted in two phases. First, the level of impact intensity was predicted at the site, local, and regional level. Second, a professional judgment was rendered on whether or not the impact, in its context, was significant. "Significant" does not necessarily imply a separate judgment on the overall severity of the impact. Rather, it may indicate a judgment regarding which impacts warrant heightened attention, by the Air Force or others, during project planning; or it may reflect a judgment as to the extent of the action necessary to avoid that impact. It should be emphasized that the analysis in many environmental resources assumes only that standard construction mitigations will be adopted. This tends to present a conservative analysis, since any additional mitigations provided by the Air Force, state, and local agencies would reduce the impacts from those predicted in this document. Those identified impacts which cannot be avoided or greatly reduced by mitigation measures are termed Unavoidable Adverse Impacts and appear at the conclusion of each Resource subsection in Section 3.0.

The following two summary matrices (Figures 3.0-1 and 3.0-2) provide an overview of impacts to environmental resources as a result of the Proposed Action and its alternative options.

The first table identifies the level of impact (negligible, low, moderate, or high) and whether or not it is significant for each environmental resource. The table identifies short-term (associated with construction activity until 1990) and long-term impacts (associated with the operational phase after construction). Geographical

extent of impacts is assigned to one of three levels: site (where local direct construction activities occur); local (within a city jurisdiction or district surrounding an impacted area); and regional (within the Region of Influence defined for each environmental resource in Chapter 2.0).

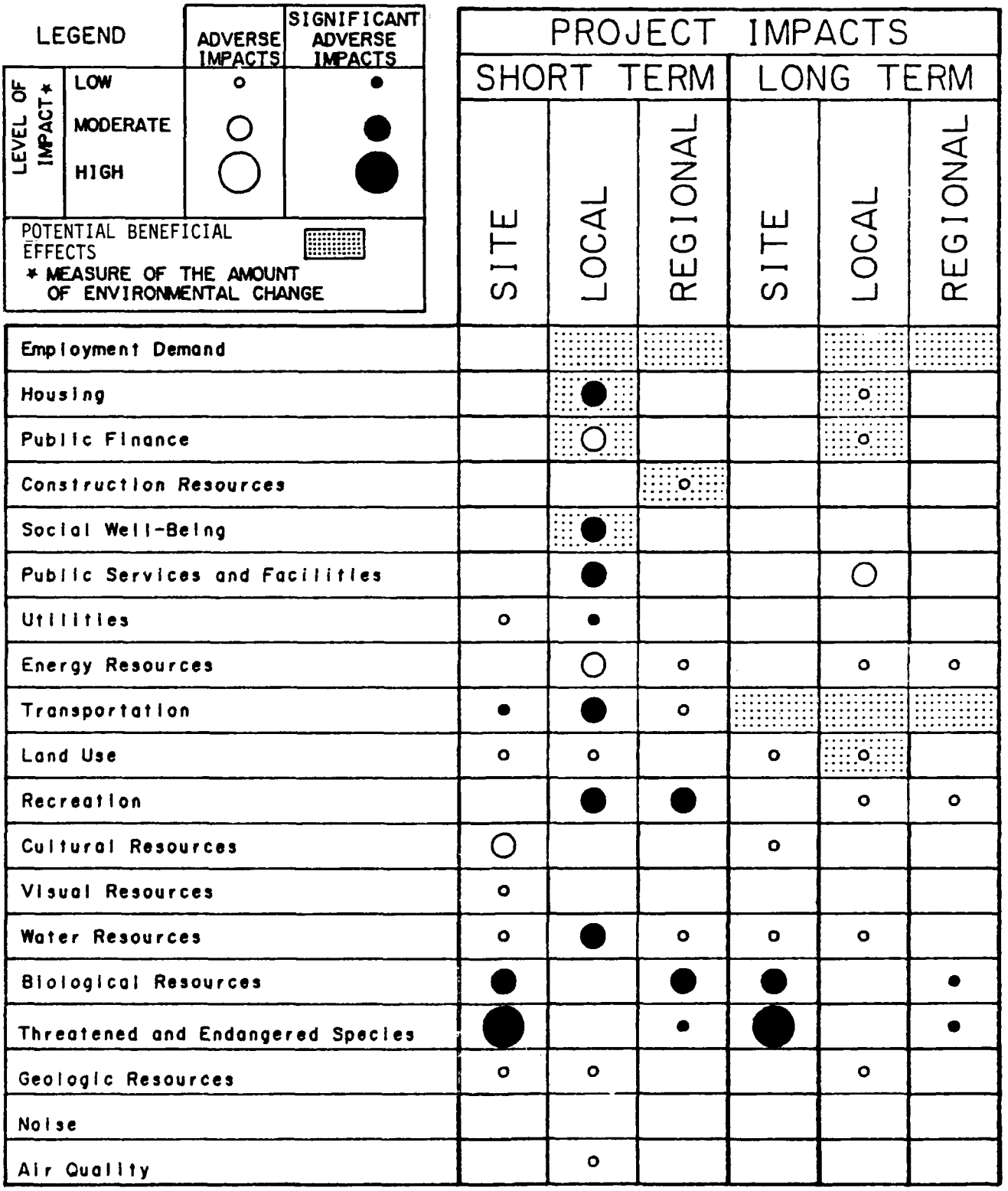
This presentation provides a visual ranking within each environmental resource but cannot be used to compare separate resources. Definitions of level of impact and significance for each environmental resource appear at the beginning of each resource section.

The second table compares the alternative options associated with the Proposed Action. Only those environmental resources which identify a low, moderate, or high impact associated with an alternative are featured. The level of impact and significance definitions are the same as for the first table. The alternatives considered have to do with the three staging area options, ten cable system routes, and three access routes from F.E. Warren AFB as described in Chapter 1.0.

Both tables result from the impact analysis presented in this chapter. Summary impact tables appear at the conclusion of the impact analysis for each environmental resource. In these impact tables, the level of impact and significance is aggregated first to the element level then from the element level to the environmental resource. The explanation of how aggregation was accomplished is described at the conclusion of the section for each resource.

FIGURE 3.0-1

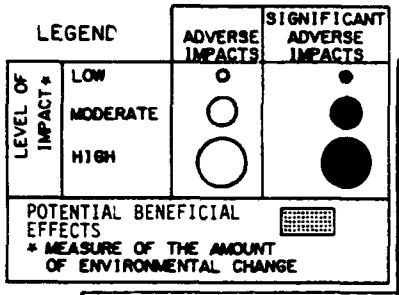
SHORT AND LONG TERM IMPACTS



Note: Adverse impacts are identified with various sized circles and are shaded if significant. If there are also beneficial effects, a dot pattern is included. The level of beneficial effect is not quantified here. See appropriate section for detailed explanation. In some cases, there are both adverse impacts and beneficial effects for the same resource.

Figure 3.0-2

ALTERNATIVES COMPARISON MATRIX

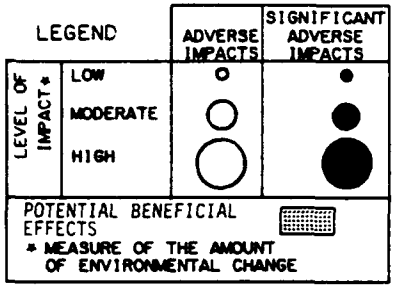


	Cable Paths[1]										ROADS[2]			STAG'NG[3]		
	Proposed Action					Alternatives										
	PA1	SB1	RB1	PA4	PD1	SB2	PB1	SC2	PA2	PA3	R1	R2	R3	PROPOSED	ALT.	NONE
ENERGY RESOURCES	o	o	o	o	o	o	o	o	o	o	o	o	o			
TRANSPORTATION													o	o		
LAND USE	o	o	o	o	o	o	o	o		o			o			
CULTURAL RESOURCES	o	◯	o	o	◯	◯	◯	◯	o	◯	o	o	o	o	o	
VISUAL RESOURCES											o	o	o			
WATER RESOURCES	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o
BIOLOGICAL RESOURCES			●	•	●	•	●	•		●	●	●	●			

Notes: 1 Denotes specific cable paths. For location of cable paths see Section 1.6.3.3 and Figure 1.6.3-1.
2 For location of alternative routes see Section 1.6.2.
3 For location of staging areas see Section 1.6.6.

Figure 3.0-2

ALTERNATIVES COMPARISON MATRIX



	Cable Paths [1]										ROADS[2]			STAGING[3]		
	Proposed Action					Alternatives										
	PA1	SB1	RB1	PA4	PD1	SB2	PB1	SC2	PA2	PA3	R1	R2	R3	PROPOSED	ALT.	NONE
THREATENED AND ENDANGERED SPECIES	●	●	●	●	●	●	●	●	●	●	⬤	⬤	⬤			
GEOLOGIC RESOURCES	o	o	o	o	o	o	o	o	o	o	o	o	o			
AIR QUALITY	o	o	o	o	o	o	o	o	o	o	o	o	o			

Notes: 1 Denotes specific cable paths. For location of cable paths see Section 1.6.3.3 and Figure 1.6.3-1.
2 For location of alternative routes see Section 1.6.2.
3 For location of staging areas see Section 1.6.6.

3.1 Human Resources

3.1.1 Employment Demand

3.1.1.1 Introduction

The analysis of employment demand serves to describe the regional economy's available labor force which may be utilized for the project. This evaluation is done in order to determine the need for labor not available within the region. As a result of the evaluation of needs for nonlocal labor, it is possible to estimate the resulting inmigration of workers and their families.

Although population inmigration resulting from the project is developed in this analysis, no population impact assessment is estimated in this section. This is because population, in terms of numbers of people alone, has no impact in and of itself. The direct impact of population on the housing market, the public finances of the area, utilities and public services are discussed in those respective sections.

The generation of employment demand, and the resulting employment of labor and increased personal income is desirable, and therefore considered to be a beneficial effect. The concern for the potentially adverse side effects of wage escalation and inflation are considered in the analyses of Social Well-Being and Housing.

The justification for the employment demand Area of Concentrated Study is based on the allocation of population to counties as shown in Table 3.1.1-7. The Area of Concentrated Study is defined as those counties which will receive project-associated inmigrants.

3.1.1.2 Employment Demand Level of Impact Definitions

Impacts on employment are measured by the ability of the economic mechanism or the market interactions of supply and demand to respond to the project impact, and the effect on the area's economy. The criteria for impact and significance determinations are assessed upon the civilian labor demand and supply only, as military personnel are assigned to their jobs outside of the functioning of the economic market. The construction phase of the project is taken to be short term, while the operational phase is considered as the long term.

- Negligible Impact - Occurs when unemployment rates are not affected but some job shifting to take advantage of higher paying jobs and an associated change in income occurs.

- Low Impact - Will occur when a decline in the area's unemployment occurs, along with a corresponding change in real income, but local labor is still available to be hired.

- Moderate Impact - Will occur when the local labor supply is fully utilized and a corresponding change in real income occurs.

- o High Impact - Will occur when the increase in employment demand can not be met by the available labor work force, then income increases and inmigration occurs.

3.1.1 3 Population and Employment Significance Criteria

It is considered to be significant in terms of employment demand when that demand leads to a 1 percent change in the rate of unemployment.

3.1.1.4 Environmental Impacts of the Proposed Action and Project Alternatives

Economic impacts of the Proposed Action are related to effects on local and regional labor and the need for inmigration. Local and regional labor available are allocated to meet direct project requirements, procurement-induced demands and personal consumption-induced demands. Direct project employees hired in the region are assumed not to relocate. Indirect employees in the service sectors currently located outside the Cheyenne vicinity are assumed to relocate.

Needs in excess of the available local and regional labor force are assumed to be met through inmigration. Inmigrants are allocated to communities through the use of a gravity model incorporating commuting distance and community populations. Category-specific household sizes are used to determine the number of accompanying dependents.

Analytic methods for the No Action Alternative included the use of a cohort-survival model to estimate population by age and sex, and an econometric model to project levels of associated economic activity. These models were run at the county level with the exception of the Denver metropolitan area where the analysis was done for the area as a whole. The results of the cohort-survival models and the econometric models are summarized in Section 3.1.1.4.1.

3.1.1.4.1 Baseline Future - No Action Alternative

The 16-county Region of Influence has an estimated 1983 population of 2.2 million. This figure is projected to increase to 2.6 million by 1990 (Table 3.1.1-1). The projected increase displays a growth rate of 2.4 percent which is lower than the increase that occurred between 1970 and 1980. After 1990, it averages 2.1 percent per year.

The number of households in the Region of Influence in 1983 is estimated to be 826,000. Between 1970 and 1980, the number of households increased 4.4 percent per year.

The labor force in the Region of Influence in 1983 is approximately 1.2 million persons. The projected increase to 1.5 million in 1990 and to 1.7 million in 1995 are due primarily to increases in the projected labor force participation rate. The labor force participation rate stood at 42 percent in 1970 and increased to 52 percent by 1983. The regional rate is projected to follow national trends by continuing to increase, although at a decreasing rate. In 1990, the labor force participation rate is projected to be 56 percent.

Table 3.1.1-1

PROJECTED SOCIOECONOMIC DATA FOR THE SIXTEEN-COUNTY REGION

YEAR	POPULATION	HOUSEHOLDS	LABOR FORCE	GROSS LFPR	RESIDENT EMPLOYMENT	UNEMPLOYED WORKERS
1982	2171920	805215	1119190	51.5	1072337	46849
1983	2228540	826206	1149890	51.6	1083948	65944
1984	2285510	847327	1201700	52.6	1139806	61891
1985	2342830	868411	1252910	53.5	1195638	57273
1986	2400440	889936	1303380	54.3	1248335	55046
1987	2458020	911283	1351670	55.0	1298504	53169
1988	2515650	932649	1392700	55.4	1337922	54778
1989	2573280	954014	1430250	55.6	1373166	57080
1990	2630900	975376	1467900	55.8	1410176	57725
1991	2688450	996712	1504370	56.0	1446094	58280
1992	2745860	1017996	1540529	56.1	1482638	57891

YEAR	UNEMP. RATE	EMPLOYMENT BY PLACE OF WORK	EARNINGS (MILLIONS OF CURRENT $)	EARNINGS (MILLIONS OF 1982 $)
1982	4.19	1155481	20963.5	20963.5
1983	5.73	1190267	22689.2	21841.1
1984	5.15	1248815	24998.0	22968.7
1985	4.67	1307331	27606.1	24117.3
1986	4.22	1363351	30517.7	25227.3
1987	3.93	1417305	33823.9	26382.9
1988	3.93	1462648	37322.0	27409.4
1989	3.99	1504640	41116.8	28404.0
1990	3.93	1549021	45367.7	29472.6
1991	3.87	1590481	50047.1	30547.3
1992	3.76	1633388	55201.5	31728.5

YEAR	PERSONAL INCOME (MILLIONS OF CURRENT $)	PERSONAL INCOME (MILLIONS OF 1982 $)	PERSONAL INCOME PER CAPITA (CURRENT $)	PERSONAL INCOME PER CAPITA (1982 $)
1982	26582.1	26582.1	12200	12200
1983	28827.9	27750.2	12900	12500
1984	31803.0	29221.3	13900	12800
1985	35161.9	30718.2	15000	13100
1986	38911.4	32165.9	16200	13400
1987	43179.9	33680.7	17600	13700
1988	47697.1	35028.9	19000	13900
1989	52593.1	36331.9	20400	14100
1990	58084.5	37733.8	22100	14300
1991	64127.7	39141.7	23900	14600
1992	70779.5	40682.4	25800	14800

Note: 1 Gross LFPR = Unemployment plus Employment divided by Population.

Unemployment rates for the region are projected to follow the national forecast of slowly declining rates from the current high levels. The 1983 rate of unemployment is estimated to be 5.7 percent, although for the 1982-1983 winter months the seasonal rate was much higher at about 8 percent. This rate is for the entire region, while for some counties the unemployment rate in 1983 is even higher, at about 12 percent. The peak year for unemployment, prior to 1983, was 1975 when the unemployment rate reached 5.0 percent. The forecast rate for 1990 is 3.9 percent and by 1995 it is projected to be 3.6 percent. Constant-dollar earnings per worker are projected to reach their pre-recession level of $18,400 in 1984. After 1984, constant-dollar earnings per worker are expected to grow at 0.6 percent per year. This rate is slightly below the 1970 to 1980 growth rate of 0.9 percent. After 1990, real earnings will resume at a faster growth rate of 1.1 percent. The projection generally follows the assumption of a gradual recovery from the recent recession.

Before identifying the project-related labor demand in the discussion of the Proposed Action, there are several onbase projects which will require labor otherwise available for project use. These projects include building a commissary, base exchange, and a one-for-one replacement of military family housing. These projects are considered to occur over and above normal base maintenance, and will require construction labor. As a result of the employment of this otherwise available labor, it is then necessary to inmigrate additional workers.

3.1.1.4.2 Proposed Action

The economic impact of the Proposed Action is principally defined by the change in employment caused by the project, and the interaction with the local labor market which then leads to inmigration.

Table 3.1.1-2 shows the project average annual direct employment requirements. The table indicates that the peak year for total project-related employment impact occurs in 1986. The 1991 workforce of 475 is the long-term project workforce, and is expected to remain constant for all subsequent years during the operational phase of the project.

Table 3.1.1-3 shows the average number of jobs including those which are considered to be filled by available labor; as well as those filled by weekly commuters and inmigrants, on an annual average basis. In general, locally available labor will fill all the road and construction jobs. Principal trade requirements include general laborers, carpenters, sheet metal workers, and masons. The onbase construction labor described in Section 3.1.1.4.1 and the indirect workers associated with that activity are assumed to be employed before allocation of project employment. Table 3.1.1-4 shows the annual unemployment rate with the project.

Table 3.1.1-2

PROJECT AVERAGE MANPOWER REQUIREMENTS BY YEAR[1]

	1984	1985	1986	1987	1988	1989	1990	1991 and on
Deployment Area								
Construction	4	40	58	58	39	0	0	0
Defense Access Roads	15	280	315	150	0	0	0	0
Assembly & Checkout and Site Activation Task Force	0	15	240	310	265	265	10	0
SUBTOTAL:	19	335	613	518	304	265	10	0
F.E. Warren AFB								
Construction	99	631	71	0	0	0	0	0
Assembly & Checkout and Site Activation Task Force	50	165	620	605	535	515	22	0
Operations[2]								
Military	0	115	400	438	425	425	404	404
Civilian	0	15	70	77	75	75	71	71
SUBTOTAL:	149	926	1,161	1,120	1,035	1,015	497	475
TOTAL:	168	1,261	1,774	1,638	1,339	1,280	507	475

Notes: 1 Source: U.S. Air Force.
2 Represents additional manpower to operate the project.

Table 3.1.1-3

TOTAL JOBS, LOCAL AND REGIONAL HIRES,
AND INMIGRATION

	1983	1984	1985	1986	1987	1988	1989	1990	1991
Additional Jobs	26	456	2,664	3,249	3,250	2,200	1,976	754	633
Average Annual Local Hires	22	446	627	1,060	1,030	1,051	876	350	229
Average Annual Weekly Commuters	0	0	973	877	522	303	334	0	0
Average Annual Inmigrant Workers	4[a]	10[a]	1,064	1,311	1,698	846	766	404	404
Inmigrant Population	10[a]	25[a]	2,808	3,764	4,811	2,397	2,092	1,034	1,034

Note: a Not formally used in further analyses.

Table 3.1.1-4

NO ACTION AND PROJECT ANNUAL UNEMPLOYMENT PERCENTAGE RATES

	1984	1985	1986	1987	1988	1989	1990	1991 & on
Without Project Unemployment Rate - Laramie County	5.01	4.49	4.18	3.92	3.93	3.98	5.93	3.87
With Project Unemployment Rate - Laramie County	4.13	3.50	3.34	3.34	3.38	3.32	3.39	3.32
Without Project Unemployment Rate - Region of Influence	5.15	4.57	4.22	3.93	3.93	3.99	3.93	3.87
With Project Unemployment Rate - Region of Influence	5.06	4.23	4.04	3.80	3.84	3.92	3.88	3.99

Based on the amount of local labor available, an estimate is made of the number of workers and their families expected to inmigrate as a result of project demand for workers which cannot be satisfied by locally available labor. Population is allocated to the communities of Wheatland, Torrington, Scottsbluff, Gering, Laramie, Pine Bluffs, Fort Collins, and Greeley which are distant from F.E. Warren AFB, but close to groups of silos. In the event that the Air Force requires a daily report to a central location (such as a dispatch area in Cheyenne or Kimball), population would be more concentrated around the dispatch center. This has not been a requirement in the past. Inmigration of direct project labor is a moderate impact.

Inmigrant workers and families are directly allocated to communities, rather than rural areas with low population density. Inmigrants are temporary residents who would utilize existing services (water, power, etc.).

Rural (farmhouse, etc.) locations are by definition self-sufficient. As the nature of this study is to determine the requirements of the existing infrastructure to serve the temporary residents, allocation to rural areas will therefore tend to understate the potential impact upon the communities of the region.

Table 3.1.1-5

ALLOCATION OF WEEKLY COMMUTERS BY LOCATION AND YEAR

	1983	1984	1985	1986	1987	1988	1989	1990	1990 & on
Cheyenne	0	0	1,697	781	395	213	235	0	0
Wheatland	0	0	0	84	0	0	0	0	0
Torrington	0	0	0	25	77	0	0	0	0
Scottsbluff/ Gering	0	0	0	0	87	90	0	0	0
Kimball	0	0	0	0	0	0	99	0	0

A part of the local labor force will be commuting from places too distant for daily driving such as Sheridan or Rock Springs. Table 3.1.1-5 shows the yearly peak number of weekly commuters and the community to which they will commute. This can be contrasted with the average number of weekly commuters shown in Table 3.1.1-3. The actual place where they choose to reside during the week may deviate from this based upon the availability of motel rooms or other temporary residences.

The estimate of the available labor supply discussed in Section 3.1.1.4.1 is based upon the assumption of a strong national economic recovery. If this does not occur, labor force availability will be greater than that estimated. This is especially true in the affected Colorado communities with large university populations available for work but not considered a part of the labor force at this time. It is very likely that an even greater reduction in indirect inmigration will occur as a result of consideration of these assumed unavailable resources. This is especially true as peak project work and therefore peak labor demand will occur in the summer months. The result of this effect is shown in Table 3.1.1-6 which indicates the total inmigration resulting from the project assuming increased labor force participation.

A comparison of population impacts associated with baseline estimates for each of the counties affected is shown in Table 3.1.1-7. A community-specific comparison is shown in Table 3.1.1-8.

3.1.1.4.3 Consideration of Alternatives

The project alternatives entail the use of different staging areas which are used as administrative center, dispatch, and storage areas. As such, they are staffed by locally hired personnel, and changing their selection will not alter inmigration. Other alternatives, namely road and cable paths also will not alter inmigration.

Table 3.1.1-6

INMIGRATION ESTIMATES:
WORKERS AND ACCOMPANYING DEPENDANTS

	1983	1984	1985	1986	1987	1988	1989	1990	1991 and on
Cheyenne	0	0	2,732	3,481	3,781	1,868	1,719	942	942
Direct	0	0	1,220	1,941	2,241	1,868	1,719	942	942
Indirect	0	0	1,512	1,540	1,540	0	0	0	0
Laramie	0	0	16	119	90	7	6	0	0
Direct	0	0	16	119	90	7	6	0	0
Indirect	0	0	0	0	0	0	0	0	0
Pine Bluffs	0	0	1	6	24	24	24	0	0
Direct	0	0	1	6	24	24	24	0	0
Indirect	0	0	0	0	0	0	0	0	0
Fort Collins	0	0	40	40	147	43	40	0	0
Direct	0	0	40	40	147	43	40	0	0
Indirect	0	0	0	0	0	0	0	0	0
Greeley	0	0	19	26	46	24	22	0	0
Direct	0	0	19	26	46	24	22	0	0
Indirect	0	0	0	0	0	0	0	0	0
Kimball	0	0	0	0	29	33	119	0	0
Direct	0	0	0	0	29	33	119	0	0
Indirect	0	0	0	0	0	0	0	0	0
Gering	0	0	0	0	168	91	12	0	0
Direct	0	0	0	0	123	91	12	0	0
Indirect	0	0	0	0	45	0	0	0	0
Scottsbluff	0	0	0	0	191	95	16	0	0
Direct	0	0	0	0	146	95	16	0	0
Indirect	0	0	0	0	45	0	0	0	0
Torrington	0	0	0	0	151	43	42	0	0
Direct	0	0	0	0	106	43	42	0	0
Indirect	0	0	0	0	45	0	0	0	0
Wheatland	0	0	0	0	92	77	0	0	0
Direct	0	0	0	0	92	77	0	0	0
Indirect	0	0	0	0	0	0	0	0	0

Table 3.1.1-7

INMIGRATION ESTIMATES AND BASELINE - TOTAL POPULATION
BY COUNTY

	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991
Albany:											
Baseline	29,516	30,175	30,848	31,549	32,265	33,009	33,763	34,541	35,332	36,148	36,978
Impact	0	0	0	0	16	119	90	7	6	0	0
TOTAL:	29,516	30,175	30,848	31,549	32,265	33,009	33,763	34,541	35,332	36,148	36,978
Goshen:											
Baseline	12,221	12,450	12,738	13,095	13,518	13,973	14,431	14,890	15,340	15,781	16,228
Impact	0	0	0	0	0	0	151	43	42	0	0
TOTAL:	12,221	12,450	12,738	13,095	13,518	13,973	14,582	14,933	15,382	15,781	16,228
Laramie:											
Baseline	70,319	71,847	73,394	74,960	76,556	78,147	79,735	81,321	82,901	84,483	86,059
Impact	0	0	0	0	2,733	3,579	3,897	1,984	1,835	1,034	1,034
TOTAL:	70,319	71,847	73,394	74,960	79,289	81,726	83,632	83,305	84,736	85,517	87,093
Platte:											
Baseline	10,293	10,649	11,389	11,757	12,113	12,458	12,807	13,142	13,470	13,807	14,143
Impact	0	0	0	0	0	0	92	77	0	0	0
TOTAL:	10,293	10,649	11,389	11,757	12,113	12,458	12,899	13,219	13,470	13,807	14,143
Banner:											
Baseline	919	925	931	937	942	951	959	964	965	973	980
Impact	0	0	0	0	0	0	0	0	0	0	0
TOTAL:	919	925	931	937	942	951	959	964	965	973	980

Table 3.1.1-7 Continued

INMIGRATION ESTIMATES AND BASELINE - TOTAL POPULATION
BY COUNTY

	1981	1983	1983	1984	1985	1986	1987	1988	1989	1990	1991
Kimball:											
Baseline	4,871	4,856	4,836	4,808	4,776	4,748	4,714	4,682	4,649	4,614	4,587
Impact	0	0	0	0	0	0	29	33	119	0	0
TOTAL:	4,871	4,856	4,836	4,808	4,776	4,748	4,743	4,715	4,768	4,614	4,587
Scotts Bluff:											
Baseline	38,596	38,827	39,024	39,193	39,343	39,477	39,588	39,690	39,779	39,852	39,915
Impact	0	0	0	0	0	0	359	186	28	0	0
TOTAL:	38,596	38,827	39,024	39,193	39,343	39,477	39,947	39,876	39,807	39,852	39,915
Larimer:											
Baseline	155,550	161,988	168,522	175,164	181,915	188,775	195,689	202,676	209,734	216,865	224,059
Impact	0	0	0	0	40	40	147	43	40	0	0
TOTAL:	155,550	161,988	168,522	175.164	181,955	188,815	195,836	202,719	109,774	216,865	224,059
Weld:											
Baseline	127,275	131,041	134,904	138,836	142,845	146,941	151,108	155,369	159,723	164,178	168,717
Impact	0	0	0	0	19	26	46	24	22	0	0
TOTAL:	127,275	131,041	134,904	138,836	142,864	146,967	151,154	155,393	159,745	164,178	168,717

Table 3.1.1-8

INMIGRATION ESTIMATES AND BASELINE - TOTAL POPULATION
BY COMMUNITY

	1983	1984	1985	1986	1987	1988	1989	1990	1991
Torrington:									
Baseline	5,665	5,741	5,818	5,896	5,973	6,050	6,127	6,204	6,281
Impact	0	0	0	0	151	43	42	0	0
TOTAL:	5,665	5,741	5,818	5,896	6,124	6,093	6,169	6,204	6,281
Wheatland:									
Baseline	4,500	4,500	4,500	4,500	4,500	4,500	4,500	4,500	4,500
Impact	0	0	0	0	92	77	0	0	0
TOTAL:	4,500	4,500	4,500	4,500	4,592	4,577	4,500	4,500	4,500
Scottsbluff:									
Baseline	14,156	14,217	14,272	14,320	14,361	14,398	14,430	14,456	14,494
Impact	0	0	0	0	191	95	16	0	0
TOTAL:	14,156	14,217	14,272	14,320	14,552	14,493	14,446	14,456	14,494
Kimball:									
Baseline	3,129	3,124	3,116	3,110	3,101	3,092	3,083	3,072	3,066
Impact	0	0	0	0	29	33	119	0	0
TOTAL:	3,129	3,124	3,116	3,110	3,130	3,125	3,202	3,072	3,066
Gering:									
Baseline	8,480	8,727	8,975	9,223	9,741	9,720	9,868	10,216	10,964
Impact	0	0	0	0	168	91	12	0	0
TOTAL:	8,480	8,727	8,975	9,223	9,909	9,811	9,980	10,216	10,964

Table 3.1.1-8 Continued
INMIGRATION ESTIMATES AND BASELINE - TOTAL POPULATION
BY COMMUNITY

	1983	1984	1985	1986	1987	1988	1989	1990	1991
Ft. Collins:									
Baseline	96,092	99,447	102,817	106,196	109,571	112,947	116,323	119,697	123,067
Impact	0	0	40	40	147	43	40	0	0
TOTAL:	96,092	99,447	102,857	106,236	109,718	112,990	116,363	119,697	123,067
Greeley:									
Baseline	76,026	78,184	80,351	82,525	84,696	86,867	89,039	91,209	93,376
Impact	0	0	19	26	46	24	22	0	0
TOTAL:	76,026	78,184	80,370	82,551	84,742	86,891	89,061	91,209	93,376
Albin:									
Baseline	131	133	134	135	136	137	138	140	141
Impact	0	0	0	0	0	0	0	0	0
TOTAL:	131	133	134	135	136	137	138	140	141
Burns:									
Baseline	296	306	316	325	335	345	354	364	374
Impact	0	0	0	0	0	0	0	0	0
TOTAL:	296	306	316	325	335	345	354	364	374
Carpenter:									
Baseline	102	102	103	103	104	105	105	106	106
Impact	0	0	0	0	0	0	0	0	0
TOTAL:	102	102	103	103	104	105	105	106	106

Table 3.1.1-8 Continued
INMIGRATION ESTIMATES AND BASELINE - TOTAL POPULATION
BY COMMUNITY

	1983	1984	1985	1986	1987	1988	1989	1990	1991
Harrisburg:									
Baseline	87	87	88	88	89	90	90	91	91
Impact	0	0	0	0	0	0	0	0	0
TOTAL:	87	87	88	88	89	90	90	91	91
Cheyenne:									
Baseline	60,781	61,642	62,508	63,376	64,243	65,110	65,977	66,844	67,710
Impact	0	0	2,732	3,481	3,781	1,868	1,719	942	942
TOTAL:	60,781	61,642	65,240	66,857	68,024	66,978	67,696	67,786	68,652
Laramie:									
Baseline	24,840	24,988	25,136	25,284	25,432	25,581	25,729	25,877	26,025
Impact	0	0	16	119	90	7	6	0	0
TOTAL:	24,840	24,988	25,152	25,403	25,522	25,588	25,735	25,877	26,025
Chugwater:									
Baseline	314	325	336	348	359	370	381	392	403
Impact	0	0	0	0	0	0	0	0	0
TOTAL:	314	325	336	348	359	370	381	392	403
Pine Bluffs:									
Baseline	1,125	1,141	1,157	1,174	1,190	1,206	1,223	1,239	1,255
Impact	0	0	1	6	24	24	24	0	0
TOTAL:	1,125	1,141	1,158	1,180	1,214	1,230	1,247	1,239	1,255

3.1.1.5 Summary of Impacts

A detailed impact matrix is shown in Figure 3.0-1. This assessment applies for all alternatives. See Section 3.1.1.5.1 for the summary.

3.1.1.5.1 Aggregation of Elements, Impacts, and Significance

The overall impact rating for employment demand is high and not significant in the local and regional level in the short term and low and not significant on the local and regional level in the long term. In addition some portion of high short term impacts may be beneficial to the region. No method of aggregation is required for the employment demand resource as there is only one element to consider.

Because the construction phase of the project causes a reduction in unemployment as shown in Table 3.1.1-4, and because local labor can not supply the project created demand, as shown in Table 3.1.1-3, the short-term impact of the project impact is considered to be high for both the regional and local area. Real per-capita income also increases during this period, as shown on Table 3.1.1-9.

For the long-term operational phase of the project, local labor is available to supply the non-military employment demand, and is available in excess of the demand created by the project. As a result, this impact is defined to be low for both the regional and the local area.

As is shown in Table 3.1.1-4, the effect of the project on the unemployment rate is never greater than 1 percent for either the region or the local area, and as a result the impact of the project is defined to be not significant for both the short and long term.

3.1.1.6 Mitigation Measures

Potential inmigration related mitigation measures that will be considered are identified below. One, some, or all of the mitigation measures may ultimately be selected to reduce potential inmigration impacts upon other resources. Each measure identifies the party responsible to implement, but not necessarily to pay for, the measure.

- There are two basic ways in which population effects can be mitigated. The first is by enhancement or increased availability of local labor, while the second is the provision of alternative sites for residential location, such as a temporary worker living area or provision of group transportation (contractor or Air Force).

- Methods to enhance labor force availability include job training programs and employment referral systems. Job training programs would alter the population impacts because they would provide a greater locally available labor force with project-related skills. These programs would entail the training of workers in the trades required for decommissioning of Minuteman and for Launch Facility modification. As more local labor becomes available for direct employment, the need for inmigration will be reduced (contractor or Air Force).

Table 3.1.1-9

REGIONAL PER CAPITA INCOME (1982 $)

	1984	1985	1986	1987	1988	1989	1990	1991
Without Project	11,800	12,301	12,673	13,043	13,234	13,598	13,863	14,183
With Project	11,806	12,350	12,700	13,069	13,253	13,606	13,863	14,183

- o Another mitigation measure, to lessen the impact of inmigration, would be a job referral service dedicated to project-related employment (over and above the usual "hiring hall" arrangement for construction workers). An efficient referral system, especially one involved with all forms of available jobs, both direct and indirect, would reduce labor market friction. This would have two implications. First, local labor would be more available as the floor unemployment rate is reduced. Secondly, labor market friction among inmigrants would be reduced, thereby reducing the need for inmigration (contractor or Air Force).

- o Detailed careful planning and scheduling to minimize labor force competition (contractor and Air Force).

3.1.1.7 Unavoidable Adverse Impacts

The inmigration of persons unable to gain employment is a result of normal labor market friction. An unavoidable adverse impact will result if jobless inmigrants remain out of work. The possibility that workers, (especially indirect workers) might remain during the declining cycle of the project implies the prevalence of a larger than usual unemployed workforce. This is also an unavoidable adverse impact.

3.1.2 Housing

3.1.2.1 Introduction

This section describes the impacts of the Proposed Action on housing. Description of the criteria used to classify impacts, the criteria used to determine the significance of these impacts, and a description of the procedures used to estimate impacts are contained in the following sections.

The Housing Area of Concentrated Study consists of those communities and geographic and politically distinct areas in which project-attributable population growth exceeds baseline projected growth by more than 5 percent in any given year. Increased population in a service area is the most important factor in determining likely effects on housing.

Justification for the Housing Area of Concentrated Study was determined by analyzing a body of western growth and development literature (Cortese 1977, 1980, 1982; Leistritz and Maki 1981; Thompson et al. 1978). These sources collectively support the position that impacts generated by less than 5 percent average incremental population growth in any given impact year are manageable and can be absorbed by most communities.

3.1.2.2 Definition of Levels of Impacts

For housing, level of impact is based on the demand for a particular housing type and the historic supply changes. For purposes of this analysis, the growth cycle for a particular housing type occurs when additional supply is required if additional demand could not be met by existing vacancies. Decline cycle for a particular housing type is defined as a decline in demand resulting in an excess supply (Tables 3.1.2-1 and 3.1.2-2). Growth and decline cycles may overlap as a result of the variations in scheduling of construction activities. Short term is defined as the 5-year construction period for deployment. Long term is defined as a period exceeding the 5-year construction period.

- Negligible Impact - Growth Cycle: An increase in demand that could be met by a small portion of the projected net vacancy. Any changes in vacancy and housing supply would be inconsequential. Decline Cycle: A decrease in demand that results in a net vacancy that exceeds baseline projections only slightly, but does not approach the average historic rate.

- Low Impact - Growth Cycle: An increase in demand that would exhaust most vacancies but could still be satisfied by the projected net vacancy. Based on historic annual supply additions (1970-1982), the average annual production could satisfy the growing demand. Decline Cycle. A decrease in demand that results in an increase in the vacancy rate, approaching but not exceeding the average historic rate (1970-1982).

Table 3.1.2-1

PROJECT IMPACTS NET ANNUAL HOUSING DEMAND AND REQUIRED CHANGES IN SUPPLY
CHEYENNE URBANIZED AREA

Housing Type	1985 Project Demand[2]	1985 Net Demand[3]	1985 Required Supply[4]	1985 Excess Supply[5]	1986 Project Demand[2]	1986 Net Demand[3]	1985-1986 Required Supply[4]	1985-1986 Excess Supply[5]	1987 Project Demand[2]	1987 Net Demand[3]	1986-1987 Required Supply[4]	1986-1987 Excess Supply[5]
Single-Family	425	265	265	0	531	369	104	0	566	392	23	0
Multifamily	196	8	8	0	189	0	0	8	184	0	0	8
Mobile Home	823	762	762	0	647	585	0	177	588	525	0	237
Other[1]	344	0	0	0	212	0	0	0	166	0	0	0
TOTAL UNITS:	1,788	1,035	1,035	0	1,579	954	104	185	1,494	917	23	245

Housing Type	1988 Project Demand[2]	1988 Net Demand[3]	1987-1988 Required Supply[4]	1987-1988 Excess Supply[5]	1989 Project Demand[2]	1989 Net Demand[3]	1988-1989 Required Supply[4]	1988-1989 Excess Supply[5]	1990 Project Demand[2]	1990 Net Demand[3]	1989-1990 Required Supply[4]	1989-1990 Excess Supply[5]
Single-Family	232	65	0	327	229	61	0	331	181	11	0	381
Multifamily	96	0	0	8	94	0	0	8	50	0	0	8
Mobile Home	348	284	0	478	341	276	0	486	116	50	0	712
Other[1]	116	0	0	0	115	0	0	0	18	0	0	0
TOTAL UNITS:	792	349	0	813	779	337	0	825	365	61	0	1,101

Notes: 1 Other category includes hotel/motel rooms and campground spaces.
2 Demand is defined as total housing needs as induced by the Project.
3 Net Demand is defined as demand less net vacancy (net vacancy equals gross vacancy minus frictional vacancy).
4 Required Supply is defined as increases in supply required to satisfy net demand.
5 Excess supply is defined as vacancy resulting from the decline cycle conditions of the Proposed Action.

Table 3.1.2-2

PROPOSED ACTION NET ANNUAL HOUSING DEMAND AND REQUIRED CHANGE IN SUPPLY
CITY OF KIMBALL

Housing Type	1987 Project Demand[2]	1987 Net Demand[3]	1987 Required Supply[4]	1987 Excess Supply[5]	1988 Project Demand[2]	1988 Net Demand[3]	1987 - 1988 Required Supply[4]	1987 - 1988 Excess Supply[5]	1989 Project Demand[2]	1989 Net Demand[3]	1988 - 1989 Required Supply[4]	1988 - 1989 Excess Supply[5]
Single-Family	1	0	0	0	2	0	0	0	8	0	0	0
Multifamily	2	0	0	0	2	0	0	0	9	0	0	0
Mobil Home	6	0	0	0	6	0	0	0	51	42	42	0
Other[1]	2	0	0	0	2	0	0	0	25	0	0	0
TOTAL UNITS:	11	0	0	0	12	0	0	0	93	42	42	0

	1990 Project Demand[2]	1990 Net Demand[3]	1989 - 1990 Required Supply[4]	1989 - 1990 Excess Supply[5]
Single-Family	0	0	0	0
Multifamily	0	0	0	0
Mobile Home	0	0	0	42
Other[1]	0	0	0	0
TOTAL UNITS:	0	0	0	42

Notes:
1 Other category includes hotel/motel rooms and campground spaces.
2 Demand is defined as total housing needs as induced by the Project.
3 Net Demand is defined as demand less net vacancy (net vacancy equals gross vacancy minus frictional vacancy).
4 Required Supply is defined as increases in supply required to satisfy net demand.
5 Excess supply is defined as vacancy resulting from the decline cycle conditions of the Proposed Action.

- Moderate Impact - Growth Cycle: An increase in demand that exceeds the projected net vacancy. Supply additions to meet increased demand would have to approach but not exceed the highest historical (1970-1982) annual production levels. Decline Cycle: A decrease in demand that results in a net vacancy that would exceed the annual average net vacancy, but not the highest historical (1970-1982) annual net vacancy.

- High Impact - Growth Cycle: An increase in demand that exceeds the projected net vacancy. Supply additions to meet increased demand would have to exceed the highest historical (1970-1982) annual production level. Decline Cycle: A decrease in demand that results in a net vacancy that would exceed the highest historical (1970-1982) annual net vacancy.

3.1.2.3 Determination of Significance Criteria

- The intensity and severity of housing impacts: Impacts which create strained conditions in the market and would require vigorous supply adjustments for providers and/or users but only when aggregated with any of the criteria regarding controversy, duration, or institutional responses noted below.

- The duration of housing impacts: Impacts which extend beyond a 2-year period for both growth and decline cycles will be considered significant.

- The institutional responses to housing impacts: Impacts which cause shifts in the historic mix of housing types affecting housing industry participants (providers and users).

- The controversy of housing impacts: Impacts which by community and/or housing industry consensus are considered to be controversial.

3.1.2.4 Environmental Impacts of the Proposed Action and Project Alternatives

Baseline housing forecasts were developed utilizing spatial allocation and housing models. The relationships between housing units and population were corrected to reflect recent trends. The disaggregation of housing by type was modified to reflect housing composition in the forecast communities.

Net annual increases in housing demand by unit type for construction and operations personnel relative to baseline growth and vacancy in housing stock was projected for the impact communities. Housing impacts were developed on the basis of projected population allocation. Population/housing ratios, vacancy factors, housing composition, and other variables derived from recent construction workforce studies were utilized.

3.1.2.4.1 Baseline Future - No Action Alternative

3.1.2.4.1.1 Cheyenne Urbanized Area

The Cheyenne Urbanized Area is expected to experience a housing unit growth rate from 1983 to 1990 of just under 10 percent, increasing from 24,809 dwelling units to 27,283 dwelling units. It is projected that approximately 65 percent of the housing stock will be single family, 23 percent multifamily, and 12 percent mobile homes. Table 3.1.2-3 summarizes the baseline projections. The low net vacancy tight market conditions experienced from 1980 to 1982 are projected to continue through the baseline future period.

3.1.2.4.1.2 City of Kimball

The city of Kimball's housing stock is composed of 1,269 units of which 900 (71%) are single family, 225 (18%) are multifamily, and 144 (11%) are mobile homes. According to baseline projections between 1983 and 1990, the city will experience no growth with all housing category supply levels remaining stable.

3.1.2.4.2 Proposed Action

3.1.2.4.2.1 Cheyenne Urbanized Area

As shown in Table 3.1.2-1, the Cheyenne Urbanized Area will experience impacts between 1985 and 1990 as a result of changes in demand and supply due to the Proposed Action. Single-family impacts for both growth and decline cycles are considered to be only short term in that impacts for both cycles do not exceed a 5-year period.

Single-family and multifamily housing will experience both growth and decline cycle impact conditions. Single family housing will experience a high, significant, short-term impact at the local level during the decline cycle. An excess supply of 327 units in 1988 will increase to 381 by 1990. A net vacancy will occur that exceeds the highest historical net vacancy rate of 1.0 percent (1970 to 1980 annual average) as a result of this excess supply. The significance rating is judged on the severity (i.e., the highest historical net vacancy rate will be exceeded) and the controversy of this impact (i.e., community and housing industry consensus that the high net vacancy rate is controversial).

Multifamily housing will experience a short-term, low, not significant impact at the local level in 1985 during the growth cycle. Only an additional supply of 8 units will be required to meet the total demand of 196 units. Beginning in 1986 and continuing through 1990, the decline cycle will occur. The impact for multifamily housing is considered negligible in the long term because this excess supply results in a net vacancy of 0.1 percent which is less than the projected net vacancy of 3.2 percent for any year during this period.

Table 3.1.2-3

BASELINE FORECAST - CHEYENNE URBANIZED AREA

Housing Type	1983	1984	1983-1984 Change	1983-1984 %Change	1985	1984-1985 Change	1984-1985 %Change	1986	1985-1986 Change	1985-1986 %Change
Single-Family	16,126	16,354	228	1.4	16,584	230	1.4	16,814	230	1.4
Multi-family	5,706	5,787	81	1.4	5,868	81	1.4	5,950	82	1.4
Mobile Home	2,977	3,019	42	1.4	3,062	43	1.4	3,104	42	1.4
Other[1]	2,414	2,414	0	0	2,414	0	0	2,414	0	0
TOTAL Year-Round Housing Units:	24,809	25,160	351	1.4	25,514	354	1.4	25,868	354	1.4

	1987	1986-1987 Change	1986-1987 %Change	1988	1987-1988 Change	1987-1988 %Change	1989	1988-1989 Change	1988-1989 %Change	1990	1989-1990 Change	1989-1990 %Change
Single-Family	17,044	230	1.4	17,274	230	1.3	17,504	230	1.3	17,734	230	1.3
Multi-family	6,031	81	1.4	6,112	81	1.3	6,194	82	1.3	6,275	81	1.3
Mobile Home	3,147	43	1.4	3,189	42	1.3	3,231	42	1.3	3,274	43	1.3
Other[1]	2,414	0	0	2,414	0	0	2,414	0	0	2,414	0	0
TOTAL Year-Round Housing Units:	26,222	354	1.4	26,575	353	1.3	26,929	354	1.3	27,283	354	1.3

Note: 1 Other category includes hotel/motel rooms and campground spaces. The Other category is not included in Total Year-Round Housing Units.

Mobile homes will experience a high and significant impact for both the short and long term in the Cheyenne Urbanized Area. The short-term high impact during the growth cycle in 1985 is a result of the required supply of 762 units which exceeds the projected net vacancy of 61 units and exceeds the highest historical annual change in supply of 297 units in 1982.

The long-term high impact is the result of excess supply during the decline cycle period of 1986-1990, with 177 units in 1986 increasing to 712 excess units in 1990 which creates a net vacancy that exceeds the highest historical net vacancy of 91 units in 1982.

The significance ratings for mobile home for the short-term high impact is based on the application of the following criteria with respect to intensity, controversy, and institutional response: Intensity - exceeds the highest historical annual production level; Controversy - a community and housing industry consensus that the magnitude of the supply increase is controversial; and Institutional Response - housing industry shifts to large volume of mobile home sales. The long-term high impact significance rating is based on the application of the following criteria with respect to duration and controversy: Duration - a high net vacancy during the decline cycle extending beyond a 2-year period; and Controversy - a community and housing industry consensus that the large number of vacant mobile homes constitutes a controversial issue.

The Other housing category which includes hotel and motel rooms and campground spaces will experience negligible impacts for both short term and long term from 1985 through 1990 and from then on. No net demands will result due to the projected vacancies in the market, therefore, requiring no change in supply or creation of any excess supply.

Only local impacts for housing will be experienced in the Cheyenne Urbanized Area.

Single-family housing, during decline cycle conditions (1988-1990), will experience a reduction in net demand from the peak net demand of 392 in 1987 to a low of 11 in 1990, producing high, short-term impacts. Multifamily housing during decline cycle conditions (1986-1990) will show a zero net demand for the 5 years (long-term, negligible impacts) as a result of the decreasing demand for multifamily units, and the availability of vacancies which can absorb the demand.

The Other housing category will show negligible impacts from 1985 to 1990, whereby no net demands will result due to the availability of vacancies which can absorb the demand.

3.1.2.4.2.2 City of Kimball

As shown in Table 3.1.2-2 the city of Kimball will experience short-term housing impacts from 1987 through 1990 for both growth and decline cycles. Only short-term impacts will be experienced in that no impacts are expected to exceed a 5-year period.

Single-family, multifamily, and other housing categories will experience short-term negligible local impacts only during the growth cycle from 1987 through 1989. Although there are demands for housing in these categories, the projected net vacancy can accommodate the demands resulting in a zero net demand (i.e., zero required supply). These impacts are judged to be not significant.

Mobile homes will experience both short-term growth and decline cycle impact conditions. A high and significant short-term impact is the result of a required supply of 42 units in 1989 (growth cycle) and an excess supply of 42 units in 1990 (decline cycle). The increase in demand in 1989 exceeds the projected net vacancy and the highest historical annual supply change of 3 units (1970-1980 annual average). A net vacancy that exceeds the highest historical annual net vacancy of 9 units in 1980 is a result of this 1990 decrease in demand.

The significant rating for mobile homes for the short-term impact is based on the application of the following criteria with respect to intensity, severity, and controversy: Intensity and Severity - required supply exceeds the highest historical annual production level and excess supply exceeds the highest historical annual net vacancy; and Controversy - a community and housing industry consensus that the increases in supply and excess supply are of such a magnitude that they are considered controversial.

Only local impacts for housing will be experienced in the city of Kimball.

3.1.2.4.3 Consideration of Alternatives

As no changes in population impacts are anticipated due to staging, roads, or cable alternatives (Section 3.1.1.4.2), no variation in housing impacts are projected.

3.1.2.5 Summary of Impacts

3.1.2.5.1 Explanation of Detailed Impact Matrix

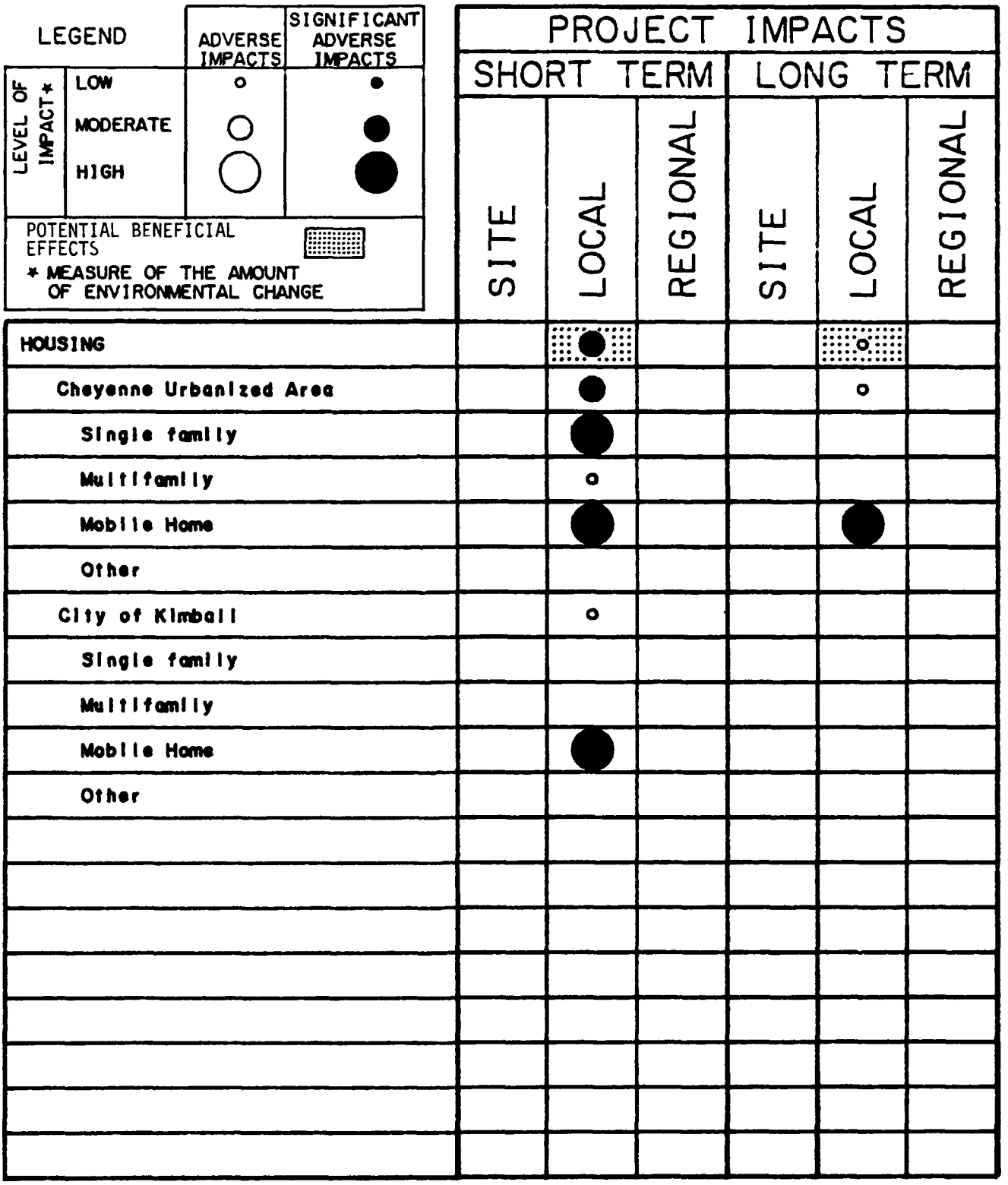
Figure 3.1.2-1 summarizes the level of impacts and significance ratings for each housing type (single-family, multifamily, mobile home, and other) and for both jurisdictions (Cheyenne Urban Area and the City of Kimball) by the Housing Resource. All impacts are local.

As noted previously in Section 3.1.2.4.2.1 for the Cheyenne Urbanized Area, single family housing will experience short-term, high, and significant impacts during the decline cycle whereby the excess supply produces a net vacancy that exceeds the highest historical net vacancy rate. Single family housing impacts are judged to be significant as a result of their severity and controversy.

Multifamily housing will experience short-term low impacts during the growth cycle whereby the demand exceeds the projected net vacancy and the market response would be within the range of historic annual production levels. Multifamily housing in the Cheyenne Urbanized Area also will experience long-term negligible impacts during the decline cycle whereby the excess supply produces a net vacancy that is less than the projected net vacancy.

FIGURE 3.1.2-1

HOUSING SUMMARY IMPACT MATRIX



Mobile home housing in the Cheyenne Urbanized Area will experience short-term, high, and significant impacts during the growth cycle whereby the demand exceeds the projected net vacancy and the market response exceeds the highest historical annual production level. Long-term, high, and significant impacts occur during the decline cycle whereby the excess supply produces a net vacancy that exceeds the highest historical annual net vacancy. These impacts are judged to be significant as a result of their controversy, duration, intensity, and institutional response.

Other housing in the Cheyenne Urbanized Area will experience short and long-term negligible impacts which is a result of demand being met by a portion of the net vacancy during the growth cycle. and a decrease in demand that results in a net vacancy that is less than the projected net vacancy during the decline cycle.

The Housing Resource for the Cheyenne Urbanized Area will experience both short and long-term impacts when the aggregation methodology discussed in Section 3.1.2.5.2 is applied. For the short-term, aggregate impacts will be moderate and significant since two of the four subelements are high, namely single family and mobile homes; and significant as a result of the significance ratings for the same housing types.

Beneficial effects may result due to the potential increase in sales value and rental income resulting from increased demand. Moreover, an opposite effect on the consumer may result, particularly those on fixed income.

As noted previously in Section 3.1.2.4.2.2 for the city of Kimball, only short-term and local impacts will be experienced. Single-family, multifamily and other housing types or subelements will experience negligible impacts during the growth cycle whereby increases in demand can be met by a portion of the projected net vacancy. Mobile homes will experience high and significant impacts during both the growth and decline cycles. High impacts during the growth cycle are a result of an increase in demand that exceeds the projected net vacancy and the market response exceeds the highest historical annual production level. High impacts during the decline cycle are a result of a decrease in demand which creates a net vacancy that exceeds the highest historical annual net vacancy. The mobile home impacts are judged to be significant as a result of their intensity, severity, and controversy.

The Housing Resource for the city of Kimball will experience only short-term, low impacts because only one subelement, mobile homes, experiences a high impact. The Housing Resource impact is not significant because only one subelement, mobile homes, is judged to be significant.

Again, beneficial effects may result because of the potential increase in sales value and rental income due to increased demand.

3.1.2.5.2 Aggregation of Elements, Impacts, and Significance

The Housing Resource for the Area of Concentrated Study will experience overall short-term, moderate, and significant impacts and long-term, low, and not significant impacts at the local level.

The aggregation of two jurisdictions (Cheyenne Urbanized Area and the city of Kimball) to the Area of Concentrated Study is based on a qualitative assessment and ranking of the two jurisdictions relative to the overall level of impacts and significance ratings of the Housing Resource. In this instance, the Cheyenne Urbanized Area will experience higher levels of impact across the Housing Resource subelements and impacts of significance among more subelements. For these resources, the level of impact and significance ratings for the Cheyenne Urbanized Area are judged to more accurately reflect overall Housing Resource impacts.

The aggregation of impact ratings for housing types or subelements to the Housing Resource or element level is accomplished by employing the following method: a negligible aggregate impact occurs when no subelement experiences a high impact rating; a low aggregate impact occurs when one subelement experiences a high impact; a moderate aggregate impact occurs when two or three subelements experience high impacts; and a high aggregate impact occurs when all of the subelements experience high impacts. This method applies to both the growth and decline cycles.

The aggregation of significance ratings is established as follows: if two or more of the subelements are judged to be significant in accordance with the set of significance criteria, then the resource or element is determined to be significant.

3.1.2.6 Mitigation Measures

Potential mitigation measures that will be considered are identified below. One, some, or all of the mitigation measures may ultimately be selected. Each measure identifies the party responsible to implement, but not necessarily to pay for, the measure.

- Provide housing demand forecast data to officials to assist in local planning (Air Force);
- Offer incentives to builders and developers who participate in federal and secondary mortgage market programs (public agency, contractor);
- Review plans, policies, and regulations for mobile home and recreational vehicle parks (public agency); and
- Consider the provision of a temporary, full-service worker living area (contractor).

3.1.2.7 Unavoidable Adverse Impacts

Unavoidable adverse impacts are those remaining impacts which cannot be thoroughly negated by mitigation measures.

- Increased demand pressures leading to inflationary housing costs and rental prices could occur during the short term or period of construction activity. These pressures will most likely be reduced for the long term or operational period of the projects. (For further discussion see Social Well-Being Section 3.1.5.)

- Decreases in demand leading to: excess supply in mobile homes and single-family units resulting in high vacancy rates. This condition will most likely occur during the decline cycle and for both short and long-term impacts.

- Decreased resale market conditions for mobile homes and single-family units with decline in housing values. This condition will occur with the increases in vacancy rates noted previously and will not typically represent decline cycle conditions of long-term impacts.

3.1.3 Public Finance

3.1.3.1 Introduction

The Public Finance Area of Concentrated Study consists of communities and geographically and politically distinct areas that experience project-attributable growth that exceeds baseline projected growth by more than 5 percent in any given year based on inmigrant population allocation. The Area of Concentrated Study consists of the following governmental entities:

- Laramie County, Wyoming;
- The City of Cheyenne, Wyoming;
- Laramie County School District No. 1;
- South Cheyenne Water and Sewer District;
- City of Cheyenne Board of Public Utilities;
- Kimball County, Nebraska;
- The City of Kimball, Nebraska;
- Kimball County School District No. 1 (K to 12); and
- Kimball County School District No. 3 (K to 12).

School districts and county governments within these areas were included in the Public Finance Area of Concentrated Study, as were contiguous urban service districts.

3.1.3.2 Definition of Levels of Impacts

Impacts for Public Finance are classified in terms of revenues and expenditures. Short term is defined as equal to one budget period which is 1 year. Long term is defined as a period exceeding 1 year.

- Negligible Impact - Will result in no change in public revenues and expenditures from forecasts projected without the project.
- Low Impact - Will cause a change in operating expenditures which is offset by an equivalent change in revenues attributable to the project.
- Moderate Impact - Will cause an expenditure imbalance attributable to the project resulting in necessary reductions in carryover funds.
- High Impact - The project will cause a public entity to raise fees or tax rates.

3.1.3.3 Determination of Significance Criteria

An impact is considered significant if project impacts necessitate changes in existing fiscal policy including tax structures or bonded indebtedness.

3.1.3.4 Environmental Impacts of the Proposed Action and Project Alternatives

For the No Action Alternative, expenditures were projected using a constant service level and an adjusted incremental cost approach. Categorical expenditures were adjusted to reflect planned or anticipated changes in service levels and capital facility improvements.

Revenues were project specific to each revenue source. Adjustments were based upon recent changes in state law in Nebraska and Wyoming, and the most recent disbursements of mineral royalty and severance tax revenues in Wyoming.

The 3 percent state sales and use tax and the 1 percent local option sales and use tax were projected using regression analysis of receipts and disbursements over the last 10 years against changes in per capita income with cost deflation adjustments.

Debt service requirements were identified as well as debt margins and borrowing capacity based on statutory limitation for assessment of revenue generation constraints.

For the Proposed Action, revenues and expenditures were projected in a similar manner with adjustments made to reflect impact conditions. Additional debt service and other impacts causing changes in expenditure levels, as well as increased revenues as a result of the project, were included. The Community Impact Payment from the State of Wyoming to the City of Cheyenne and Laramie County was also calculated and added into gross revenues for those jurisdictions.

Total revenues and expenditures for each governmental jurisdiction analyzed in the Public Finance section are summarized in Tables 3.1.3-1 and 3.1.3-2. These tables indicate annual financial conditions.

3.1.3.4.1 Laramie County, Wyoming

3.1.3.4.1.1 Baseline Future - No Action Alternative

Tables 3.1.3-3 and 3.1.3-4 present revenues and expenditure projections for the No Action Alternative. Revenues and expenditures are projected to increase $500,000 and $2.1 million, respectively. The major revenue source is the County's 3 percent state sales and use tax, the 1 percent local option sales and use tax, and the severance tax. In 1986 it is estimated that at current spending levels, a revenue/expenditure imbalance amounting to $160,000 will occur.

Table 3.1.3-1

REVENUES AND EXPENDITURES SUMMARY - NO-ACTION
1982 CONSTANT DOLLARS

	1982[a] Actual	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992
Laramie County Revenue Projections No-Action 1982 Constant Dollars	9,320,766	10,127,365	10,261,498	10,387,453	10,037,593	10,162,413	10,271,899	10,372,291	10,475,505	10,575,620	10,682,346
Laramie County Expenditure Projections No-Action 1982 Constant Dollars	8,993,721	9,372,826	9,459,720	10,039,573	10,196,561	10,362,185	10,523,776	10,678,976	10,829,754	10,991,762	11,140,738
BALANCE	327,045	754,539	801,778	347,880	(158,968)	(199,772)	(251,877)	(306,685)	(354,249)	(416,142)	(458,392)
Projected Laramie County School District No. 1 Revenues No-Action	38,001,849	44,584,274	52,647,843	52,113,985	53,212,724	54,043,524	54,643,669	55,405,292	56,165,147	56,935,388	57,716,695
Laramie County School District No. 1 Projected Expenditures No-Action	37,625,153	39,213,021	48,919,888	49,000,622	50,406,467	51,358,222	52,648,107	53,057,031	53,561,812	54,580,210	55,278,596
BALANCE	376,696	5,371,253	3,727,955	3,113,363	2,836,257	2,685,302	1,995,562	2,348,261	2,603,335	2,355,178	2,438,099
City of Cheyenne Revenues No-Action 1982 Constant Dollars	23,137,992	21,691,442	21,886,789	22,060,134	22,259,294	22,453,410	22,614,060	22,755,408	22,902,703	23,043,890	23,198,725
City of Cheyenne Expenditures Projections No-Action 1982 Constant Dollars	22,217,403	22,643,393	24,157,226	25,098,491	26,050,581	26,523,405	26,850,124	27,091,843	27,413,562	27,734,910	28,055,145
BALANCE	920,589	(951,951)	(2,270,437)	(3,038,357)	(3,791,287)	(4,069,995)	(4,236,064)	(4,336,435)	(4,510,859)	(4,691,020)	(4,856,420)
Cheyenne Board of Public Utilities-Waterworks No-Action Revenues	3,944,302	3,881,371	4,846,746	6,667,737	7,882,998	8,003,156	8,125,589	8,250,299	8,377,284	8,506,544	8,638,081
Cheyenne Board of Public Utilities-Waterworks No-Action Expenditures	3,600,253	3,811,212	5,086,238	5,809,128	7,635,670	7,702,114	7,883,460	7,955,708	8,031,858	8,110,910	7,344,863
BALANCE	344,049	70,159	(239,492)	858,609	247,328	301,042	242,129	294,591	345,426	395,634	1,293,218

Table 3.1.3-1 Continued

REVENUES AND EXPENDITURES SUMMARY - NO-ACTION
1982 CONSTANT DOLLARS

	1982[a] Actual	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992
City of Cheyenne Board of Public Utilities Sewers Revenues No-Action	1,394,210	1,231,309	1,248,740	1,266,297	1,283,878	1,301,434	1,319,015	1,336,571	1,354,128	1,371,684	1,389,165
City of Cheyenne Board of Public Utilities Sewers Expenditures No-Action	1,096,122	1,111,521	1,123,066	1,134,694	1,146,538	1,157,966	1,169,611	1,181,239	1,192,866	1,204,494	1,216,072
BALANCE	298,088	119,788	125,674	131,603	137,304	143,468	149,404	155,332	161,262	167,190	173,093
South Cheyenne Water and Sewer Revenue No-Action	614,032	608,649	612,114	620,344	614,417	622,672	630,928	639,273	626,186	634,165	642,144
South Cheyenne Water and Sewer Expenditure No-Action	599,541	608,177	599,987	606,466	613,040	619,544	626,048	632,622	621,309	627,582	568,134
BALANCE	14,491	472	12,127	13,878	1,377	3,128	4,880	6,651	4,877	6,583	74,010
Kimball City No-Action Revenue	1,013,469	1,128,498	1,127,286	1,125,463	1,124,016	1,121,957	1,119,843	1,117,728	1,115,181	1,113,029	1,110,915
Kimball City No-Action Expenditure	681,402	688,064	687,094	685,543	684,380	682,635	680,890	679,145	677,013	675,849	673,717
BALANCE	332,067	440,434	440,192	439,920	439,636	439,322	438,953	438,583	438,168	437,180	437,198

Note: a Annual Budget, Laramie County, FY 1980 to 1983.

Table 3.1.3-2

REVENUES AND EXPENDITURES SUMMARY - PROPOSED ACTION
1982 CONSTANT DOLLARS

	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992
Laramie County Proposed Revenue Proposed Action 1982 Constant Dollars	9,320,766	10,197,680	10,293,377	11,006,508	10,365,056	10,495,407	10,525,574	10,608,253	10,640,581	10,619,906	10,726,631
Laramie County Projected Expenditures Proposed Action 1982 Constant Dollars	8,993,721	9,372,826	9,549,720	10,494,851	10,709,276	10,924,705	10,876,038	11,145,496	11,214,178	11,213,427	11,563,586
BALANCE:	327,045	824,854	743,657	511,657	(344,220)	(429,298)	(350,464)	(537,243)	(573,597)	(593,521)	(636,955)
Laramie County School District No. 1 Projected Revenues Proposed Action	38,001,849	44,584,274	52,648,278	52,337,801	56,466,417	57,496,977	58,242,789	57,148,907	57,567,491	57,633,214	58,439,476
Laramie County School District No. 1 Proposed Expenditures Proposed Action	37,625,153	39,213,021	48,919,888	51,340,497	52,854,283	54,938,171	54,929,300	55,010,900	54,986,270	55,973,358	57,018,320
BALANCE:	376,696	5,371,253	3,728,390	997,304	3,612,134	2,558,806	3,313,489	2,138,007	2,581,221	1,659,856	1,421,156
City of Cheyenne Projected Revenues Proposed Action 1982 Constant Dollars	23,137,992	21,695,489	21,956,951	23,189,660	22,903,992	23,153,326	23,144,700	23,242,162	23,299,655	23,174,532	23,329,361
City of Cheyenne Projected Expenditures Proposed Action 1982 Constant Dollars	22,217,403	22,643,393	23,962,886	25,529,478	27,173,172	27,699,213	27,422,384	27,604,772	27,824,206	28,145,787	28,465,995
BALANCE:	920,589	947,904	(2,005,935)	(2,339,818)	(4,269,180)	(4,545,887)	(4,277,684)	(4,362,610)	(4,524,551)	(4,971,255)	(5,136,634)
City of Cheyenne Board of Public Utilities Waterworks Revenues Proposed Actions	3,994,302	3,881,371	5,189,098	7,345,334	8,002,183	7,622,546	7,577,888	8,418,532	8,331,669	8,615,921	8,636,609
City of Cheyenne Board of Public Utilities Waterworks Expenditures Proposed Action	3,600,253	3,811,212	5,293,976	6,175,081	7,804,524	7,528,018	7,591,305	8,087,088	8,028,721	8,213,222	7,379,761
BALANCE:	344,049	70,159	(104,878)	1,170,253	197,659	94,528	(13,417)	331,444	302,948	402,699	1,256,848

Table 3.1.3-2 Continued

REVENUES AND EXPENDITURES SUMMARY - PROPOSED ACTION
1982 CONSTANT DOLLARS

	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992
Board of Public Utilites-Sewers Proposed Action Revenues	1,394,210	1,231,209	1,248,740	1,289,821	1,336,971	1,364,741	1,350,257	1,304,567	1,376,554	1,394,110	1,411,591
Board of Public Utilities-Sewers Proposed Action Expenditures	1,096,122	1,111,521	1,123,066	1,150,275	1,181,503	1,199,896	1,190,303	1,199,780	1,207,720	1,219,347	1,230,926
BALANCE:	298,088	119,788	125,674	139,546	155,468	164,845	159,954	104,787	168,834	174,763	180,665
South Cheyenne Water and Sewer Revenues Proposed Action	614,032	608,649	612,114	1,059,924	735,989	731,274	686,328	692,914	630,011	637,990	645,969
South Cheyenne Water and Sewer Expenditures Proposed Action	599,541	608,177	599,987	733,070	708,816	705,101	669,692	674,881	624,316	630,589	571,141
BALANCE:	14,491	472	12,127	326,854	27,173	26,173	16,636	18,033	5,695	7,401	74,828
Kimball City Revenues Proposed Action	1,013,469	1,128,498	1,127,286	1,125,463	1,124,016	1,128,231	1,127,521	1,149,070	1,119,241	1,113,029	1,110,915
Kimball City Expenditures Proposed Action	681,402	688,648	687,677	686,125	684,960	688,842	687,871	722,026	677,586	675,840	674,093
BALANCE:	332,067	439,850	439,609	439,338	439,056	439,389	439,650	427,044	441,655	437,189	436,822

Table 3.1.3-3

PROJECTED LARMIE COUNTY REVENUES - NO ACTION
1982 CONSTANT DOLLARS

	1982[a] (Actual)	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992
STATE SOURCE REVENUES											
3% SALES AND USE TAX	1508327	1462311	1485930	1504668	1528962	1552184	1568147	1579924	1592990	1604754	1619544
CIGARETTE TAX	79570	81658	84601	87628	90634	93634	96624	99597	102577	105536	108516
GASOLINE TAX	243192	249574	258567	267819	277009	286178	295316	304402	313509	322553	331660
SEVERANCE TAX	1468672	1212536	1212536	1212536	1212536	1212536	1212536	1212536	1212536	1212536	1212536
HB 126 B	15000	0	0	0	0	0	0	0	0	0	0
OTHER STATE TRANSFERS	172192	176711	183078	189629	196136	202628	209098	215532	221980	228384	234832
SUBTOTAL:	3486953	3182790	3224711	3262279	3305277	3347160	3381721	3411990	3443591	3473763	3507088
FEDERAL SOURCE TRANSFERS											
FEDERAL REVENUE SHARING ENTITLEMENT	916185	916185	916185	916185	916185	916185	916185	916185	916185	916185	916185
FEDERAL REVENUE SHARING EARNED INTEREST	75499	75499	75499	75499	75499	75499	75499	75499	75499	75499	75499
FEDERAL PILT	13683	13683	13683	13683	13683	13683	13683	13683	13683	13683	13683
LEAA GRANTS	0	0	0	0	0	0	0	0	0	0	0
CETA GRANTS	11267	0	0	0	0	0	0	0	0	0	0
OTHER FEDERAL TRANSFERS	166572	170943	177103	183440	189734	196015	202274	208497	214735	220930	227168
SUBTOTAL:	1183206	1176310	1182470	1188807	1195101	1201382	1207641	1213864	1220102	1226297	1232535
CITY SOURCE TRANSFERS	295999	301696	305967	310268	314576	318878	323186	327487	331789	336090	340374
OWN SOURCE											
OPTIONAL 1% SALES TAX	1306651	1350367	1372117	1389481	1411915	1433359	1448100	1458975	1471042	1481905	1495562
PROPERTY TAX	940465	999316	1020638	1042369	1064032	1085654	1107248	1128761	1150301	1171760	1193259
MOTOR VEHICLE TAX	178800	183492	190104	196906	203663	210404	217122	223803	230498	237148	243844
LICENSES,PERMITS, FEES, & OTHER INCOME AND REVENUES	253000	258448	263962	269582	275185	280777	286361	291925	297496	303046	308606
COUNTY CLERK'S FEES	252683	258124	263631	269244	274840	280425	286003	291559	297123	302666	308219
COURT FEES	62458	63803	65164	66552	67935	69315	70694	72067	73443	74813	76185
BUILDING FUND INCOME	405735	420765	429742	438892	0	0	0	0	0	0	0
SUBTOTAL:	3399792	3534314	3605359	3673027	3297569	3359933	3415529	3467091	3519904	3571337	3625675
TOTAL REVENUES	8365950	8195110	8318507	8434381	8112523	8227352	8328076	8420433	8515385	8607488	8705672
INTEREST INCOME	954816	712975	723710	733791	705789	715780	724543	732578	740839	748851	757393
CARRYOVER		1219281	1219281	1219281	1219281	1219281	1219281	1219281	1219281	1219281	1219281
TOTAL AVAILABLE REVENUES:	9320766	10127365	10261498	10387453	10037593	10162413	10271899	10372291	10475505	10575620	10682346
BUILDING FUND BALANCE	408862	829627	1259369	1698261							

Note: a Annual Budget, Laramie County, FY 1980 to 1983.

Table 3.1.3-4

LARAMIE COUNTY EXPENDITURE PROJECTIONS - NO ACTION
1982 CONSTANT DOLLARS

	1982[a] (Actual)	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992
GENERAL GOVERNMENT	2862176	2923804	2986189	3049769	3113150	3176411	3239593	3302535	3365558	3428341	3491244
SHERIFF	1237994	1517580	1549961	1582962	1615859	1648694	1681488	1714158	1746870	1779457	1812106
DISTRICT & COUNTY COURT	577594	527483	538845	550428	561988	573539	585088	596607	608153	619671	615096
COUNTY JAIL	760231	776600	793170	810058	826893	843696	860478	877196	893936	910612	927320
ROADS AND BRIDGES	1257391	1284465	1311871	1339803	1367647	1395439	1423195	1450847	1478533	1506115	1533749
1% OPTIONAL	1306651	1351210	1378000	1444951	1449422	1462804	1472332	1476031	1475103	1465966	1499623
REVENUE SHARING	991684	991684	991684	991684	991684	991684	991684	991684	991684	991684	991684
SUBTOTAL:	8993721	9372826	9549720	9769655	9926643	10092267	10253858	10409058	10559836	10721844	10870820
ADDITIONAL CAPITAL OUTLAYS AND DEBT SERVICE											
JOINT CITY & COUNTY JAIL				269918	269918	269918	269918	269918	269918	269918	269918
SHERIFF'S DEPT. REMODEL				60000							
TOTAL:	8993721	9372826	9549720	10039573	10196561	10362185	10523776	10678976	10829754	10991762	11140738
BONDED DEBT OUTSTANDING	0	0	0	0	0	0	0	0	0	0	0
LEGAL DEBT MARGIN	4118960	4207649	4297427	4388925	4480136	4571176	4662100	4752681	4843377	4933728	5024251

Note: a Laramie County Budget, FY 1983.

The County's share of debt service on the joint city/county jail is projected to be over $269,918 per year. Financing for the jail is proposed through joint power revenue bonds. Laramie County's general obligation bonding capacity is anticipated to remain at 100 percent throughout the study period.

Under the No Action Alternative, additional capital facilities and improvements include remodeling of present Sheriff's Department space into offices and storage in 1985 at a cost of $60,000, and the joint city/ county jail in 1985 at a total cost of $5.5 million. Of this, the county's share is estimated to be $2.5 million, resulting in an additional annual cost of $269,918. These items are included in the expenditure projections in Table 3.1.3-4 and will also satisfy capacity requirements caused by the Proposed Action.

3.1.3.4.1.2 Proposed Action

Under the Proposed Action the potential negative balance previously identified, also occurs in 1986. The amount of this negative balance is projected to be $344,220 in 1986 ($185,252 greater than under the No Action Alternative), increasing to $350,464 in 1988 ($98,487 greater than under the No Action Alternative), and $636,955 ($378,563 greater than under the No Action Alternative) in 1992 as indicated in Table 3.1.3-5 and 3.1.3-6. This is due to the unresponsiveness of all major revenue sources to major population increases other than sales and use taxes and the State of Wyoming Impact Assistance Payment. Revenue from these sources is not sufficient to offset increased expenditures. This impact will be long term and high, as it would necessitate a change in tax rates exceeding 1 year. Wyoming Impact Assistance Payments to the County amount to $661,592 over the project period. The County may also have to delay the planned city/ county jail facility or raise taxes to pay for this facility as a result of the project. This impact will be long term and high as it will necessitate a change in tax rates exceeding 1 year. However, it will be not significant since no change in overall tax structure will be required. Additional staffing requirements identified in the Public Services and Facilities section will result in low long and short term, not significant impacts as these expenditures exceed 1 year and are offset by an equivalent change in revenues attributable to the project. See Section 3.1.3.5.1 for overall county impacts.

3.1.3.4.2 The City of Cheyenne, Wyoming

3.1.3.4.2.1 Baseline Future - No Action Alternative

The City of Cheyenne can expect a revenue/expenditure imbalance if present spending levels are maintained, indicated in Table 3.1.3-7 and 3.1.3-8. Expenditures are projected to increase by $5.8 million. In 1992, the shortfall is expected to be $4.8 million. The severance tax and mineral royalties, along with the 3 percent and 1 percent local option sales and use tax will continue to provide the majority of revenues for the City.

Additional capital facilities and improvements necessary under No Action conditions are detailed and factored into Table 3.1.3-8. Provision of these items will satisfy facility and improvement requirements under the Proposed Action.

Table 3.1.3-5

PROJECTED LARAMIE COUNTY
REVENUES - PROPOSED ACTION
1982 CONSTANT DOLLARS

	1982 (Actual)	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992
STATE SOURCE REVENUES											
IMPACT ASSISTANCE PAYMENT				153342	81753	97257	107069	111049	111122	0	0
3% SALES AND USE TAX	1508327	1463155	1500564	1639272	1567683	1583187	1592999	1596979	1597052	1608815	1623605
CIGARETTE TAX	79570	81658	84601	93838	95560	98129	99109	102018	103038	105997	108977
GASOLINE TAX	243192	249574	258567	286799	292062	299916	302910	311799	314918	323962	333069
SEVERANCE TAX	1468672	1212536	1212536	1212536	1212536	1212536	1212536	1212536	1212536	1212536	1212536
HB 126 B	15000	0	0	0	0	0	0	0	0	0	0
OTHER STATE TRANSFERS	172192	176711	183078	203068	206795	212355	214475	220769	222977	229381	235830
SUBTOTAL	3486953	3183634	3239345	3588855	3456389	3503380	3529098	3555150	3561643	3480692	3514017
FEDERAL SOURCE TRANSFERS											
FEDERAL REVENUE SHARING ENTITLEMENT	916185	916185	916185	916185	916185	916185	916185	916185	916185	916185	916185
FEDERAL REVENUE SHARING EARNED INTEREST	75499	75499	75499	75499	75499	75499	75499	75499	75499	75499	75499
FEDERAL PILT	13683	13683	13683	13683	13683	13683	13683	13683	13683	13683	13683
LEAA GRANTS	0	0	0	0	0	0	0	0	0	0	0
CETA GRANTS	11267	0	0	0	0	0	0	0	0	0	0
OTHER FEDERAL TRANSFERS	166572	170943	177103	196440	200045	205424	207475	213564	215700	221895	228133
SUBTOTAL	1183206	1176310	1182470	1201807	1205412	1210791	1212842	1218931	1221067	1227262	1233500
CITY SOURCE TRANSFERS	295999	301696	305967	316033	327585	334610	330840	334347	337284	341585	345869
OWN SOURCE											
OPTIONAL 1% SALES TAX	1306651	1351210	1386811	1524085	1450636	1464362	1472952	1476031	1475103	1485966	1499623
PROPERTY TAX	940465	999316	1020638	1080139	1112763	1138714	1134262	1153746	1164380	1185838	1207338
MOTOR VEHICLE TAX	178800	183492	190104	210861	214731	220505	222706	229242	231534	238184	244880
LICENSES,PERMITS, FEES, & OTHER INCOME AND REVENUES	253000	258448	263962	279350	287788	294499	293348	298387	301137	306687	312247
COUNTY CLERK'S FEES	252683	258124	263631	279000	287427	294130	292980	298013	300760	306303	311856
COURT FEES	62458	63803	65164	68963	71046	72703	72419	73663	74342	75712	77084
BUILDING FUND INCOME	405735	483765	429742	454795	0	0	0	0	0	0	0
SUBTOTAL	3399792	3598157	3620053	3897194	3424390	3484913	3488667	3529081	3547256	3598690	3653028
TOTAL REVENUES	8365950	8259797	8347835	9003889	8413776	8533694	8561447	8637508	8667249	8648229	8746412
GENERAL FUND INVESTMENT AND INTEREST INCOME	954816	718602	726262	783338	731999	742431	744846	751463	754051	752396	760938
CARRYOVER		1219281	1219281	1219281	1219281	1219281	1219281	1219281	1219281	1219281	1219281
TOTAL AVAILABLE REVENUES	9320766	10197680	10293377	11006508	10365056	10495407	10525574	10608253	10640581	10619906	10726631
BUILDING FUND BALANCE	408862	829627	1259369	1714164							

SOURCE: ANNUAL BUDGET, LARAMIE COUNTY, FY1982

Table 3.1.3-6

LARAMIE COUNTY EXPENDITURE PROJECTIONS - PROPOSED ACTION
1982 CONSTANT DOLLARS

		1982[a] (Actual)	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992
GENERAL GOVERNMENT		2862176	2923804	2986189	3160277	3255727	3331656	3318629	3375636	3406749	3469532	3532435
SHERIFF	(1)	1237994	1517580	1549961	1661018	1723215	1764197	1743313	1773998	1787707	1800837	1833486
DISTRICT & COUNTY COURT	(1)	577594	527483	538845	576924	598429	612745	606073	616919	622015	626928	622353
COUNTY JAIL	(1)	760231	776600	793170	850002	881931	902803	892116	907818	914834	921553	938261
ROADS AND BRIDGES	(1)	1257391	1284465	1311871	1405869	1458512	1493199	1475523	1501494	1513097	1524211	1551845
1% OPTIONAL		1306651	1351210	1378000	1444951	1449422	1462804	1472332	1596979	1597052	1608815	1623605
IMPACT ASSISTANCE					74208	80539	95699	106449	111049	111122	0	0
REVENUE SHARING		991684	991684	991684	991684	991684	991684	991684	991684	991684	991684	991684
SUBTOTAL:		8993721	9372826	9549720	10164933	10439358	10654787	10606120	10875578	10944260	10943559	11093668
ADDITIONAL CAPITAL OUTLAY AND DEBT SERVICE												
JOINT CITY/ COUNTY JAIL		0	0	0	269918	269918	269918	269918	269918	269918	269918	269918
SHERIFF'S DEPT. REMODEL					60000							
TOTAL:		8993721	9372826	9549720	10494851	10709276	10924705	10876038	11145496	11214178	11213477	11363586
BONDED DEBT OUTSTANDING		17987442 0	0	0	0	0	0	0	0	0	0	0
LEGAL DEBT MARGIN		4118960	4207649	4297427	4388925	4480136	4571176	4662100	4752681	4843377	4933728	5024251

Notes: 1 Commuters are included in expenditures for these categories.
a Laramie County Fiscal Year 1983 budget.

Table 3.1.3-7

CITY OF CHEYENNE REVENUES - NO ACTION
1982 CONSTANT DOLLARS

	1982[a] (Actual)	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992
STATE SOURCE TRANSFERS											
1% SALES AND USE TAX	3554071	3475133	3531263	3575794	3633527	3688712	3726648	3754636	3785688	3813644	3848791
CIGARETTE TAX	334667	341108	345940	350800	355671	360537	365402	370268	375134	379994	384837
GAS TAX	525122	535228	542810	550436	558079	565714	573348	580983	588618	596244	603843
MINERAL ROYALTIES (1)	1362599	1124913	1124913	1124913	1124913	1124913	1124913	1124913	1124913	1124913	1124913
SEVERANCE TAX (2)	4651165	3840002	3840002	3840002	3840002	3840002	3840002	3840002	3840002	3840002	3840002
OTHER	15000	0	0	0	0	0	0	0	0	0	0
SUBTOTAL:	10427624	9316383	9384927	9441944	9512192	9579877	9630314	9670802	9714354	9754796	9802386
FEDERAL SOURCE TRANSFERS											
REVENUE SHARING	1082497	1082497	1082497	1082497	1082497	1082497	1082497	1082497	1082497	1082497	1082497
OWN SOURCE											
PROPERTY TAX	970613	992151	1006206	1020342	1034510	1048663	1062815	1076968	1091120	1105256	1119343
1% SALES AND USE TAX	3123865	3209100	3260933	3302055	3355368	3406329	3441361	3467206	3495882	3521698	3554153
FRANCHISES	1210255	527048	534514	542023	549550	557068	564586	572104	579622	587131	594614
USER FEES											
i recreation	281862	287286	291356	295449	299552	303650	307748	311846	315944	320037	324116
ii refuse	1956160	1993806	2022050	2050457	2078930	2107371	2135811	2164251	2192691	2221099	2249408
iii other (3)	185601	297139	297139	297139	297139	297139	297139	297139	297139	297139	297139
LICENSES, FINES, PERMITS FEES, RENTAL INCOME	1347239	1373167	1392618	1412183	1431793	1451380	1470967	1490555	1510142	1529707	1549204
SUBTOTAL:	9075595	8679697	8804816	8919648	9046842	9171599	9280427	9380068	9482540	9582067	9687977
TOTAL REVENUES: (4)	20585716	19078578	19272240	19444090	19641531	19833974	19993238	20133367	20279791	20419360	20572860
1% CARRYOVER (5)	2446881	2446881	2446881	2446881	2446881	2446881	2446881	2446881	2446881	2446881	2446881
INTEREST INCOME (6)	105395	165984	167668	169164	170891	172556	173941	175160	176431	177648	178984
TOTAL AVAILABLE REVENUES:	23137992	21691442	21886789	22060134	22259294	22453410	22614060	22755408	22902703	23043890	23198725

Notes: 1 MINERAL ROYALTY REVENUE HELD AT 1981 LEVEL FOR 1983 TO 1985 DUE TO SLOWDOWN IN STATE MINERAL PRODUCTION. ALLOWED TO INCREASE AT HISTORIC
2 SEVERANCE TAX REVENUE HELD AT 1982 LEVEL FOR 1983 TO 1985 DUE TO SLOWDOWN IN STATE MINERAL PRODUCTION. ALLOWED TO INCREASE AT HISTORIC
3 1980-1982 AVERAGE ANNUAL COLLECTIONS HELD CONSTANT AT 1983 LEVEL
4 CITY OF CHEYENNE CARRIES OVER SALES AND USE TAX REVENUES INTO SUBSEQUENT YEARS AS A RUNNING TOTAL OF AMOUNT COLLECTED. SALES AND USE TAX REVENUES WHICH ARE UNSPENT IN ONE FISCAL YEAR ARE ALSO CARRIED OVER INTO NEXT FISCAL YEAR AND ARE TREATED AS CREDITS IN BOTH FISCAL YEARS. FOR PURPOSES OF THIS ANALYSIS, SALES AND USE TAX REVENUES ARE TREATED AS A CREDIT ONLY IN THE YEAR IN WHICH THEY ARE RECEIVED.
5 1% CARRYOVER AMOUNTS DERIVED FROM 1982 AND 1983 FY BUDGETS FOR THE CITY OF CHEYENNE, SPECIAL REVENUE SECTIONS.
6 1980-1982 AVERAGE ANNUAL INTEREST EARNED ON TOTAL REVENUES,INCLUDING 1% CARRYOVER LESS INTEREST (EQUALS .87%)

a Annual Budget, City of Cheyenne, FY1982 to 1984. Comprehensive Annual Finacial Report, FY1982.

Table 3.1.3-8

CITY OF CHEYENNE EXPENDITURE PROJECTIONS - NO ACTION
1982 CONSTANT DOLLARS

	1982[a] (Actual)	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992
GENERAL GOVERNMENT	3031592	3089953	3133725	3177750	3221877	3265953	3310029	3354105	3398181	3442296	3486079
PUBLIC SAFETY (1)	7255484	7395160	7499917	7605282	7710891	7816378	7921865	8027352	8132839	8238204	8343204
HIGHWAYS & STREETS (1)	6837754	6969388	7068114	7167413	7266941	7366355	7465768	7565182	7664596	7763895	7862850
SANITATION (1)	2026024	2065027	2094280	2123702	2153192	2182648	2212104	2241561	2271017	2300439	2329759
HEALTH	657685	670346	679842	689393	698966	708526	718090	727652	737214	746765	756283
CULTURE & RECREATION (1)	2319564	2364218	2397709	2431394	2465157	2498881	2532605	2566329	2600053	2633738	2667306
EXISTING DEBT SERVICE	89300	89300	89300	89300	89300	89300	89300	89300	89300	89300	89300
SUBTOTAL:	22217403	22643393	22962886	23284233	23606323	23928042	24249761	24571480	24893199	25214547	25534782
ADDITIONAL CAPITAL OUTLAYS AND DEBT SERVICE											
STAGE II WATER	0	0	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000
JOINT CITY & COUNTY JAIL	0	0	0	269918	269918	269918	269918	269918	269918	269918	269918
TRANSFER STATION & TRUCK STORAGE			194340	194340	194340	194340	194340	194340	194340	194340	194340
FIRE TRUCK					150000						
FIRE STATION				350000	350000	350000	350000	350000	350000	350000	350000
SHOPS AND STORAGE						706105	706105	706105	706105	706105	706105
SIGNALIZING INTERESECTIONS					480000						
COMPACTOR AND GARBAGE TRUCK						75000	80000				
TOTAL:	22217403	22643393	24157226	25098491	26050581	26523405	26850124	27091943	27417562	27734910	28055145

Table 3.1.3-8 Continued

CITY OF CHEYENNE EXPENDITURE PROJECTIONS - NO ACTION
1982 CONSTANT DOLLARS

BONDED DEBT											
OUTSTANDING	(2)	615000	580000	546050	508950	468795	425300	378192	327169	271906	212051	147222
LEGAL DEBT											
MARGIN		5397347	5501210	5579138	5657519	5736080	5814551	5893022	5971493	6049965	6128345	6206454

1). THE NUMBER OF HOUSEHOLDS IN THE URBANIZED AREA WAS USED TO PROJECT PUBLIC SAFETY, HIGHWAYS AND STREETS, SANITATION, AND CULTURE AND RECREATION EXPENDITURES.

2). FIGURES REPRESENT AMORTIZED 1982 OUTSTANDING DEBT ONLY. ADDITIONAL OUTSTANDING DEBT WOULD LIKELY BE INCURRED IN MAKING ADDITIONAL CAPITAL OUTLAYS AS IDENTIFIED ABOVE. THESE AMOUNTS ARE NOT INCLUDED IN BONDED DEBT OUTSTANDING AS LOANS ARE AVAILABLE FOR FINANCING THAT WOULD NOT COUNT AGAINST THE CITY'S OUTSTANDING BONDED INDEBTEDNESS.

Note: a Annual budget, City of Cheyenne, FY 1982 to 1984. Comprehensive Annual Financial Report, FY 1982.

3.1.3.4.2.2 Proposed Action

Under the Proposed Action the potential negative balance previously identified remains, but is reduced in magnitude in 1984 (-$2,005,935 Proposed Action; -$2,270,437, No Action), and 1985 (-$2,339,818 Proposed Action; -$3,038,357, No Action). Beneficial effects will occur in the years 1984 through 1989 as revenues generated as a result of the Proposed Action exceed necessary expenditures for these years. By 1988 this is reversed and the imbalance is greater under the Proposed Action than under the No Action Alternative (-$4,460,072 Proposed Action; -$4,236,064 No Action). This situation continues through 1992 (-$5,136,634 Proposed Action; -$4,856,420 No Action) as indicated in Table 3.1.3-9 and 3.1.3-10. After 1988, this impact will be long term and high as it will exceed 1 year and necessitate an increase in taxes. It will be not significant as no change in tax structure will be required. The shift is attributed to sales and use tax revenues and the Wyoming Impact Assistance Payment reaching its peak revenue generating capacity in 1988 and declining thereafter while population driven expenditures do not decline accordingly. Other major revenue sources are not responsive to large shifts in population. Revenues generated by Wyoming Statutes 39-6-411 (Impact Assistance Payments) paid to the City are projected to total $1,572,215 over the project period. The City may also have to delay the planned city/county jail project or raise taxes to pay for this facility as a result of the project. This impact will be long term and high as it will necessitate a change in tax rates or fees exceeding 1 year. It will be not significant as no change in tax structure will be required. Additional municipal staffing requirements identified in the Public Facilities section will result in low long and short term, not significant impacts as these expenditures exceed 1 year and are offset by an equivalent change in revenues attributable to the project. See Section 3.1.3.5.1 for overall city impacts.

3.1.3.4.3 Laramie County School District No. 1

3.1.3.4.3.1 Baseline Future - No Action Alternative

Under the No Action Alternative, Laramie County School District No. 1 will continue to operate under tight fiscal conditions as indicated in Table 3.1.3-11 and 3.1.3-12. The School Board has increased its mill levy by 1 mill, effective FY 1984. The District is now at its maximum legal mill levy (with one additional mill allowed upon voter approval). Laramie School District No. 1 has utilized 75 percent of its legal debt limit with $5.5 million dollars indebtedness capacity remaining.

An additional 35,000 square foot school facility to be purchased in FY 1988 costing $3.5 million will safisfy some facility and improvement requirements under the Proposed Action. The annual debt service associated with this facility would be $377,885.

3.1.3.4.3.2 Proposed Action

The Proposed Action will accelerate enrollment overcrowding projected to occur in 1992 by 3 to 4 years under the No Action Alternative. Peak enrollment in 1987 is projected to be 7 percent higher than peak enrollment under No Action. The Proposed Action will increase peak year revenues by approximately

Table 3.1.3-9

CITY OF CHEYENNE REVENUES - PROPOSED ACTION
1982 CONSTANT DOLLARS

	1982 (Actual)	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992
A. STATE SOURCE TRANSFERS											
IMPACT ASSISTANCE PAYMENT				364413	194249	231128	254444	263905	264076	0	0
3% SALES AND USE TAX	3554071	3477138	3566041	3895676	3725512	3762391	3785797	3795168	3795339	3823296	3858443
CIGARETTE TAX	334667	341108	345940	357318	370380	378320	374057	378026	381344	386208	391051
GAS TAX	525122	535228	542810	560663	581160	593617	586929	593155	598363	605994	613593
MINERAL ROYALTIES (1)	1362599	1124913	1124913	1124913	1124913	1124913	1124913	1124913	1124913	1124913	1124913
SEVERANCE TAX (2)	4651165	3840002	3840002	3840002	3840002	3840002	3840002	3840002	3840002	3840002	3840002
OTHER	15000	0	0	0	0	0	0	0	0	0	0
SUBTOTAL	10427624	9318388	9419705	10142985	9836216	9930370	9966052	9995169	10004037	9780413	9828002
B. FEDERAL SOURCE TRANSFERS											
REVENUE SHARING	1082497	1082497	1082497	1082497	1082497	1082497	1082497	1082497	1082497	1082497	1082497
C. OWN SOURCE											
PROPERTY TAX	970613	992152	1006207	1039302	1077295	1100387	1087990	1099532	1109185	1123331	1137417
1% SALES AND USE TAX	3123865	3211496	3295711	3621937	3447388	3480007	3500420	3507738	3505533	3531349	3563905
FRANCHISES	1210255	527048	534514	552095	572278	584544	577359	584090	589218	596733	604215
USER FEES											
i recreation	281862	287286	291356	300939	311940	318627	315037	318379	321174	325271	329349
ii refuse	1956160	1993806	2022050	2088557	2164908	2211313	2186399	2209595	2228993	2257421	2285720
iii other (3)	185601	297139	297139	297139	297139	297139	297139	297139	297139	297139	297139
LICENSES, FINES, PERMITS FEES, RENTAL INCOME	1347239	1373167	1392618	1438423	1491007	1522967	1505808	1521784	1535143	1554722	1574218
SUBTOTAL	9075595	8681704	8839594	9338391	9361956	9514985	9470752	9538257	9586385	9685966	9791871
TOTAL REVENUES (4)	20585716	19082590	19341797	20563873	20280669	20527852	20519301	20615922	20672919	20548876	20702370
1% CARRYOVER (5)	2446881	2446881	2446881	2446881	2446881	2446881	2446881	2446881	2446881	2446881	2446881
INTEREST INCOME (6)	105395	166019	168274	178906	176442	178592	178518	179359	179854	178775	180111
TOTAL AVAILABLE REVENUES	23137992	21695489	21956951	23189660	22903992	23153326	23144700	23242162	23299655	23174532	23329361

1. MINERAL ROYALTY REVENUE HELD AT 1981 LEVEL FOR 1983 to 1992 DUE TO SLOWDOWN IN STATE MINERAL PRODUCTION.
2. SEVERANCE TAX REVENUE HELD AT 1982 LEVEL FOR 1983 TO 1992, DUE TO SLOWDOWN IN STATE MINERAL PRODUCTION.
3. 1980-1982 AVERAGE ANNUAL COLLECTIONS HELD CONSTANT AT 1982 LEVEL
4. CITY OF CHEYENNE CARRIES OVER SALES AND USE TAX REVENUES INTO SUBSEQUENT YEARS AS A RUNNING TOTAL OF AMOUNT COLLECTED. SALES AND USE TAX REVENUES WHICH ARE UNSPENT IN ONE FISCAL YEAR ARE ALSO CARRIED OVER INTO NEXT FISCAL YEAR AND ARE TREATED AS CREDITS IN BOTH FISCAL YEARS. FOR PURPOSES OF THIS ANALYSIS, SALES AND USE TAX REVENUES ARE TREATED AS A CREDIT ONLY IN THE YEAR IN WHICH THEY ARE RECEIVED.
5. 1% CARRYOVER AMOUNTS DERIVED FROM 1982 AND 1983 FY BUDGETS FOR THE CITY OF CHEYENNE, SPECIAL REVENUE SECTIONS.
6. 1980-1982 AVERAGE ANNUAL INTEREST EARNED ON TOTAL REVENUES, INCLUDING 1% CARRYOVER LESS INTEREST (EQUALS .8%)

SOURCE: ANNUAL BUDGET, CITY OF CHEYENNE, FY1982 TO 1984
COMPREHENSIVE ANNUAL FINANCIAL REPORT, FY1982

Table 3.1.3-10

CITY OF CHEYENNE EXPENDITURE PROJECTIONS - PROPOSED ACTION
1982 CONSTANT DOLLARS

		1982[a] (Actual)	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992
GENERAL GOVERNMENT		3031592	3089953	3133725	3236796	3355123	3427041	3388430	3424377	3454440	3498497	3542366
PUBLIC SAFETY	(1)	7255484	7395160	7499917	7746597	8179789	8201908	8109500	8195534	8267483	8372925	8477916
HIGHWAYS & STREETS	(1)	6837754	6969388	7068114	7300591	7567479	7729688	7642601	7723681	7791488	7890859	7989806
SANITATION	(1)	2026024	2065027	2094280	2163162	2242241	2290304	2264500	2288524	2308615	2338059	2367376
HEALTH		657685	670346	679842	702203	727873	743475	735099	742897	749419	758977	768494
CULTURE & RECREATION	(1)	2319564	2364218	2397709	2476572	2567108	2622134	2592591	2620096	2643098	2676808	2710373
DEBT SERVICE		89300	89300	89300	89300	89300	89300	89300	89300	89300	89300	89300
SUBTOTAL:		22217403	22643393	22962886	23715220	24728914	25103850	24822021	25084409	25303843	25625424	25945632
ADDITIONAL CAPITAL OUTLAYS AND DEBT SERVICE												
STAGE II WATER				1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000
JOINT CITY COUNTY JAIL					269918	269918	269918	269918	269918	269918	269918	269918
TRANSFER STATION & TRUCK STORAGE					194340	194340	194340	194340	194340	194340	194340	194340
FIRE TRUCK						150000						
FIRE STATION					350000	350000	350000	350000	350000	350000	350000	350000
SHOPS AND STORAGE							706105	706105	706105	706105	706105	706105
SIGNALIZING INTERSECTIONS						480000						
COMPACTOR & GARBAGE TRUCK							75000	80000				
TOTAL:		22217403	22643393	23962886	25529478	27173172	27699213	27422384	27604772	27824206	28145787	28465995

Table 3.1.3-10 Continued

CITY OF CHEYENNE EXPENDITURE PROJECTIONS - PROPOSED ACTION
1982 CONSTANT DOLLARS

	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992
BONDED DEBT OUTSTANDING	615000	580000	546050	508950	468795	425300	378192	327169	271906	212051	147222
LEGAL DEBT MARGIN	5397347	5501210	5579130	5657519	5736080	5814551	5893022	5971493	6049965	6128345	6206454

Notes: 1 THE NUMBER OF HOUSEHOLDS IN THE CHEYENNE URBANIZED AREA WAS USED TO PROJECT EXPENDITURES FOR PUBLIC SAFETY, HIGHWAYS AND STREETS, SANITATION AND CULTURE AND RECREATION TO ACCOUNT FOR USE OF THESE FACILITIES AND SERVICES BY NON-RESIDENTS.

2 FIGURES REPRESENT AMORTIZED OUTSTANDING 1982 DEBT ONLY. ADDITIONAL OUTSTANDING WOULD LIKELY BE INCURRED IN MAKING ADDITIONAL CAPITAL OUTLAYS AS IDENTIFIED ABOVE. THESE AMOUNTSARE NOT INCLUDED IN BONDED DEBT OUTSTANDING AS LOANS ARE AVAILABLE FOR FINANCING THAT WOULD NOT COUNT AGAINST THE CITY'S BONDED INDEBTEDNESS.

a Annual budget, City of Cheyenne, FY 1982 to 1984. Comprehensive Annual Financial Report, FY 1982.

Table 3.1.3-11

PROJECTED LARAMIE COUNTY SCHOOL DISTRICT NO. 1 REVENUES - NO ACTION

	1982[a] (Actual)	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992
STATE SOURCE TRANSFERS											
STATE FOUNDATION PROGRAM	25180011	30674644	38870000	38869484	39738498	40327958	40735389	41285705	41832339	42387397	42951290
STATE LAND INCOME	2902187	4172464	2795000	2853573	2899997	2933839	2975100	3016942	3059372	3102399	3146032
OTHER	0	1240	1240	1240	1240	1240	1240	1240	1240	1240	1240
SUBTOTAL:	28082198	34847108	41665000	41723057	42638495	43261797	43710490	44302647	44891712	45489797	46097322
FEDERAL SOURCE TRANSFERS											
P.L.874	572903	814460	821152	838360	851999	861942	874064	886357	898823	911464	924283
ROTC	48361	19503	19663	20075	20402	20640	20930	21225	21523	21826	22133
RESTRICTED FEDERAL GRANTS	0	0	700000	0	0	0	0	0	0	0	0
SUBTOTAL:	621264	833963	1540815	858436	872401	882582	894995	907582	920346	933290	946416
COUNTY SOURCE TRANSFERS											
6 MILL COUNTY LEVY	2269534	1270909	1325977	1354209	1382353	1410443	1438498	1466447	1494431	1522309	1550240
MOTOR VEHICLE TAX	343897	351302	358797	366437	374052	381653	389244	396807	404379	411923	419481
FINES AND FORFEITURES	260450	266058	271735	277520	283288	289045	294794	300521	306256	311969	317693
OTHER	7286	7413	7569	7692	7781	7891	8002	8114	8228	8344	8358
SUBTOTAL:	2881167	1895682	1964078	2005858	2047474	2089031	2130538	2171890	2213295	2254546	2295773
OWN SOURCE											
SPECIAL DISTRICT 25 MILL LEVY	4619227	4925993	4971118	5011963	5116995	5200243	5260928	5334917	5409948	5486033	5563189
OPTIONAL 1 MILL LEVY	0	0	198845	200479	204680	208010	210437	213397	216398	219441	222528
MOTOR VEHICLE TAXES	739788	755717	771842	788275	804657	821008	837339	853608	869897	886125	902383
OTHER	73702	170598	172000	175604	178461	180544	183083	185658	188269	190917	193602
SUBTOTAL:	5432717	5852308	6113804	6176321	6304793	6409804	6491787	6587580	6684512	6782516	6881701
TOTAL REVENUES	37017346	43429061	51283697	50763672	51863164	52643214	53227809	53969698	54709865	55460148	56221211
INTEREST AND DIVIDENDS	984503	1155213	1364146	1350314	1379560	1400310	1415860	1435594	1455282	1475240	1495484
TOTAL AVAILABLE REVENUES:	38001849	44584274	52647843	52113985	53242724	54043524	54643669	55405292	56165147	56935388	57716695

Note: a ANNUAL BUDGETS, LARAMIE COUNTY SCHOOL DISTRICT NO.1, FY1983 & 1984

Table 3.1.3-12

LARAMIE COUNTY SCHOOL DISTRICT NUMBER ONE PROJECTED EXPENDITURES - NO ACTION
1982 CONSTANT DOLLARS

	1982[a] (Actual)	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992
INSTRUCTIONAL SERVICES	26843988	27089894	27312481	27884847	28338500	28669201	29071978	29481114	29896609	30316345	30742440
ADMINISTRATION	9198676	9282941	9359215	9555349	9710803	9824125	9962145	10102344	10244723	10388554	10534565
DEBT SERVICE	1475907	2274547	3432836	2745586	2673309	2591582	2555355	1864627	1264900	1164673	1104945
UNALLOCATED			8195356	8194840	9063854	9653314	10060745	10611061	11157695	11712753	12276646
CASH RESERVE	0	500000	500000	500000	500000	500000	500000	500000	500000	500000	500000
SUBTOTAL:	37518571	39147381	48799888	48880622	50286467	51238222	52150222	52559146	53063927	54082325	55158596
ADDITIONAL CAPITAL OUTLAY AND BONDED DEBT											
REPAIRS & MAINTENANCE	106582	65640	120000	120000	120000	120000	120000	120000	120000	120000	120000
SCHOOL BUILDING							377885	377885	377885	377885	377885
TOTAL:	37625153	39213021	48919888	49000622	50406467	51358222	52648107	53057031	53561812	54580210	55278596
BONDED DEBT OUTSTANDING	5420000	16645000	15585000	13495264	12001727	10457225	12360929	10562780	9312672	8360494	7306127
LEGAL DEBT MARGIN	14854962	3239969	4462852	6972716	8799242	10586484	8978426	11076887	12631976	13892248	15259377

Note: a ANNUAL BUDGET, LARAMIE COUNTY SCHOOL DISTRICT NO.1, FY1983 &1984

$3.5 million as indicated in Table 3.1.3-13, provided the District can add classroom units qualifying it for increased revenue transfers from the State Foundation Program. Programmatic, operating, administrative and support expenditures will increase by approximately $2.7 million in peak enrollment years. In terms of these expenditures, associated impacts will be low, not significant, and short term as increased operating expenditures are offset by an equivalent change in revenues and it exceeds 1 year.

The Proposed Action will cause additional capital expenditures over the No Action Alternative in order to provide an additional school building in 1987 at a total cost of $8 million and eight school buses costing approximately $280,000. Projected expenditures under the Proposed Action for Laramie County School District are indicated in Table 3.1.3-14. Impacts associated with these expenditures will be moderate, long term and not significant as it will not require changes in fiscal policy.

3.1.3.4.4 City of Cheyenne Board of Public Utilities

3.1.3.4.4.1 Baseline Future - No Action Alternative

The sewerworks fund of the Cheyenne Board of Public Utilities is estimated to remain in sound fiscal condition over the study period as shown in Table 3.1.3-15. The regional 201 Plan prepared for the Board has recommended construction of a new regional facility in order to expand its capacity and to ensure compliance during periods of peak flow. Local matching funds for this project were estimated at $937,000. Total additional annual operating and maintenance costs are estimated at $827,000, starting in 1986.

The waterworks fund is projected to experience an operating revenue/ expenditure imbalance in 1984, although cash reserves may be sufficient to cover this temporary situation throughout the study period as shown in Table 3.1.3-16. An upgrade in treatment capacity is anticipated to increase bonded indebtedness in 1988.

3.1.3.4.4.2 Proposed Action

The sewerworks fund of the Board of Public Utilities is projected to experience a steady increase in revenues and expenditures. The proposed 201 regional wastewater treatment facility will reach peak capacity in 1987 or 1988, 3 to 4 years after it is built. Without the project, capacity will not be reached until the mid-1990s.

The waterworks fund is also projected to remain in balance over the project period except for 1 year. Due to the planning and engineering fees and the increased sale of water taps generated from project-induced development, the Cheyenne Board of Public Utilities will experience beneficial effects in all years except 1984 and 1988, as revenues exceed expenditures. In 1988 a minor cash flow imbalance of less than $20,000 is projected as a result of the population decline when no tap fees or planning and engineering fees will be collected. Tables 3.1.3-17 and 3.1.3-18 present revenue and expenditure projections for the sewerworks and waterworks fund, respectively. The impacts will be short term,

Table 3.1.3-13

LARAMIE COUNTY SCHOOL DISTRICT NUMBER ONE PROJECTED REVENUES - PROPOSED ACTION
1982 CONSTANT DOLLARS

	1982[a] (Actual)	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992
STATE SOURCE TRANSFERS											
STATE FOUNDATION PROGRAM	25180911	30674644	38870000	38869484	42326190	43065311	43712808	42669463	42985002	42932238	43528456
STATE LAND INCOME	2902187	4172464	2795090	3013237	3086562	3138192	3083091	3100012	3102181	3142748	3183966
OTHER	0	1240	1240	1240	1240	1240	1240	1240	1240	1240	1240
SUBTOTAL:	28082198	34847108	41665090	41883721	45412752	46203503	46795899	45769475	46087183	46074986	46712422
FEDERAL SOURCE TRANSFERS											
P.L.874	572903	814460	821152	885269	906811	921980	905791	910762	911400	923318	935428
ROTC	48361	19503	19663	21199	21714	22078	21690	21809	21824	22110	22400
RESTRICTED FEDERAL GRANTS	0	0	700000	0	0	0	0	0	0	0	0
SUBTOTAL:	621264	833963	1540815	906467	928525	944057	927481	932572	933224	945428	957827
COUNTY SOURCE TRANSFERS											
6 MILL COUNTY LEVY	2269534	1270909	1325977	1354209	1382353	1410443	1438498	1466447	1494431	1522309	1550240
MOTOR VEHICLE TAX	343897	351302	358797	366437	374052	381653	389244	396807	404379	411923	419481
FINES AND FORFEITURES	260450	266058	271735	277520	283288	289045	294794	300521	306256	311969	317693
OTHER	7286	7413	7992	8186	8323	8177	8222	8228	8335	8445	8318
SUBTOTAL:	2881167	1895682	1964502	2006353	2048016	2089318	2130758	2172003	2213402	2254646	2295733
OWN SOURCE											
SPECIAL DISTRICT 25 MILL LEVY	4619227	4925993	4971118	5011963	5403304	5534788	5627372	5528564	5558907	5562797	5635541
OPTIONAL 1 MILL LEVY	0	0	198845	200479	216132	221392	225095	221143	222356	222512	225422
MOTOR VEHICLE TAXES	739788	755717	771842	788275	804657	821008	837339	853608	869897	886125	902383
OTHER	73702	170598	172000	185430	189942	193119	189728	190770	190903	193400	195936
SUBTOTAL:	5432717	5852308	6113804	6186147	6614035	6770308	6879534	6794084	6842063	6864833	6959282
TOTAL REVENUES:	37017346	43429061	51284121	50981688	55003329	56007186	56733673	55668134	56075873	56139893	56925264
INTEREST AND DIVIDENDS	984503	1155213	1364158	1356113	1463089	1489791	1509116	1480772	1491618	1493321	1514212
TOTAL AVAILABLE REVENUES:	38001849	44584274	52648278	52337801	56466417	57496977	58242789	57148907	57567491	57633214	58439476

Note: a Annual Budget, Laramie County School District No. 1, FY 1983 and 1984.

Table 3.1.3-14

LARAMIE COUNTY SCHOOL DISTRICT NUMBER ONE PROJECTED EXPENDITURES - PROPOSED ACTION
1982 CONSTANT DOLLARS

	1982[a] (Actual)	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992
INSTRUCTIONAL SERVICES	26843988	27089894	27312481	29445076	30161594	30666124	30127676	30293026	30314225	30710642	31113418
ADMINISTRATION	9198676	9282941	9359215	10089995	10335526	10508414	10323903	10380564	10387828	10523669	10661689
DEBT SERVICE	1475907	2274547	3432836	2745586	2673309	2591582	2555355	1864627	1264900	1164673	1104945
UNALLOCATED			8195356	8194840	9063854	9653314	10060745	10611061	11157695	11712753	12276646
CASH RESERVE	0	500000	500000	500000	500000	500000	500000	500000	500000	500000	500000
SUBTOTAL:	37518571	39147381	48799888	50975497	52734283	53919434	53567678	53649278	53624648	54611736	55656698
ADDITIONAL CAPITAL OUTLAY AND DEBT SERVICE											
REPAIRS & MAINTENANCE	106582	65640	120000	120000	120000	120000	120000	120000	120000	120000	120000
SCHOOL BUILDING							377885	377885	377885	377885	377885
SCHOOL BUILDING						863737	863737	863737	863737	863737	863737
SCHOOL BUSSES				245000		35000					
TOTAL:	37625153	39213021	48919888	51340497	52854283	55183171	54929300	55010900	54986270	55973358	57018320
BONDED DEBT OUTSTANDING	5420000	16645000	15585000	13495264	12001727	18457225	19860929	17637780	15677672	8610494	7666127
LEGAL DEBT MARGIN	14854962	3239469	4462852	8117951	10137425	4052262	2253327	4597846	6573514	13931669	15171682

Note: a ANNUAL BUDGET, LARAMIE COUNTY SCHOOL DISTRICT NO.1, FY1983 & 1984.

Table 3.1.3-15

BOARD OF PUBLIC UTILITIES
REVENUE AND EXPENDITURE PROJECTIONS
SEWERAGE - NO ACTION

	1982[a] (Actual)	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992
REVENUES											
USER CHARGES	1064281	1084764	1100121	1115588	1131076	1146543	1162032	1177499	1192965	1208432	1223833
PLANNING AND ENGINEERING FEES	39625	40388	40959	41535	42112	42688	43264	43840	44416	44992	45565
MISCELLANEOUS	14667	14949	15161	15374	15588	15801	16014	16227	16440	16654	16866
SUBTOTAL:	1118573	1140101	1156241	1172497	1188776	1205032	1221310	1237566	1253822	1270078	1286264
INTEREST	275637	91208	92499	93800	95102	96403	97705	99005	100306	101606	102901
TOTAL REVENUES:	1394210	1231309	1248740	1266297	1283878	1301434	1319015	1336571	1354128	1371684	1389165
EXPENDITURES											
OPERATING	479192	488414	495329	502293	509267	516230	523204	530168	537132	544096	551030
ADMINISTRATION	320930	327107	331737	336401	341072	345736	350406	355070	359734	364398	369042
DEBT SERVICE	296000	296000	296000	296000	296000	296000	296000	296000	296000	296000	296000
TOTAL:	1096122	1111521	1123066	1134694	1146338	1157966	1169611	1181239	1192866	1204494	1216072
ADDITIONAL CAPITAL OUTLAY AND DEBT SERVICE (1)											
"201" REGIONAL WASTEWATER FACILITY & ASSOCIATED OPERATING COSTS				937000	827000	827000	827000	827000	827000	827000	827000
DEBT OUTSTANDING	2975000	2860000	2779000	2692110	2598888	2498859	2391511	2276292	2152609	2019821	1877241
LEGAL DEBT MARGIN	2590347	2641224	2800103	2965431	3137202	3315668	3501566	3695222	3897343	4108568	4329251

Notes: a City of Cheyenne Board of Public Utilities Annual Report, FY 1982. Regional "201" Wastewater Facility Plan, 1982.

1 These expenditures are not included in the total as it has not yet been determined how these costs will be paid for.

Table 3.1.3-16

CITY OF CHEYENNE BOARD OF PUBLIC UTILITIES REVENUE AND EXPENDITURE PROJECTIONS
WATERWORKS FUND - NO ACTION
1982 CONSTANT DOLLARS

	1982[a] (Actual)	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992
REVENUES											
WATER OPERATING	3361236	3377395	4255518	5066093	5572702	5684208	5797989	5914047	6032380	6152988	6275873
NON OPERATING	157303	29709	17000	20000	20000	20000	20000	20000	20000	20000	20000
P & E AND EXPANSION FEES	66090	184031	242250	246750	252000	257250	262500	267750	273000	278250	283500
SURPLUS WATER SALES					700000	700000	700000	700000	700000	700000	700000
CITY CONTRIBUTION				1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000
TAP FEES	136279	88678	156978	159894	163296	166698	170100	173502	176904	180306	183708
SUBTOTAL:	3720908	3679813	4671746	6492737	7707998	7828156	7950589	8075299	8202284	8331544	8463081
NON-FUND INTEREST	223394	201558	175000	175000	175000	175000	175000	175000	175000	175000	175000
TOTAL REVENUES:	3944302	3881371	4846746	6667737	7882998	8003156	8125589	8250299	8377284	8506544	8638081
EXPENDITURES											
SUPPLY, TREATMENT & DISTRIBUTION	1043033	1072430	1172988	1196409	1220329	1244747	1269663	1295078	1320991	1347402	1374312
ADMINISTRATION	696314	770000	950000	968969	988341	1008117	1028297	1048880	1069867	1091258	1113052
DEBT SERVICE	1369000	1369000	1369000	1369000	1369000	1369000	1369000	1369000	1369000	1369000	520000
STAGE II LOAN REPAYMENT			748000	1300000	3063000	3063000	3063000	3063000	3063000	3063000	3063000
STAGE II O & M				124000	139000	156000	174000	195000	219000	245000	274000
CAPITAL PURCHASES	202422	214193	429000	429000	429000	429000	429000	429000	429000	429000	429000
TRANSFER TO FUNDS	289484	385589	417250	421750	427000	432250	437500	442750	448000	453250	458500
ADDITIONAL CAPITAL REQUIREMENTS							113000	113000	113000	113000	113000
TOTAL EXPENDITURES:	3600253	3811212	5086238	5809128	7635670	7702114	7883460	7955708	8031858	8110910	7344863
BONDED DEBT OUTSTANDING	19279999	9450000	8605770	7715853	6777743	5788795	4746215	3647053	2488194	2023691	1631524

Note: a CITY OF CHEYENNE BOARD OF PUBLIC UTILITIES ANNUAL REPORT, FY1982
ANNUAL BUDGET, CITY OF CHEYENNE, FY1982 TO 1984.

not significant, and moderate due to the expenditure imbalance in 1988 and low, not significant in the long term for all other years as changes in operating expenditures are offset by an equivalent change in revenues.

3.1.3.4.5 South Cheyenne Water and Sewer District

3.1.3.4.5.1 Baseline Future - No Action Alternative

Revenues and expenditures are projected to increase by $28,000 by 1991, as shown in Table 3.1.3-19. The District is expected to retain almost 100 percent of its bonding capacity. In 1992 a major bond will be paid off resulting in a drop in expenditures. If the new Cheyenne regional wastewater treatment plant is built, South Cheyenne's flows could be accommodated. It has not yet been determined if or how the District will participate in the funding for this facility.

3.1.3.4.5.2 Proposed Action

Revenue and expenditure projections are presented in Table 3.1.3-20. Increased revenues from connection fees will create a substantial surplus of approximately $300,000 in 1985, resulting in beneficial effects that year. The District will be subject to water rate increases by the City of Cheyenne Board of Public Utilities from 1984 to 1992. These are not reflected in the projections, as it is assumed that these rate increases will be passed through to users. The impacts are considered to be low in the short and long term, and not significant as increased expenditures are offset by equivalent increases in revenues and the duration exceeds 1 year.

3.1.3.4.6 Kimball County, Nebraska

3.1.3.4.6.1 Baseline Future - No Action Alternative

Under the No Action Alternative, declines in revenues and expenditures are projected at 5 percent and 13 percent, respectively. Additional bonded debt capacity becomes available in FY 1988 as outstanding bonds are retired. The County is projected to maintain revenue surpluses over the projection period.

3.1.3.4.6.2 Proposed Action

Revenues and expenditures are estimated to decline over the projection period with the exception of 1988, when population demands for services and expenditures increase. Debt service requirements decline annually by $120,000 in 1988 with the retirement of the hospital bond. The impacts are considered to be long term and low in the short term and not significant as increased expenditures are offset by increases in revenues (except 1988 when it will be necessary to utilize surplus funds, but this will not result in a revenue/expenditure imbalance) and the duration exceeds 1 year.

Table 3.1.3-17

BOARD OF PUBLIC UTILITIES
REVENUE AND EXPENDITURE PROJECTIONS
SEWERAGE - PROPOSED ACTION
1982 CONSTANT DOLLARS

	1982[a] (Actual)	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992
REVENUES											
********											
USER CHARGES	1064281	1084764	1100121	1136313	1177851	1202316	1189555	1202162	1212722	1228189	1243590
PLANNING AND ENGINEERING FEES	39625	40388	40959	42307	43853	44764	44289	44759	45152	45728	46301
MISCELLANEOUS	14667	14949	15161	15660	16232	16569	16393	16567	16713	16926	17138
SUBTOTAL:	1118573	1140101	1156241	1194279	1237936	1263649	1250238	1263488	1274587	1290843	1307029
INTEREST	275637	91208	92499	95542	99035	101092	100019	101079	101967	103267	104562
TOTAL REVENUES:	1394210	1231309	1248740	1289821	1336971	1364741	1350257	1364567	1376554	1394110	1411591
EXPENDITURES											
**********											
OPERATING	479192	488414	495329	511624	530327	541342	535597	541273	546028	552992	559926
ADMINISTRATION	320930	327107	331737	342651	355177	362554	358706	362507	365692	370356	375000
DEBT SERVICE	296000	296000	296000	296000	296000	296000	296000	296000	296000	296000	296000
TOTAL EXPENDITURES:	1096122	1111521	1123066	1150275	1181503	1199896	1190303	1199780	1207720	1219347	1230926
ADDITIONAL CAPITAL OUTLAY AND DEBT SERVICE (1)											
"201" REGIONAL WASTEWATER FACILITY AND ASSOCIATED OPERATING COSTS				937000	827000	827000	827000	827000	827000	827000	827000
DEBT											
OUTSTANDING	2975000	2860000	2779000	2692110	2598868	2498859	2391511	2276292	2152609	2019821	1877241
LEGAL DEBT MARGIN	2590347	2641224	2800103	3070535	3374411	3598512	3641146	3820298	3997538	4208763	4429446

Notes: 1 These expenditures are not included in the total as it has not yet been determined how these costs will be paid for.

a City of Cheyenne Board of Public Utilities Annual Report, FY 1982; "201" Regional Wastewater Facility Plan, 1982.

Table 3.1.3-18

CITY OF CHEYENNE BOARD OF PUBLIC UTILITIES REVENUE AND EXPENDITURE PROJECTIONS
WATERWORKS FUND - IMPACT
1982 CONSTANT DOLLARS

REVENUES	1982[a] (Actual)	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992
WATER OPERATING	3361236	3377395	4255518	5279209	5710729	5695348	5694028	6187678	6139504	6303803	6399001
NON OPERATING	157303	29709	17000	20000	20000	20000	20000	20000	20000	20000	20000
P & E AND EXPANSION FEES	66090	184031	449988	528595	324321	26298	0	369833	245321	344619	282607
SURPLUS WATER SALES					561972	688860	688860	426369	592876	549185	576871
CITY CONTRIBUTION				1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000
TAP FEES	136279	88678	291592	342530	210160	17041	0	239652	158968	223313	183129
SUBTOTAL:	3720908	3679813	5014098	7170334	7827183	7447546	7402888	8243532	8156669	8440921	8461609
INTEREST	223394	201558	175000	175000	175000	175000	175000	175000	175000	175000	175000
TOTAL REVENUES:	3944302	3881371	5189098	7345334	8002183	7622546	7577888	8418532	8331669	8615921	8636609
EXPENDITURES											
SUPPLY, TREATMENT & DISTRIBUTION	1043033	1072430	1172988	1242880	1273665	1276161	1253278	1311265	1334551	1367262	1394087
ADMINISTRATION	696314	770000	950000	1006606	1031538	1033559	1015027	1061990	1080849	1107342	1129067
DEBT SERVICE	1369000	1369000	1369000	1369000	1369000	1369000	1369000	1369000	1369000	1369000	520000
STAGE II LOAN REPAYMENT			748000	1300000	3063000	3063000	3063000	3063000	3063000	3063000	3063000
STAGE II O & M				124000	139000	156000	174000	195000	219000	245000	274000
CAPITAL PURCHASES	202422	214193	429000	429000	429000	429000	429000	429000	429000	429000	429000
TRANSFER TO FUNDS	289484	385589	624988	703595	499321	201298	175000	544833	420321	519619	457607
ADDITIONAL CAPITAL REQUIREMENTS							113000	113000	113000	113000	113000
TOTAL EXPENDITURES:	3600253	3811212	5293976	6175081	7804524	7528018	7591305	8087088	8028721	8213222	7379761
REVENUE-EXPENDITURE	344049	70159	-104878	1170253	197660	94529	-13417	331444	302948	402698	1256848

Note: a City of Cheyenne Board of Public Utilities, Annual Report, FY 1982.

Table 3.1.3 19

SOUTH CHEYENNE WATER AND SEWER DISTRICT
EXPENDITURE AND REVENUE PROJECTIONS - NO ACTION
1982 DOLLARS

	1982[a] (Actual)	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992
EXPENDITURES (1)											
ADMINISTRATION	87975	89669	90939	92209	93499	94774	96050	97339	95129	96351	97581
WATER OPERATIONS	231000	235447	238782	242119	245504	248853	252202	255588	249762	252993	256223
SEWER OPERATIONS	129600	132095	133966	135838	137737	139616	141495	143395	140126	141939	143751
FIXED CHARGES AND CAPITAL OUTLAY	56300	56300	56300	56300	56300	56300	56300	56300	56300	56300	56300
BONDED INDEBTEDNESS	94666	94666	80000	80000	80000	80000	80000	80000	80000	80000	14279
TOTAL EXPENDITURES:	599541	608177	599987	606466	613040	619544	626048	632622	621309	627582	568134
REVENUES											
PROPERTY TAXES	29412	29978	30403	30828	31259	31685	32112	32543	32969	33395	33822
CONNECTION FEES	9410	17451	13088	13093	0	0	0	0	0	0	0
USER FEES											
WATER MINIMUMS	108000	110079	111638	113198	114781	116347	117913	119496	116772	118282	119793
SALE OF WATER	220000	224235	227412	230589	233814	237003	240193	243417	237869	240945	244022
SEWER SERVICE	160000	163080	165390	167701	170046	172366	174686	177031	172995	175233	177470
MISCELLANEOUS	4970	5066	5137	5209	5282	5354	5426	5499	5374	5443	5513
SUBTOTAL:	531792	549890	553069	560619	555182	562755	570329	577985	565979	573299	580619
INTEREST	72971	49490	49776	50456	49966	50648	51330	52019	50938	51597	52256
CARRYOVER	9269	9269	9269	9269	9269	9269	9269	9269	9269	9269	9269
TOTAL REVENUES:	614032	608649	612114	620344	614417	622672	630928	639273	626186	634165	642144
TOTAL (REVENUES-EXPENDITURES):		472	12127	13877	1377	3128	4880	6651	4877	6583	74010

Notes: 1 Water rate increase in Cheyenne has direct effect on water expenditures. 26% in 1983; 24% in 1984: 15% in 1985; 8% in 1986; 7% a year from 1987 to 1992.

a South Cheyenne Water and Sewer District Budget, 1983.

Table 3.1.3-20

SOUTH CHEYENNE WATER AND SEWER DISTRICT
EXPENDITURE AND REVENUE PROJECTIONS - PROPOSED ACTION
1982 DOLLARS

	1982[a] (Actual)	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992
EXPENDITURES (1)											
ADMINISTRATION	87975	87669	90939	117039	112282	111554	104609	105627	95710	96940	98171
WATER OPERATIONS	231000	235447	238782	307315	294825	292912	274678	277350	251311	254541	257771
SEWER OPERATIONS	129600	132095	133966	172416	165408	164335	154105	155604	140995	142807	144620
FIXED CHARGES AND CAPITAL OUTLAY	56300	56300	56300	56300	56300	56300	56300	56300	56300	56300	56300
BONDED INDEBTEDNESS	94666	94666	80000	80000	80000	80000	80000	80000	80000	80000	14279
TOTAL EXPENDITURES:	599541	608177	599987	733070	708816	705101	669692	674881	624316	630589	571141
REVENUES											
PROPERTY TAXES	29412	29978	30403	39129	37538	37295	34973	35313	33173	33600	34026
CONNECTION FEES	9410	17451	13088	268943	0	0	0	0	0	0	0
USER FEES											
WATER MINIMUMS	108000	110079	111638	143680	137840	136946	128421	129670	117496	119006	120517
SALE OF WATER	220000	224235	227412	292681	280786	278964	261598	264143	239343	242420	245497
SEWER SERVICE	160000	163080	165390	212859	204208	202883	190253	192104	174068	176305	178543
MISCELLANEOUS	4970	5066	5137	6612	6343	6302	5910	5967	5407	5476	5546
SUBTOTAL :	531792	549890	553069	963904	666716	662390	621155	627197	569488	576808	584128
INTEREST	72971	49490	49776	86751	60004	59615	55904	56448	51254	51913	52572
CARRYOVER	9269	9269	9269	9269	9269	9269	9269	9269	9269	9269	9269
TOTAL REVENUES:	614032	608649	612114	1059924	735989	731274	686328	692914	630011	637990	645969
TOTAL (REVENUES-EXPENDITURES):		472	12127	326854	27173	26173	16635	18033	5695	7401	74828

Notes: 1 Water rate increase in Cheyenne has direct effect on water expenditures. 24% in 1984; 26% in 1985; 15% in 1986; 7% per year from 1987 to 1992.

a South Cheyenne Water and Sewer District Budget, 1983.

3.1.3.4.7 City of Kimball, Nebraska

3.1.3.4.7.1 Baseline Future - No Action Alternative

Under the No Action Alternative, Kimball is expected to experience a small decline in annual revenues with expenditures declining by a lesser amount over the same period leaving a net fiscal balance of $43,000 in FY 1992 as indicated in Tables 3.1.3-21 and 3.1.3-22. Two outstanding bonds will be retired in the late 1980s. The major revenue source for the City will continue to be local property taxes. A yearly carryover of $300,000 to $350,000 is expected to continue over the study period.

3.1.3.4.7.2 Proposed Action

Under the Proposed Action, revenues will rise approximately $97,446 from 1982 to 1992 with higher expenditures in 1987, 1988 and 1989. No revenue/expenditure imbalance is expected throughout the study period as shown in Tables 3.1.3-23 and 3.1.3-24. The impacts are considered low, and not significant in the long term with the exception of 1988 when impacts are considered moderate, not significant, and short term. The increase in expenditures is offset by corresponding increases in revenues for all years except 1988 when carryover and surpluses would be reduced. Impacts to the City of Kimball are unique in that they are substantial but are less than 1 year in length. Under these circumstances, it is not possible for a public entity to respond to such a dramatic yet quick population increase in terms of its budgeting process. The only revenues that will respond to this situation are local fees, fines, licenses, and permits as Nebraska municipalities do not receive sales and use tax revenues in proportion to the amounts collected locally. Impacts in this year are considered to be moderate and not significant as it will result in decreases in surplus and carryover funds.

3.1.3.4.8 Kimball County School District K-12

3.1.3.4.8.1 Baseline Future - No Action Alternative

Kimball County Elementary School Districts No. 1 and No. 3 are estimated to experience a declining student population although revenue base is not expected to deteriorate. The District currently has 100 percent of its bonding capacity available.

3.1.3.4.8.2 Proposed Action

Under the Proposed Action, Elementary School Districts No. 1 and No. 3 will experience nearly constant revenues and expenditures. In all years, revenues exceed expenditures. The impacts are considered low and not significant in the short and long term as increased expenditures are offset by equivalent changes in revenues.

3.1.3.4.9 Consideration of Alternatives

As no changes in population impacts are anticipated due to staging, roads or cable alternatives, no variation in Public Finance impacts are projected.

Table 3.1.3-21

KIMBALL CITY REVENUE PROJECTIONS - NO ACTION
1982 CONSTANT DOLLARS

		1982[a] (Actual)	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992
STATE SOURCE TRANSFERS												
IN-LIEU-OF-TAX	(1)	2400	134912	134783	134437	134179	133790	133402	133014	132539	132151	131762
INSURANCE TAX		8500	8500	8486	8465	8448	8424	8399	8375	8345	8321	8296
HOMESTEAD ALLOCATION		19248	0	0	0	0	0	0	0	0	0	0
GOVERNMENTAL SUBDIVISION		23679	0	0	0	0	0	0	0	0	0	0
PROPERTY TAX RELIEF	(1)	22565	43600	43530	43419	43335	43210	43084	42959	42806	42680	42555
HIGHWAY ALLOCATION		126924	131713	131503	131166	130913	130534	130156	129777	129314	128935	128556
SUBTOTAL:		203316	318725	318302	317487	316875	315958	315041	314124	313004	312087	311170
FEDERAL SOURCE TRANSFERS												
REVENUE SHARING		20451	16384	16384	16384	16384	16384	16384	16384	16384	16384	16384
EARNED INTEREST		4088	1638	1393	1393	1393	1393	1393	1393	1393	1393	1393
SUBTOTAL:		24539	18022	17777	17777	17777	17777	17777	17777	17777	17777	17777
COUNTY SOURCE TRANSFERS												
PRO-RATE MOTOR VEHICLE		1266	1267	1265	1262	1259	1255	1252	1248	1244	1240	1236
COUNTY SHARED FUNDS		23956	23971	23933	23872	23826	23757	23688	23619	23535	23466	23397
SUBTOTAL:		25222	25238	25198	25133	25085	25012	24940	24867	24778	24706	24633
OWN SOURCE												
PROPERTY TAXES		277256	277671	277227	276518	275985	275186	274388	273589	272613	271814	271016
FINES, FEES, PERMITS AND LICENSES		18129	18141	18112	18065	18030	17978	17926	17874	17810	17758	17706
USER FEES AND CHARGES		55360	55360	55395	55307	55165	55059	54900	54740	54581	54386	54227
MISCELLANEOUS		3556	3556	3550	3541	3534	3524	3514	3504	3491	3481	3471
SUBTOTAL:		354301	354728	354285	353431	352715	351748	350727	349707	348495	347439	346419
TOTAL:		607378	716713	715561	713827	712452	710495	708485	706475	704054	702008	699998
CARRYOVER		356004	356004	356004	356004	356004	356004	356004	356004	356004	356004	356004
INTEREST		50087	55781	55721	55631	55560	55458	55353	55249	55123	55017	54912
TOTAL AVAILABLE REVENUES:		1013469	1128498	1127286	1125463	1124016	1121957	1119843	1117728	1115181	1113029	1110915

Notes: 1 Projected based upon proposed 1983 City Budget projections. Increased amount reflects change in state law.

2 Includes all operating fund revenues: General, Street, Revenue Sharing, Library, Police, Parks and Recreation, Swimming Pool, Fire Maintenance, Cemetary, Park and Social Security Funds.

a Budget Statement and Certificate of Tax, Kimball City FY 1983.

Table 3.1.3-22

KIMBALL CITY EXPENDITURE PROJECTIONS - NO ACTION
1982 CONSTANT DOLLARS

	1982[a] (Actual)	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992
GENERAL GOVERNMENT	115220	114999	114816	114522	114301	113970	113640	113309	112905	112684	112280
PUBLIC SAFETY	65990	65864	65758	65590	65464	65274	65085	64895	64664	64538	64306
HIGHWAYS & STREETS	146224	145944	145711	145338	145058	144638	144218	143799	143286	143006	142493
CULTURE AND RECREATION	280951	279829	279382	278667	278130	277325	276520	275715	274732	274195	273211
DEBT SERVICE	73017	81427	81427	81427	81427	81427	81427	81427	81427	81427	81427
TOTALS:	681402	688084	687094	685543	684380	682635	680890	679145	677013	675849	673717
DEBT OUTSTANDING	397404	359770	321793	283816	245839	207862	169885	131908	93931	55954	17977
LEGAL DEBT MARGIN	3432845	3426275	3420800	3412040	3405470	3395615	3385760	3375905	3363860	3357290	3345244

Note: a Kimball City Budget, 1983.

Table 3.1.3-23

KIMBALL CITY REVENUE PROJECTIONS - PROPOSED ACTION
1982 CONSTANT DOLLARS

		1982[a] (Actual)	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992
STATE SOURCE TRANSFERS												
IN-LIEU-OF-TAX	(1)	2400	134912	134783	134437	134179	135041	134826	142419	132539	132151	131762
INSURANCE TAX		8500	8509	8486	8465	8448	8503	8489	8967	8345	8321	8296
HOMESTEAD ALLOCATION		19248	0	0	0	0	0	0	0	0	0	0
GOVERNMENTAL SUBDIVISION		23679	0	0	0	0	0	0	0	0	0	0
PROPERTY TAX RELIEF	(1)	22565	43690	43530	43419	43335	43614	43544	45997	42806	42680	42555
HIGHWAY ALLOCATION		126924	131713	131503	131166	130913	131755	131545	138953	129314	128935	128556
SUBTOTAL:		203316	318725	318302	317487	316875	318913	318404	336336	313004	312087	311170
FEDERAL SOURCE TRANSFERS												
REVENUE SHARING		20451	16384	16384	16384	16384	16384	16384	16384	16384	16384	16384
EARNED INTEREST		4088	1638	1393	1393	1393	1393	1393	1393	1393	1393	1393
SUBTOTAL:		24539	18022	17777	17777	17777	17777	17777	17777	17777	17777	17777
COUNTY SOURCE TRANSFERS												
PRO-RATE MOTOR VEHICLE		1266	1267	1265	1262	1259	1267	1265	1336	1244	1240	1236
COUNTY SHARED FUNDS		23956	23971	23933	23872	23826	23979	23941	25289	23533	23466	23397
SUBTOTAL:		25222	25238	25198	25133	25085	25246	25206	26625	24778	24706	24633
OWN SOURCE												
PROPERTY TAXES		277256	277671	277227	276518	275985	277760	277316	277316	272613	271814	271016
FINES, FEES, PERMITS AND LICENSES		18129	18141	18112	18065	18030	18146	18117	19138	17810	17758	17706
USER FEES AND CHARGES		55360	55360	55395	55307	55165	55059	55413	55325	58440	54386	54227
MISCELLANEOUS		3556	3556	3550	3541	3534	3557	3551	3751	3491	3481	3471
SUBTOTAL:		354301	354728	354285	353431	352715	354522	354398	355530	352355	347439	346419
TOTAL:		607378	716713	715561	713827	712452	716458	715784	736268	707913	702008	699998
CARRYOVER		356004	356004	356004	356004	356004	356004	356004	356004	356004	356004	356004
INTEREST		50087	55781	55721	55631	55560	55768	55733	56798	55324	55017	54912
TOTAL AVAILABLE REVENUES:		1013469	1128498	1127286	1125463	1124016	1128231	1127521	1149070	1119241	1113029	1110915

Notes: 1 Projected based upon proposed 1983 City Budget projections. Increased amount reflects change in state law.

2 Includes all operating fund revenues: General, Street, Revenue Sharing, Library, Police, Parks and Recreation, Swimming Pool, Fire Maintenance, Cemetary, Park and Social Security Funds.

a Budget Statement and Certificate of Tax, Kimball City FY 1983.

Table 3.1.3-24

CITY OF KIMBALL EXPENDITURE PROJECTIONS - PROPOSED ACTION
INCREMENTAL ADJUSTED COST APPROACH

	1982[a] (Actual)	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992
GENERAL GOVERNMENT	115220	114999	114816	114522	114301	115036	114852	121321	112905	112574	112243
PUBLIC SAFETY	65990	65864	65758	65590	65464	65885	65780	69484	64664	64474	64285
HIGHWAYS & STREETS	146224	145944	145711	145338	145058	145991	145758	153967	143286	142866	142446
CULTURE AND RECREATION	280951	280413	279965	279248	278711	280503	280055	295828	275305	274499	273692
DEBT SERVICE	73017	81427	81427	81427	81427	81427	81427	81427	81427	81427	81427
TOTALS:	681402	688648	687677	686125	684960	688842	687871	722026	677586	675840	674093

Note: a KIMBALL CITY BUDGET, 1983.

3.1.3.5 Summary of Impacts

3.1.3.5.1 Explanation of Detailed Impact Matrix

Figure 3.1.3-1 summarizes all the Public Finance impacts identified. Impacts for Laramie County are considered to be long term, not significant and moderate as a result of the projected revenue/expenditure imbalance and as a result of increased taxes to pay for the city/county jail. Additional staffing requirements are considered to be low, not significant and short term as expenditures are offset by revenues and the duration does not exceed 1 year.

Impacts for the City of Cheyenne are considered to be long term, not significant and high as a result of the projected revenue/expenditure imbalance as it would exceed 1 year and necessitate an increase in taxes. Beneficial effects will occur in the years 1984 to 1987 as revenues are higher relative to expenditures in those years under the Proposed Action than under the No Action Alternative. Additional staffing requirements are considered to be low in the short-term, and not significant as expenditures are offset by revenues and the duration does not exceed 1 year.

Impacts for Laramie County School District No. 1 are low, not significant and short term with respect to operating and support functions as increased expenditures are offset by equivalent changes in revenues. Impacts are moderate, long term, and not significant in terms of the capital costs associated with constructing a new school building as it requires an increase in bonded indebtedness and bond retirement funds over more than one budget period.

Impacts for the Board of Public Utilities are considered to be moderate and not significant in the short term as a minor revenue/expenditure imbalance occurs in 1 year. In all other years impacts are considered to be long term, not significant and low. Short and long-term beneficial effects as a result of the project will result due to increased collection of planning and engineering fees (essentially a system improvement fee) as a result of increased development.

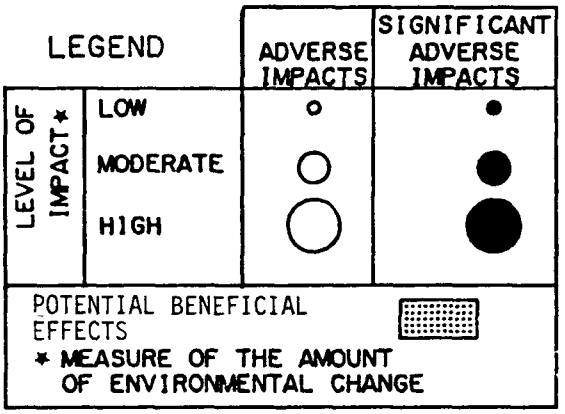
Impacts for the South Cheyenne Sewer and Water District are considered to be not significant and low in the short and long term as increased expenditures are offset by equivalent increases in revenues. Short and longterm beneficial effects of the project will result due to increased revenues over required expenditures, with a duration of more than 1 year.

Impacts for Kimball County are considered to be low and not significant in the short and long term as increased expenditures are offset by increased revenues and the duration exceeds 1 year.

Impacts for the City of Kimball are low and not significant in the short and long term except for 1 year (1988) when expenditures are not offset by equivalent changes in revenues. Impacts in 1988 are considered to be moderate, not significant and short term as a result of the decline in surplus and carryover funds and the effect such a large but temporary increase in population will have upon public expenditure requirements.

FIGURE NO. 3.1.3-1

PUBLIC FINANCE SUMMARY IMPACT MATRIX



	PROJECT IMPACTS					
	SHORT TERM			LONG TERM		
	SITE	LOCAL	REGIONAL	SITE	LOCAL	REGIONAL
PUBLIC FINANCE		○			◌	
City of Cheyenne		◌			○	
City of Cheyenne Board of Public Utilities		○			◌	
Laramie County		◌			○	
South Cheyenne Water and Sewer District		◌			◌	
Laramie County School District No. 1		◌			○	
City of Kimball		○			◌	
Kimball County		◌			◌	
Kimball County School District No. 1 and No. 3 (K to 12)		◌			◌	

Impacts for Kimball County School Districts No. 1 and No. 3 are considered to be low and not significant in the long and short term as increased expenditures are offset by increased revenues over more than one budget period.

3.1.3.5.2 Aggregation of Elements, Impacts, and Significance

The overall level of impact and significance ratings for Public Finance are moderate and not significant in the short term and low and not significant in the long term on the local levels. Determination of overall impact ratings for the Public Finance resource involved aggregation of the Public Finance subelements. They were based on area condition and professional experience in determining a balance between positive and negative impact considerations. Overall Public Finance resource impacts were determined separately for short and long term considerations of Proposed Action. The methodology involved aggregation of the Public Finance subelements which are the eight county, city, and special district jurisdictions identified in the Public Finance Area of Concentrated Study. The various subelements were assigned equal average weight and overall impact determined to be that of the majority impact. For example, if low impacts at the local level were reported for the majority of the subelements, the aggregate local level impact will also be low. Resource impact significance was determined in the same manner.

3.1.3.6 Mitigation Measures

Potential mitigation measures that will be considered are identified below. One, some, or all of the mitigation measures may ultimately be selected. Each measure identifies the party responsible to implement, but not necessarily to pay for, the measure.

3.1.3.6.1 Laramie County, Wyoming

- Mitigation measures for Laramie County are identical to those listed for Cheyenne below.

3.1.3.6.2 The City of Cheyenne, Wyoming

- Continue to pursue grant funding for the new city/county jail (public agency);
- Prepare Capital Improvements and Facility Plan (public agency);
- Increase fees and license charges (public agency);
- Require all contractors and subcontractors to obtain a Wyoming sales tax license;
- Have all project-related purchases of supplies, materials, and equipment made by contractors rather than through Department of Defense/Air Force Regional Civil Engineers purchasing (contractor/USAF); and
- Review for potential reduction in expenditure levels (public agency).

3.1.3.6.3 Laramie County School District No. 1

- Increase mill levy through referendum by 1 mill as allowed by law (public agency);
- Increase the number of students per classroom or reduce expenditures on nonstructural, extra-curricular activities (public agency);
- Increase bonded indebtedness to finance necessary facility expansion and improvements (public agency);
- Request funding through the Federal Impact/Disaster Aid to School Districts program (discussed further in Public Services and Facilities section) (public agency); and
- Reduction of service level (public agency).

3.1.3.6.4 City of Cheyenne Board of Public Utilities

- Implement the 201 Regional Wastewater Facility Plan by 1985 (public agency);
- Negotiate an agreement with the South Cheyenne Water and Sewer District to process its flows (public agency);
- Charge the District for processing its wastewater based on the percentage capacity of the new facility utilized in processing its peak flows (public agency);
- Continue water rate increases through 1986 to achieve a total rate increase of 65 percent over the 1983 rates (public agency); and
- Continue to move toward equalization of water user fees for all customers so that all fees are equalized by 1987 (public agency).

3.1.3.6.5 South Cheyenne Water and Sewer District

- Raise water minimums and user fees to meet higher bulk rate water purchase charges by the City of Cheyenne Board of Public Utilities (public agency); and
- Begin negotiations with the Cheyenne Board of Public Utilities regarding billing and charges for processing District wastewater in other Cheyenne Board of Public Utilities facilities (public agency).

3.1.3.6.6 Kimball County, Nebraska

- Mitigation measures for Kimball County are identical to those listed for the City of Kimball.

3.1.3.6.7 The City of Kimball, Nebraska

- o Increase staff to serve the increase in population (public agency);
- o Provision of temporary worker living areas for project employees and their families including (contractor):
  - Temporary wastewater treatment plant for trailer park housing;
  - Temporary recreational amenities for the trailer park; and
  - Temporary municipal services for the trailer park.
- o Provide financial assistance to the City for the above services and facilities as necessary to meet the needs of the temporary peak year population (public agency).

3.1.3.6.8 Kimball County School District

Kimball County School District No. 1 and No. 3 will not require any mitigation measures due to the Proposed Action.

3.1.3.7 Unavoidable Adverse Impacts

There are no unavoidable adverse project-related impacts on any of the jurisdictions discussed above.

3.1.4 Construction Resources

3.1.4.1 Introduction

This section describes the impacts of the Proposed Action on the various construction markets in the Region of Influence and the Area of Concentrated Study which are identical as indicated in Section 2.1.4.1.1. The region's ability to absorb the additional demands and descriptions of the criteria and procedures used to classify, estimate, and determine impact significance are included in this analysis.

3.1.4.2 Definition of Levels of Impacts

Construction Resources impacts are measured in terms of supply-demand imbalance for construction materials in the Region of Influence on a short and long-term basis. Construction materials are closely associated with construction activities. Therefore, a short-term impact is defined as one not exceeding the duration of construction activities ending in 1990 and a long-term impact is defined as one exceeding the duration of the construction period.

- Negligible Impact - Will produce no or little change in the capacity utilization rate of a particular materials industry but will affect regional supplier's inventories.

- Low Impact - Will cause a change in capacity utilization and affect inventories of regional suppliers. This will affect the existing materials market by increasing resource production. Existing production facilities will be capable of satisfying this demand.

- Moderate Impact - Will occur when temporary shortages accompany the increased capacity utilization of regional suppliers.

- High Impact - Will occur when regional suppliers have reached maximum capacity utilization and exhausted inventories, and could not completely satisfy the increase in demand.

3.1.4.3 Determination of Significance Criteria

An impact is considered significant if the project material demand denies required materials to other users.

3.1.4.4 Environmental Impacts of Proposed Action and Project Alternatives

For the No Action Alternative, published forecasts of production and consumption were used. In the absence of forecasts, future conditions were assumed to follow historical trends. Capacity changes within the Region of Influence were also determined.

The Proposed Action was evaluated by comparing construction quantity requirements with available production capacity and consumption within the trade area. Production capacity within the ROI was determined through discussions with trade organizations and major material producers. The anticipated change in capacity utilization and inventories were then quantified in percentages.

The impact analysis of the Proposed Action was done for Construction Resources by utilizing a Material Resource list that indicates the quantity of materials needed as opposed to using an Industrial Classification list which estimates dollars expended per material. The analysis provides a worst-case scenario as the actual timing of materials purchases is unknown. Therefore it is assumed the total required quantity is purchased at a single point in time.

Certain assumptions were also made regarding where materials will be purchased. It is assumed that cement, aggregate, ballast, asphalt, and roofing will be purchased within the Region of Influence. Geological Resources has identified as much as 9.6 million cubic yards (cy) of aggregate within the Region of Influence. Structural steel, reinforcement steel, and steel rail will be purchased outside the Region of Influence because no producers are currently located within the Region of Influence. The majority of the lumber, plywood, and wood ties needed for the project will likely be purchased outside the Region of Influence. However, an unknown quantity could be obtained within the Region of Influence if the local small scale suppliers increased production or changed inventories. All of the impacts were assessed at the regional level since the Area of Concentrated Study and trade areas are regional in scope. Also the impacts are assessed on a short-term basis because all impacts are associated with the construction phase of the project.

3.1.4.4.1 Cement

3.1.4.4.1.1 Baseline Future - No Action Alternative

Region of Influence cement production is not anticipated to change based on discussions with plant officials. Future purchasing is expected to reflect historical patterns with Region of Influence plants satisfying normal market demands.

3.1.4.4.1.2 Proposed Action

The project will require 6,400 tons of cement. This quantity represents only 0.5 percent of operating capacity within the Region of Influence and 1 percent of Wyoming operating capacity. Since existing production facilities are capable of handling this demand the impact is considered low, short term, and not significant.

3.1.4.4.2 Coarse and Fine Aggregate

3.1.4.4.2.1 Baseline Future - No Action Alternative

Colorado and Wyoming highway department data indicate a large supply of aggregate in the Region of Influence. State consumption data indicate that demand exceeded 32,837,000 tons in Colorado and Wyoming in 1980.

3.1.4.4.2.2 Proposed Action

The project requires 1,097,131 tons of coarse and fine aggregate during the 6-year construction period with over one half of the total (565,049 tons) needed in 1985. This peak-year demand represents 2 percent of current consumption. Aggregate is found in abundance throughout the Region of Influence and existing quarries can adjust production to meet demand. The impact is rated low, short term, and not significant.

3.1.4.4.3 Railroad Ballast

3.1.4.4.3.1 Baseline Future - No Action Alternative

The Region of Influence supply of ballast is extensive because in many quarries the mining permit does not limit the route of extraction. A forecast of ballast production was not available; but it is assumed that future production will meet or exceed the current level (over 900,000 tons per year) as consumption data were not available.

3.1.4.4.3.2 Proposed Action

The Proposed Action will require 410 cy of ballast which amounts to less than 1 percent of current production. Existing facilities are capable of satisfying this demand. The impacts are rated low, short term, and not significant.

3.1.4.4.4 Asphalt

3.1.4.4.4.1 Baseline Future - No Action Alternative

A current capacity utilization estimate for the Region of Influence was not available, although nationally the industry is running at approximately 50 percent; forecasts indicate an increase in supplies over the next 10 years. A consumption forecast provided by the Asphalt Institute predicts Wyoming demand will reach 215,000 tons in 1983.

3.1.4.4.4.2 Proposed Action

The project will require a total of 2,760 tons of asphalt. This represents an increase of 1 percent over 1983 consumption forecast. Wyoming refineries currently satisfy the states asphalt needs and are capable of meeting project demands. The impact is rated low, short term, and not significant.

3.1.4.4.5 Roofing

3.1.4.4.5.1 Baseline Future - No Action Alternative

Production capacity within the Region of Influence may expand in the near future if the second plant (in Denver) reopens. Production statistics and forecasts were not available for the trade area. Nationally, production is at 7,565,700 tons per year (1981) and analysts predict demand will remain relatively constant over the next few years.

3.1.4.4.5.2 Proposed Action

The project will require 5,700 tons of asphalt roofing. Although the trade area is smaller than the nation, consumption and production statistics were only available at the national level. Compared to national production, the project demand represents less than 0.01 percent. Existing production facilities will be capable of satisfying this demand. The impacts are rated low, short term, and not significant.

3.1.4.4.6 Lumber

3.1.4.4.6.1 Baseline Future - No Action Alternative

Most suppliers of softwood, lumber, and plywood to the Region of Influence are located outside the Region of Influence. Consumption forecasts for the nation predict plywood demand will reach 18 billion square feet (sq ft) on a three-eighths inch basis by 1986 and softwood lumber demand could reach 50 billion board feet by 1986.

3.1.4.4.6.2 Proposed Action

The quantities of softwood, lumber, and plywood required for the project were not available. Therefore, total lumber quantity (484,880 board feet) was used to evaluate impacts. The project's requirements will increase softwood lumber and plywood production by less than 0.01 percent. The project demand could be met by inventory changes. The impact is considered negligible and short term.

3.1.4.4.7 *Wood Ties*

3.1.4.4.7.1 Baseline Future - No Action Alternative

Production statistics and forecasts were not available. Domestic consumption remained relatively stable at 25 to 27 million ties annually.

3.1.4.4.7.2 Proposed Action

The project requirement of 400 ties will have a minimal effect upon total demand. The local timber industry is involved in wood ties production and the quantity required for the project would have a minor effect on local supplier's inventories. Therefore the impact is rated negligible in the short term.

3.1.4.4.8 Structural Steel

3.1.4.4.8.1 Baseline Future - No Action Alternative

Purchases of structural steel involve producers located outside the Region of Influence. A consumption forecast for the trade area (the nation) predicts economic recovery with mid-decade shipments returning to the 1981 level of 8.7 million tons.

3.1.4.4.8.2 Proposed Action

The project will require a total of 4,400 tons. This represents less than a 0.1 percent increase in the forecast demand (8.7 million tons by 1886). This increase will produce little or no change in the capacity utilization rate of structural steel and regional suppliers could adjust inventories to meet demand. The impact is rated negligible and short term.

3.1.4.4.9 Reinforcement Steel

3.1.4.4.9.1 Baseline Future - No Action Alternative

Supplies of steel reinforcing bars will be located outside of the Region of Influence. A national demand forecast was not available. It is assumed that domestic consumption will increase slightly over present levels (4,067,991 tons in 1980).

3.1.4.4.9.2 Proposed Action

The project will require 3,300 tons of steel reinforcing bars. Compared to current national consumption this will raise demand by less than 0.1 percent producing little or no change in the capacity utilization rate. The impacts are rated negligible and short term.

3.1.4.4.10 Steel Rail

3.1.4.4.10.1 Baseline Future - No Action Alternative

Purchases of steel rail will involve producers located outside the Region of Influence. A forecast of demand for the nation was not available, so consumption is assumed to remain at historical levels (776,557 tons in 1981).

3.1.4.4.10.2 Proposed Action

The project will require 23 tons of steel rail. Assuming consumption does not drop below the record low of 537,537 tons in 1975, the project requirements will increase demand by less than .005 percent which represent little or no change in the capacity utilization rate. The impacts are rated negligible and short term.

3.1.4.4.11 Other Materials

3.1.4.4.11.1 Baseline Future - No Action Alternative

Additional non-major materials have not been analyzed. Only total values are included in the baseline projections.

3.1.4.4.11.2 Proposed Action

The Proposed Action has not been forecasted.

3.1.4.4.12 Consideration of Alternatives

The alternatives to the Proposed Action do not measurably alter the impact assessment (i.e., roads and cable routes).

3.1.4.5 Summary of Impacts

3.1.4.5.1 Explanation of Detailed Impact Matrix

The impacts (of major project materials identified to date) discussed in Section 3.1.4.4 are summarized below in Figure 3.1.4-1. The impacts on five resources are rated low and short term while the impacts on the remaining five resources are rated negligible and short term. In all cases the long-term impacts are negligible and not significant.

3.1.4.5.2 Aggregation of Elements, Impact, and Significance Rating

Figure 3.1.4-1 presents the impacts for Construction Resources. The overall aggregation for Construction Resources are low and not significant in the short term and negligible and not significant in the long term on the regional level.

Some beneficial impacts may occur in the ROI as a result of the project. These will result from a greater utilization of existing plant capacities and further employment needed to meet increased demand. Further employment could cause a rise in personal income throughout the ROI.

Determination of overall impact ratings for Construction Resources involved the aggregation of element impact ratings. They were based on the area condition and professional experience. Overall Construction Resource impacts are determined separately for short and long-term considerations of the Proposed Action. The methodology involved an aggregation of ten construction market elements. The various elements were assigned equal average weight and overall impact determined to be that of the majority impact. For example, if low impacts at the regional level were reported for the majority of the construction market elements, the aggregate regional-level impact will also be low. Resource impact significance was determined in the same manner.

3.1.4.6 Mitigation Measures

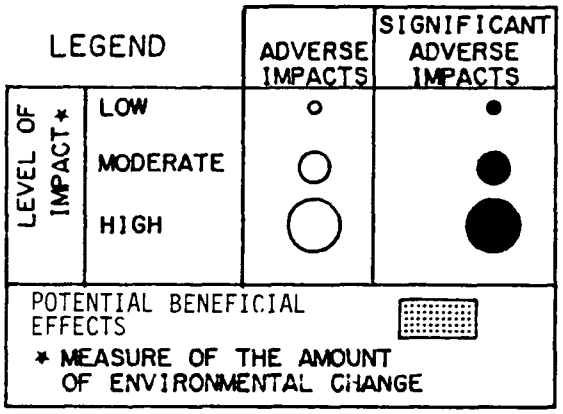
The Construction Resources impacts do not warrant mitigation measures as procurement needs evaluated were determined to have a not significant impact upon the supply of construction materials.

3.1.4.7 Unavoidable Adverse Impacts

There are no unavoidable adverse impacts for Construction Resources anticipated with respect to supply considerations for the Region of Influence. However, the utilization of nonrenewable resources such as cement, aggregate, or petroleum products may be viewed as resulting in an irreversible and irretrievable commitment of resources.

FIGURE 3.1.4-1

CONSTRUCTION RESOURCES SUMMARY IMPACT MATRIX



	PROJECT IMPACTS					
	SHORT TERM			LONG TERM		
	SITE	LOCAL	REGIONAL	SITE	LOCAL	REGIONAL
CONSTRUCTION RESOURCES			○			
Cement			○			
Aggregate			○			
Ballast			○			
Asphalt			○			
Roofing			○			
Lumber						
Wood Ties						
Structural Steel						
Reinforcing Steel						
Steel Rail						

3.1.5 Social Well-Being

3.1.5.1 Introduction

This section evaluates possible future changes in the social well-being of area residents and inmigrants, with and without the project. The impact discussion includes both beneficial effects and adverse impacts of the project on current and future populations.

The Social Well-Being Area of Concentrated Study includes Laramie and Kimball counties, and the cities of Cheyenne and Kimball. These areas were chosen because they are the counties and communities where the major population inmigration, over 5 percent in any 1 year, is expected to occur.

County and community-wide changes are considered. Major, structural changes in the areas' social make-up are not anticipated. However, changes are expected to occur that will affect both subgroups and community functions. The changes that may occur have been determined based on assessment of potential project characteristics, previous events as experienced by other communities faced with similar developments and an appraisal of existing resources and attitudes regarding these groups or community functions.

3.1.5.2 Definition of Levels of Impacts

Social Well-Being impacts are measured in terms of population inmigration associated with the project. As peak inmigration will occur during the construction phase, short term impacts are defined as not exceeding the duration of construction activities ending in 1990. Therefore, long term impacts are defined as those exceeding the duration of the construction period.

For this Social Well-Being assessment, levels of impact are defined as follows:

- Negligible Impact - The area has previously experienced changes similar to those assessed, and related public and private resources and responses are adequate to deal with the changes.
- Low Impact - The area has previously not experienced changes similar to those assessed, but related public and private resources and responses are adequate to deal with changes.
- Moderate Impact - The area has previously experienced changes similar to those assessed, but related public and private resources and responses are not adequate to deal with changes.
- High Impact - The area has previously not experienced changes similar to those assessed, and related public and private resources and responses are not adequate to deal with changes.

3.1.5.3 Determination of Significance Criteria

Project impacts are judged significant if population subgroups are not able to adjust or assimilate through existing institutional and informal social structures.

3.1.5.4 Environmental Impacts of the Proposed Action and Project Alternatives

The approach followed in this assessment was primarily to project historic trends.

In preparation of this impact assessment, four sources have been utilized: archival data on social indicators, interviews with local residents and officials, information prepared by local planning groups, and a review of the literature on rapid growth in the West. Among these are Murdock and Leistritz (1979), Freudenberg (1980, 1982), Flynn and Flynn (1982), Thompson, et al. (1982), and Branch et al. (1982).

The method used to prepare the impact analysis for the project involved an evaluation of the quantitative and qualitative information describing the area in light of relevant project characteristics. Several approaches to assessing the social impacts of major construction projects were considered, and selected approaches were incorporated into the process. The results of local planning and assessment efforts also were incorporated in the analysis.

3.1.5.4.1 The City of Cheyenne and Laramie County

3.1.5.4.1.1 Baseline Future - No Action Alternative

No major future changes are anticipated that will alter existing conditions without the project. The following general trends are expected: the average population will continue to age as the 15 to 34 age cohort grows older; the relatively high suicide rate will likely remain a problem for the community; recent increases in surplus job seekers are likely to persist; the current ethnic and racial distribution in the population should hold in the near future; the divorce rate might be expected to decrease as the average population ages; and current attitudes toward planning, diversity, and community objectives probably will continue. In this regard, recent planning efforts related to the project may create opportunities for social planning efforts in general.

3.1.5.4.1.2 Proposed Action

Population increases resulting from the Proposed Action may exacerbate some local problems as identified by residents, solve some, and create others. These issues are discussed below.

Laramie County and Cheyenne may experience an increase in the number of surplus job-seekers and indigents, many of whom are unskilled and without sufficient means. The population of these people has expanded during the last year and is expected to increase with project deployment. The size of this group also will be affected by the local and national economy. Local providers do not consider current shelter and food resources adequate for these needy groups, and local attitudes generally are not considered supportive of increasing this assistance.

An increase in number of indigents or surplus job-seekers could result in increased demands for resources from both formal and informal groups, as well as resulting in conflict in the community over means for meeting these demands and possibly fewer resources for existing indigent residents. Therefore, increases in this group's number are judged to present a moderate impact in the short term and a negligible impact in the long term. Also, because surplus job-seekers are not expected easily to assimilate, this impact is judged significant in the short term. As project-related surplus job-seekers will not come to the area after the construction period, the impacts are judged not significant locally in the long term.

Many of the project's social well-being effects are expected to impact adolescents and young adults in the 15 to 34 age group which is the largest age cohort in the county. The local project planning group identified a related series of social problems that currently characterize this age group, particularly the limited recreational, entertainment and social opportunities, and the consequent high perceived rate of alcohol use. Because many of the project workers are in this age group and because of their newness to the area, the potential exists for the continuation and possible increase of social alienation for its members. Accordingly, this potential alienation, and the limited opportunities for integration and adjustment to the community, is expected to result in a moderate and significant impact in the short term at the local level and a negligible, not significant impact in the long term at the local level only.

Another category of impacts that may arise with project development includes the social problems of family violence and substance abuse. The boomtown literature includes numerous references to increased incidences of alcohol and drug abuse, related occurrences of family violence, and other legal offenses such as driving under the influence and disturbing the peace. No consensus nor firm conclusions exist regarding the increase of social problems in rapid growth circumstances. However, the incidence of social problems for new groups, in general, can be expected to be similar to existing rates barring any peculiar characteristics of the resident or inmigrating population.

Given this consideration, an increase in social problems even at current rates would still represent an impact for the area that would require increased resources and organizational responses. As a result of these problems of adjustment and related needs, the social problem impacts of family violence and substance abuse are judged to be moderate and significant in the short term and negligible, and not significant in the long term.

In addition to social problem impacts on human services and other public services, local impact planning groups indicate that human services in particular, are inadequate in the area and that support for them is low. Human services include organized efforts, both formal and informal, for meeting human needs. Because many of the available human services are operating at capacity and because some that are needed are not available, new project population needs also may not be adequately met. Both existing and new residents could be affected by the shortage of human services due to the expected increased population. Because of these shortages the project-related human service impacts are judged moderate in the short term but negligible in the long term. Because these limited human services would make adjustment more difficult for both inmigrants and existing residents,

they are considered significant in the short term. However, because of outmigration after the construction period, the impacts are judged not significant in the long term.

The potential for price inflation affecting items such as food and shelter has been noted as a possible project-related social well-being problem. Inflation has occurred in many rapid growth areas and most directly affects existing, low-income residents, especially fixed-income elderly for whom displacement could create social, psychological, and financial difficulties. Because of the possible shortage of affordable housing and other commodities, the potential impact of inflation is judged to be moderate in the short term but negligible in the long term. The potential difficulties faced by low-income persons in adjusting to project changes lead to a judgement of significance for this impact in the short term but not significant in the long term.

Another category of impacts as noted by impact planning groups involves local planning problems. These include resistance to planning regulations and development innovations. One particular set of planning problems that could arise with the project are the potential end of construction impacts. These include potential downturn problems in the housing market and for local businesses. Some impacts even could be made into long-term benefits with the appropriate planning efforts. Because of current attitudes toward planning and related limited resources, the potential social well-being impacts for the community as a whole are judged to be moderate in the short term but negligible in the long term. The problems of adjustment for both existing residents and inmigrants that would be created by the planning limitations are judged to be significant impacts in the short term. Because long-term project-related growth is small, the long-term project impacts on the community in regard to planning are judged not significant.

The last potential impact to be noted here is the displacement of certain residents living within the Quantity Distance zones required for the project. Residents in three structures (nine throughout the region) could be affected in Laramie County. These structures are located near Launch Facilities E-9, E-11, and Q-5. Options will be provided to the residents including the opportunity to sell their residences and improvements to the U.S. Government or to request an exemption allowing them to remain in their dwellings. The potential impacts of this situation in the short term are judged low and not significant because resources are adequate to deal with the changes and because the impacts will not be county or community-wide. As the dislocation problems will be settled during the construction period, these impacts are judged negligible for the long term. The residents will have adjusted to their situations in the long term and, therefore, the long term impacts are rated not significant.

Potential beneficial effects of the project include increased local jobs and decreased unemployment increased personal income, and increased capital availability in the area. These financial benefits will result in increased access to recreation, entertainment, and educational opportunities for those individuals whose incomes rise. The community and county could benefit from the potential lowered unemployment and lowered demands for welfare subsidies, the increased tax base and the consequent greater range of public services that could be offered as a result of the project.

Consideration of these social well-being issues in light of future changes presents an opportunity to plan for and to take innovative actions that will create positive changes for Cheyenne and Laramie County. This understanding can allow for building on existing strengths as well as for dealing with current problems while planning for the future. Residents of the city and the county annually demonstrate their ability to successfully carry out a major effort by planning for and running Frontier Days. This same spirit and effort, transferred to planning for and dealing with project impacts, could enhance social well-being conditions in the future.

3.1.5.4.2 The City of Kimball and Kimball County

3.1.5.4.2.1 Baseline Future - No Action Alternative

Current trends in Kimball County include the continued aging of the population with an increasingly higher median age, the continued expansion of the segment of the population over 50, and a decrease in the population overall. Other characteristics that likely will remain similar are the low divorce rate (in recent years), a relatively high per capita income, and a relatively large percentage of low-income families.

3.1.5.4.2.2 Proposed Action

Population increases from the Proposed Action may be expected to further increase some of the negative features and issues of concern identified by residents. The Proposed Action may also be expected to provide beneficial effects as well. Kimball County and the city of Kimball may experience an increase in the number of surplus job-seekers, many of whom are unskilled and without sufficient means, which will place additional burdens on social service programs. Kimball County has previously experienced population shifts similar to those that may occur with the project. Nonetheless, because of the limited resources for dealing with surplus job-seekers, this impact is considered moderate in the short term. As project-related surplus job-seekers will probably not come to the area after the construction period, the long-term impact is judged negligible.

The potential problems that surplus job-seekers may have in assimilating to the community and the difficulties that the community may have in providing for them are considered to be significant in the short term but not significant in the long term.

Additional numbers of new, young adults, both single and married, may have difficulty integrating into the community and finding suitable recreation, entertainment, and social activities. Because of these limited activities, the potential impacts for inmigrants are considered moderate in the short term but as most of the employees will leave after the construction period, long-term impacts are considered negligible.

The difficulties faced by inmigrants in adjusting to the new area are considered significant in the short term. However, because most of them will leave after the construction period, long-term impacts are judged not significant.

The potential for increased alcohol consumption that could lead to increased accidents and arrests for driving under the influence may occur with the new population. The potential for increases in family violence, possibly related to alcohol abuse, may exist particularly because of the lack of suitable social activities for both men and women.

The lack of available resources for dealing with social problems such as these, and the potential difficulties of adjustment that may be experienced by families as a result are judged moderate and significant impacts in the short term but negligible and not significant in the long term.

The situation with regard to human services in Kimball County is somewhat different than that for Laramie County. The absence of most human services in the county is an indication that people must travel for most services or do without certain ones. Those few existing human services also may be more heavily impacted as will other services such as law enforcement and those provided by volunteer groups.

Both existing and newcomer groups are likely to be affected with respect to their needs for human services. The impacts on social well-being, as a result of this human service shortage, are rated moderate and significant in the short-term. As most of the new population will leave after the construction period, long-term impacts are considered to be negligible and not significant.

Another impact that is expected is the dislocation of certain existing residents in areas within the Quantity Distance zones near the Launch Facilities. There are three such residences in Kimball County. These are located adjacent to the Launch Facilities D-4, D-9, and E-5. The same options noted previously will be presented these residents. Although these residents have not previously experienced dislocation, but because the resources will be supplied them if they choose to move from their current dwellings, the impact is judged low in the short term. As these issues will be resolved during the construction period, long-term impacts are considered to be negligible.

The potential problems of adjustment for the residents are considered significant in the short term but not significant in the long term.

The planning requirements for Kimball County will not be as great as they will be in Laramie County, although existing resources are also much more limited. The impact on the area at the end of project period will create some downtown problems that will require effective formal planning efforts. The limited technical manpower and other resources in the county make this task appreciable. The social well-being impacts that could result are, therefore, rated moderate in the short term but negligible in the long term.

Although problems of adjustment for both existing and new populations will be increased without similar increases in planning programs, the social well-being impacts related to this potential limitation are judged significant in the short term. As most new residents will leave after the construction period, long-term impacts related to planning limitations are considered to be not significant.

Beneficial effects for those residents whose incomes will rise include a higher standard of living. The community and county stand to benefit by a temporary population influx, increased local jobs, decreased unemployment and increased personal income. The tax base could temporarily increase and some additional public services might be offered as a result. Kimball County, in particular, because of its aging and declining population, could benefit from the increased diversity and social activity that will occur in the area with the influx of new persons. As with Laramie County, the project will present both opportunities and problems that can be understood and acted upon in light of the information presented here.

3.1.5.4.3 Consideration of Alternatives

As no changes in population impacts are anticipated due to staging, roads, or cable alternatives, no variation in Social Well-Being impacts are projected.

3.1.5.5 Summary of Impacts

3.1.5.5.1 Explanation of Detailed Impact Matrix

Figure 3.1.5-1 shows the impacts for both Laramie and Kimball counties and for the aggregate of the two. Major changes are not anticipated with regard to the social structure or behavioral characteristics of the local residents as a result of the project. The impacts are anticipated to affect primarily major subgroups of the population and are rated moderate in the short term for all indicators except Quantity Distance zones which receive a low impact. Because the impacted subgroups are not expected to readily adjust and assimilate within existing institutional and informal social structures, the impacts are also, with one exception, considered significant in the short term. The Quantity Distance zone impact is considered insignificant. Hence, the overall impacts are moderate and significant for both counties.

Because inmigrants are expected to assimilate and existing residents are expected to adjust to any changes created by the project, long-term impacts are judged negligible and not significant for both counties.

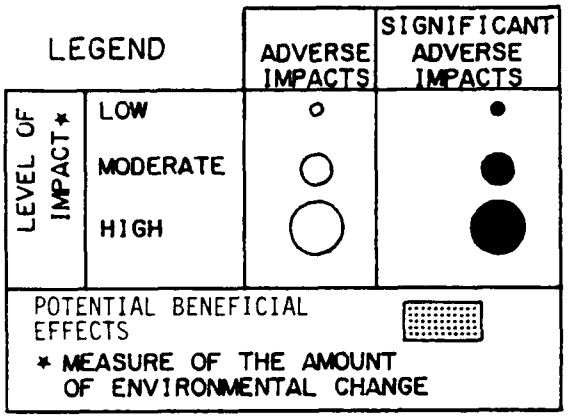
3.1.5.5.2 Aggregation of Elements, Impacts, and Significance

The overall impacts for Social Well-Being are significant and moderate in the short term and not significant and negligible in the long term on the local level. Beneficial effects will also occur over the short term as a result of the Proposed Action.

Determination of overall impact ratings for Social Well-Being involved the aggregation of the subelement impact ratings. They were based on the area condition and professional experience in determining a balance between considerations of positive and negative impacts. Overall Social Well-Being impacts are determined separately for short and long-term considerations of the Proposed Action. The methodology involved aggregation of the Social Well-Being indicators. The various indicators were assigned equal average weight and overall impact determined to be that of the majority impact. For example, if low impacts were reported on the regional

FIGURE 3.1.5-1

SOCIAL WELL-BEING SUMMARY IMPACT MATRIX



	PROJECT IMPACTS					
	SHORT TERM			LONG TERM		
	SITE	LOCAL	REGIONAL	SITE	LOCAL	REGIONAL
SOCIAL WELL-BEING		●				
City of Cheyenne and Laramie County		●				
City of Kimball and Kimball County		●				

level for the majority of indicators, the aggregate impact on the regional level would be low as well. Resource impact significance was determined in the same manner.

3.1.5.6 Mitigation Measures

Potential mitigation measures that will be considered are identified below. One, some, or all of the mitigation measures may ultimately be selected. Each measure identifies the party responsible to implement, but not necessarily to pay for, the measure.

- o A media program for discouraging surplus job seekers from out of the region (public agency).
- o Provision of adequate shelter, facilities, information and referrals, and food for surplus job-seekers and a coordinator through a center specifically prepared to deal with this population (public agency, private volunteer groups)
- o Creation of an educational program dealing with the problems of family violence and the support of existing services to deal with these problems (public agencies/subsidies, private volunteer groups).
- o The utilization of an information/coordination center that performs job referrals, develops social integration programs for new and existing residents, and distributes printed information (public agency).
- o Establishment of educational and other programs to deal with the full range of alcohol abuse problems such as the coordination of effective alcohol treatment, provision of transportation from drinking establishments for intoxicated patrons, and suggestions for alternatives to drinking as a form of entertainment (public agency, private volunteer groups).
- o A needs assessment of social well-being qualities and problems throughout the community (public agency and a program for utilizing the findings).
- o Designation of a coordination group for impact planning (public agency).
- o Development of a social monitoring program (public agency/USAF).
- o Creation of an information and coordination program with local planners and the business community concerning existing business potential, the duration of this potential, and what to expect at the end of construction. This could also include a planned phases-out program. (public agency, contractor/USAF).

3.1.5.7 Unavoidable Adverse Impacts

A potential for increased numbers of injuries and fatalities exists with all construction

projects. This potential for unavoidable adverse impacts also exists for the project but the extent is unknown. A possible increase in injuries and fatalities may also occur as a result of alcohol abuse, both onsite and on the highway.

3.1.6 Public Services and Facilities

3.1.6.1 Introduction

This section describes the impacts in the Area of Concentrated Study of the Proposed Action on education, law enforcement, criminal justice, fire protection, health care, human services, general government, and libraries.

A governmental jurisdiction is included within the Area of Concentrated Study if population directly attributable to the project causes the rate of population growth within that jurisdiction to exceed 5 percent over baseline growth in any given year. In general, communities that experience less than this 5 percent growth level in any given impact year do not approach threshold levels for public services and facilities. Consequently, an impact growth rate of greater than 5 percent could create needs for additional staffing and facilities. Based on this justification, Laramie County and Cheyenne, Wyoming, and the city of Kimball, Nebraska, fall within the Area of Concentrated Study. The county of Kimball, Nebraska, with an impact population growth of just under 5 percent, is included because the city of Kimball is a unit of local government to which the County provides services.

3.1.6.2 Definition of Levels of Impact

Definitions of level of impact were developed to classify potential impacts, both direct and indirect, of the project. Level of impact is concerned solely with the relative severity of impacts; i.e., their degree or measure of change as compared to a baseline. The impact level definitions which follow are closely tied to increases in population over baseline conditions. All public service demands are primarily driven by population. The basic assumption was that individuals will always place a demand on public services and facilities. Consequently, any increase in population will also initiate an increase in the demand for public services. The level of impact was determined by threshold levels of existing service provision and are expressed by the following definitions:

- Negligible Impact - Would result when expenditures are made to service the impact population; however, these expenditures can be accommodated within existing departmental budgets, and would not require an internal transfer of funds, additional staffing or major equipment, or additions of major capital facilities.

- Low Impact - Would result when, due to the Proposed Action, departmental budgets must be supplemented through the internal transfer of existing revenues, but would not require additional staffing or major capital equipment, or additions of major capital facilities.

- Moderate Impact - Would result when additional staffing or major equipment are required as a result of the Proposed Action, but would not require the addition of major capital facilities.

- o High Impact - Would result when construction of major capital facilities would be required as a result of the Proposed Action.

3.1.6.3 Determination of Significance Criteria

The following conditions were considered in determination of impact significance. If any of these criteria were met, the impact under consideration was deemed significant.

- o Whether the impact affects public health or safety;
- o Whether the impact is likely to be highly controversial; and
- o Whether the action or its impact threaten the violation of some federal, state, or local law or requirements imposed for the protection of the environment.

3.1.6.4 Environmental Impacts of the Proposed Action and Project Alternatives

Upon completion of the inventory of existing conditions, the Baseline Future - No Action Alternative was forecast in order to establish projected future conditions for each element within the Area of Concentrated Study. The relationship between population increases, service delivery levels, special requirements, programmatic changes in existing services, and cost was established. Extensive interviews with local officials were held to determine if programmatic changes are planned that could modify service standards.

The age-cohort/survival model developed for this project was an important component in determining the demographic characteristics of the future population and how their subsequent impacts would affect public services. Levels of service provision were then projected for all eight elements.

Methods used to project public service impacts under the Proposed Action are similar to those used in establishing baseline conditions under the No Action Alternative. The major difference is degradation or improvement of service levels which were examined based on the demographic characteristics of the impact population.

Public service and facility impact levels were both qualitatively and quantitatively examined. Increases in staffing, major equipment, and other special requirements were identified to maintain local service delivery levels.

Assumptions for public services and facilities are presented below:

- o Demand for public services and facilities is a function of population;

- o Public services will remain available for all residents within a specific governmental jurisdiction; and

- o Service levels will remain at current levels when forecast under baseline conditions.

For the Public Services analysis, there are no assumed mitigations.

3.1.6.4.1 Education

3.1.6.4.1.1 Laramie County Baseline Future - No Action Alternative

Projected future student enrollments for Laramie County School District No. 1 are shown in Table 3.1.6-1 under No Action. These projections indicate a continual increase for elementary school enrollment and stable secondary school enrollment. Student-to-teacher ratios are assumed to hold constant under the No Action Alternative. It is anticipated that with the No Action Alternative, educational services such as special education, gifted programs, and nonpublic education will experience growth in enrollments.

Although two new public elementary schools are being constructed, one is to replace an existing facility, and overcrowding at other schools will fill them both to capacity upon their completion. With no other plans to construct new schools and enrollments projected to rise, conditions for the District's elementary schools are predicted to become even more crowded under the No Action Alternative during the analysis period. For secondary school facilities, enrollments are predicted to keep existing facilities at capacity from 1983 to 1992.

Moderate enrollment increases are anticipated for Laramie County School District No. 2. As with School District No. 1, most of the increase will be found at the elementary level. Staffing increases would be minimal.

With the No Action Alternative, post-secondary education is anticipated to continue to expand in Laramie County.

3.1.6.4.1.2 Kimball County Baseline Future - No Action Alternative

Public school enrollments for the Kimball County School system were projected by grade level for the No Action Alternative and are shown in Table 3.1.6-2. Overall enrollment is projected to decrease until 1986 and then rise for the balance of the period, due mainly to increased elementary enrollment.

Future student-to-teacher ratios were assumed to remain the same as current conditions. Due to excess capacity, no changes in Kimball County School system facilities will occur during 1983 to 1992 with the No Action Alternative.

Table 3.1.6-1

PROJECTED ENROLLMENTS FOR LARAMIE COUNTY SCHOOL DISTRICT NO. 1
BY NO ACTION, PROPOSED ACTION, AND TOTAL PROJECTION
BY GRADE CATEGORY AND PERCENT INCREASE FROM NO ACTION TOTAL
1983 - 1992

	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992
No Action										
K- 6	6,908	7,029	7,213	7,355	7,546	7,720	7,911	8,102	8,303	8,658
7- 9	3,156	3,181	3,098	3,082	3,041	3,040	3,020	3,010	2,996	2,984
10-12	2,715	2,674	2,843	2,931	2,937	2,960	2,968	2,984	2,996	3,012
TOTAL:	12,779	12,884	13,154	13,368	13,524	13,720	13,899	14,096	14,295	14,654
Proposed Action										
K- 6	0	0	357	419	463	247	191	98	97	97
7- 9	0	0	190	221	240	126	96	50	45	39
10-12	0	0	189	220	239	125	96	49	44	39
TOTAL:	0	0	736	860	942	498	383	197	186	175
Total Projections										
K- 6	6,908	7,029	7,570	7,774	8,009	7,967	8,102	8,200	8,400	8,755
7- 9	3,156	3,181	3,288	3,303	3,281	3,166	3,116	3,060	3,041	3,023
10-12	2,715	2,674	3,032	3,151	3,176	3,085	3,064	3,033	3,040	3,051
TOTAL:	12,779	12,884	13,890	14,228	14,466	14,218	14,282	14,293	14,481	14,829
Percent Increase (From No Action to Total)										
K- 6	0.0	0.0	4.9	5.7	6.1	3.2	2.4	1.2	1.2	1.1
7- 9	0.0	0.0	6.1	7.2	7.9	4.1	3.2	1.7	1.5	1.3
10-12	0.0	0.0	6.6	7.5	8.1	4.2	3.2	1.6	1.5	1.3
TOTAL:	0.0	0.0	5.6	6.4	7.0	3.6	2.8	1.4	1.3	1.2

Note: The moderately declining enrollment for the No Action Alternative for grades 7-9 is explained by the declining birth rates of the late sixties and early seventies and the higher attrition rates in the higher grades. The slightly increasing enrollments in the senior high school grades is largely explained by the absorption of formerly private school enrollments.

Source: Wyoming State Department of Education 1983 Projection Model, Weighted Mean Ratio Method through 1987; Smoothed Average Technique 1988 - 1992, age-cohort survival method for the impact population.

Table 3.1.6-2

PUBLIC SCHOOL
STUDENT ENROLLMENT PROJECTIONS
BY GRADE CATEGORY
FOR THE KIMBALL COUNTY SCHOOL SYSTEM UNDER
THE BASELINE FUTURE NO ACTION ALTERNATIVE
1983 TO 1992

Grade Category	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992
K-6 (1982 actual = 536)	529	527	540	542	573	595	627	655	674	687
7-8 (1982 actual = 146)	138	153	153	147	134	140	145	139	149	165
9-12 (1982 actual = 295)	297	270	266	268	260	266	254	255	251	250
TOTAL: (1982 actual = 977)	964	950	959	957	967	1,001	1,026	1,049	1,074	1,102

Source: Nebraska Department of Education 1983 Projection Model, Mean Survival Ratio Method.

3.1.6.4.1.3 Laramie County Proposed Action

Increases in student enrollments due to the Proposed Action were projected for elementary and secondary grade levels in Laramie County School District No. 1 for 1983 to 1992 and are shown in Table 3.1.6-1. Increased enrollments begin for all grade levels in 1985 and last through 1992. The peak year of impact is 1987 when the Proposed Action is projected to result in 7 percent more students than the No Action Alternative. More importantly, the Proposed Action will cause a need in 1987 for the District to provide for 6.1 percent more students in already overcrowded elementary schools. Based on 1982 capacity figures for three grade levels, the 1987 enrollments projected with the Proposed Action will result in the following:

- Approximately 1,400 more elementary students than rated capacity (33 percent of this amount is due to the Proposed Action);
- Approximately 200 students more than rated capacity at the junior high level (all project-related); and
- Approximately 400 students exceeding capacity at the high school level (75 percent due to the Proposed Action).

Not only will the impact on enrollments be more severe for the elementary grade level, but the problem will be focused in particular on three elementary schools in South Cheyenne: Arp, Goins, and Rossman. The three schools have a current combined shortage of 33,000 square feet (sq ft) of space, based on actual square footages in each school compared to the School District standard of 122 sq ft per student. With the Proposed Action, these schools will be required to accommodate an additional 200 students. In order to do so a total of 8 additional classrooms and approximately 11 teachers will be required among the 3 schools.

District Staffing requirements due to the Proposed Action are 50 teachers, 12 other certified staff, and 25 noncertified staff in the peak impact year of 1987. Lesser numbers in proportion to enrollments will be required in the other years of the 1985 to 1992 period. In addition to staff increases, substantial classroom space will be required as a result of the Proposed Action. Based on 122 sq ft per student, the projected increased enrollments will require 56,000 sq ft of added classroom space at the peak year of impact for elementary students, approximately the equivalent size of 2 elementary schools.

Overall, the impacts of the Proposed Action will require the District to accommodate a relatively large number of secondary students from 1985 to 1989 and somewhat lesser amounts for the balance of the analysis period, and to accommodate the number of elementary students projected with the No Action Alternative for 1990 in the year 1987. This will accelerate enrollments, on the average, by about 1 year for the balance of the period. In view of the fact that the Proposed Action will require additional expenditures, increased staffing, and the addition of classroom space, the impact of the Proposed Action on Laramie County School

District No. 1 and its students is considered to be high and significant in the short term, and high, not significant in the long term. The short-term impact is significant because impacts on education tend to be controversial. This is particularly true in South Cheyenne where there is already overcrowding in the three elementary schools of Orp, Goins, and Rossman. The preliminary fall 1983 enrollment estimates indicate that over 200 students are being bused from these schools to other schools in the cluster. Not only would overcrowding from the project related students affect the general classroom size, but it is also a strain on the multipurpose facilities, playgrounds, and plumbing.

There are only three students projected to enroll in Laramie County School District No. 2 as a result of the Proposed Action. Therefore, the impact is negligible and not significant.

3.1.6.1.4.4 Kimball County Proposed Action

With only small and temporary population increases projected for Kimball County, parallel increases in student enrollments are projected. During the peak year of population increase, only 17 students (9 elementary and 8 secondary) are projected to enroll in the system as a result of the Proposed Action. Impacts on the system and its students are projected to be low but not significant in the short term and negligible in the long term.

3.1.6.4.2 Law Enforcement

3.1.6.4.2.1 Laramie County Baseline Future - No Action Alternative

With the No Action Alternative and attendant population increases, the Laramie County Sheriff's Department is projected to maintain its current levels of service for officers (0.84 per 1,000 county population) and patrol cars (1.0 per 1.93 patrol deputies) as shown in Table 3.1.6-3 throughout the analysis period of 1983 to 1992. Construction of a new, city-county law enforcement facility is projected for 1984 and will add substantial space to the Sheriff's Department. For administrative and office space an increase from 2,071 sq ft to 14,750 sq ft is projected.

3.1.6.4.2.2 City of Cheyenne Baseline Future - No Action Alternative

The City of Cheyenne Police Department is projected to maintain its existing levels of service throughout the analysis period with the No Action Alternative for officers (1.74 per 1,000 population) and patrol cars (1.0 per 3.25 patrol officers). With the occupation of the joint city-county law enforcement facility, work space (excluding jail facilities) is projected to increase to 14,500 sq ft in 1984. Table 3.1.6-4 illustrates projected service levels for 1983 to 1992 with the No Action Alternative.

Table 3.1.6-3

LARAMIE COUNTY SHERIFF'S DEPARTMENT
FUTURE STAFF, VEHICLE, AND FACILITY NEEDS
WITH THE PROJECT

	Officers		Patrol Cars		Facilities (sq ft)	
	No Action Alternative	Increase Over No Action	No Action Alternative	Increase Over No Action	No Action Alternative	Increase Over No Action
1984	63	0	16	0	5,442	0
1985	64	5	16	1	29,750	125[a]
1986	66	5	16	2	29,750	0
1987	67	5	16	2	29,750	0
1988	68	4	17	2	29,750	0
1989	70	1	17	1	29,750	0
1990	71	1	17	1	29,750	0
1991	72	1	18	0	29,750	0
1992	74	0	18	0	29,750	0

Note: a Will be temporarily required until new facility opens; based on the new facility square footage requirements, 1,250 sq ft of additional space would be temporarily required.

Source: Data derived from Laramie County Sheriff's Department records for existing conditions (1983). Projections based on existing level of service of 0.84 sworn officers per thousand population.

Table 3.1.6-4

CHEYENNE POLICE DEPARTMENT
FUTURE STAFF
VEHICLE AND SPACE NEEDS
WITH THE PROJECT

	Officers		Patrol Cars		Station Space (sq ft)	
	No Action Alternative	Increase Over No Action	No Action Alternative	Increase Over No Action	No Action Alternative	Increase Over No Action
1984	87	0	16	0	12,900	0
1985	88	5	16	2	14,500	590[a]
1986	89	6	17	0	14,500	0
1987	90	6	17	2	14,500	0
1988	92	4	17	0	14,500	0
1989	93	1	17	1	14,500	0
1990	94	1	18	0	14,500	0
1991	95	1	18	0	14,500	0
1992	96	1	18	0	14,500	0

Note: a Will be required until new facility opens; based on the new facility square footage requirements, 1,250 sq ft of additional space would be temporarily required.

Source: Data derived from Cheyenne Police Department records for existing conditions (1983). Projections based on existing level of service of 1.74 officers per thousand population plus traffic control officers.

3.1.6.4.2.3 Kimball County and City of Kimball Baseline Future - No Action Alternative

With the No Action Alternative, Kimball County and the city of Kimball are expected to decrease in population very slightly. No changes from conditions existing in 1983 to 1992 for either the Kimball County Sheriff's Department or the City of Kimball Police Department are anticipated during the analysis period with the No Action Alternative.

3.1.6.4.2.4 Laramie County Proposed Action

If the Sheriff's Department is to maintain its present and projected level of service delivery, additional officers and patrol cars will be necessary to serve the increased population in Laramie County due to the Proposed Action as shown in Table 3.1.6-3. Additional work space will be necessary in part of 1985.

In addition to these overall impacts, population for the unincorporated area of South Cheyenne is projected to increase as a result of the Proposed Action during the 1984 to 1987 period. This increase is expected to result in increased traffic, traffic accidents, and crime in this unincorporated area, bringing increased demands on the Sheriff's Department due to the Proposed Action.

In addition, the Sheriff's Department may have to provide backup support to the Cheyenne Police Department should demonstrations against the project occur in the city of Cheyenne.

Impacts on law enforcement in Laramie County are considered to be moderate and significant in the short term and negligible and not significant in the long term. Short-term impacts are significant because the project will impact public safety. Specifically, the traffic control capabilities of the Sheriff's Department are limited. With the project, average daily traffic is projected to increase by approximately 6 percent. However, traffic congestion will be even greater at the peak hours of 7:00 to 8:00 AM and 4:30 to 5:30 PM leading to a greater propensity for traffic accidents. This will be especially true at College Drive and Interstate 25 where a level of service reduction from A to D/F is projected (Section 3.1.9.2.1.1, 3.1.9.4, and 3.1.9.5.) Consequently, two additional officers and one additional patrol car are projected to be required through 1988 in order for the County to provide an officer and vehicle for traffic control duties during peak hours.

3.1.6.4.2.5 City of Cheyenne Proposed Action

If the City of Cheyenne Police Department is to maintain its present and projected levels of service delivery with the Proposed Action, additional officers and patrol cars will be necessary to serve the increased population. Some additional space will be necessary in 1985 as shown in Table 3.1.6-4. In addition to these projected overall impacts, other, more specific, impacts due to the Proposed Action are projected. Should demonstrations result from the Proposed Action, the Cheyenne Police Department will be required to respond to such civil disturbances, which will require additional expenditures. In addition to Department response, there

are several sources of backup for situations of this type such as the Laramie County Sheriff, the Wyoming State Patrol, and the Wyoming National Guard. All of these options involve costs to the taxpayer.

Impacts on law enforcement in the city of Cheyenne are considered to be moderate and significant in the short term, and moderate but not significant in the long term. Short-term impacts are significant because impacts could be controversial (especially as they relate to the discussion above on potential demonstrations) and because of potential project effects on public safety.

Public safety considerations are primarily traffic-related. The average daily traffic is projected to increase by approximately 6 percent. Congestion due to peak hour traffic between 7:00 to 8:00 AM and 4:30 to 5:30 PM will lead to a greater propensity for accidents. This will be especially true at the Randall-Interstate 25 interchange. The level of service is projected to degrade from a rating of A to D. (Refer to Sections 3.1.9.2.1.1, 3.1.9.4, and 3.1.9.5.) Consequently, two additional officers and an additional patrol car are projected to be required through 1988 in order for the City to provide an officer and vehicle for traffic control duties during peak hours.

3.1.6.4.2.6 Kimball County and City of Kimball Proposed Action

In view of the small and temporary increase in population projected for Kimball County, no changes in staff, vehicles, space, or level of service delivery for the Kimball County Sheriff's Department are likely to occur as a result of the Proposed Action. As such, impacts on law enforcement are projected to be negligible. Since the City Police Department's level of staff, vehicles, and space was the same when the city's population was substantially larger, impacts from the added population due to the Proposed Action are expected to be negligible, and not significant in the short and long term.

3.1.6.4.3 Criminal Justice

3.1.6.4.3.1 Laramie County Baseline Future - No Action Alternative

Caseloads are expected to increase for the County Court during 1983 to 1992 for at least two reasons. First, population in the urbanized area is expected to increase and urban caseloads per capita tend to be higher than rural areas. Second, Wyoming's new, tougher drunk driving law is expected to result in increased prosecutions and trials per capita. Based on these reasons and the fact that the Court is at capacity now, it is projected that the addition of a part-time judge in 1985 will be necessary to prevent a serious degradation in service level. Conversion of the new part-time judge to full-time would be necessary in 1988. Increased use of the shared courtroom will also be required, as will expansion of current computerization and records microfilming.

Prosecutions for the District Court are projected to increase by 5 percent annually under No Action for 1983 to 1992.

3.1.6.4.3.2 City of Cheyenne Baseline Future - No Action Alternative

The caseload for Cheyenne Municipal Court is expected to increase for the same reasons County Court is expected to increase under the No Action Alternative for 1983 to 1992. The part-time judge is projected to work more hours during 1983 to 1986 with conversion to a full-time position by 1987. The addition of a part-time clerk is projected to occur by 1986. No new space will be required.

The City Attorney's office is expected to expend additional staffing time during 1984 to 1985 and an additional staff attorney will be needed by 1986 along with one support person and some office reorganization.

3.1.6.4.3.3 Kimball County Baseline Future - No Action Alternative

Due to decreasing population, there are not expected to be any substantive changes in staff, space, caseload, or backlog for the Kimball County Court or the District Court with the No Action Alternative. Service levels are projected to remain constant during 1983 to 1992.

3.1.6.4.3.4 Laramie County and City of Cheyenne Proposed Action

Due to population increases which will be generated by the Proposed Action, additional staff needs for both County and Municipal courts identified with the No Action Alternative will be required approximately 1 year earlier as a result of increased caseloads due to the Proposed Action. No other impacts on the courts are anticipated due to the Proposed Action. Because expenditures will increase and staff additions are required earlier, impacts on both the County and Municipal courts are rated as moderate but not significant in the short term. Impacts are considered to be negligible and not significant in the long term.

3.1.6.4.3.5 Kimball County Proposed Action

The low projected population increases due to the Proposed Action and the projected low caseload and backlog for the Kimball County Court system with the No Action Alternative will create impacts on the Kimball County Court and its level of service that are projected to be negligible and not significant in both short and long terms.

3.1.6.4.4 Fire Protection

3.1.6.4.4.1 Laramie County Baseline Future - No Action Alternative

In order to maintain existing service levels with the No Action Alternative for firefighters and firefighting vehicles, 16 firefighters and 1 firefighting vehicle will

be required by 1992 for Fire District No. 1. Fire District No. 2 is projected to require one additional volunteer firefighter in 1984, but no additions to staff, vehicles or equipment between 1984 and 1992.

3.1.6.4.4.2 City of Cheyenne Baseline Future - No Action Alternative

The Cheyenne Fire Department is projected to rebuild and enlarge existing Fire Station No. 2 by 1986 under the No Action Alternative. In addition, as population increases, the Department is projected to increase staff and firefighting vehicles in order to maintain its existing level of service. This will mean an additional ten firefighters by 1992 and one additional firefighting vehicle.

3.1.6.4.4.3 Kimball County Baseline Future - No Action Alternative

Based on stable but slightly declining populations for both Kimball County and the city of Kimball, the respective fire departments are projected to maintain constant levels of staffing, facilities, equipment, and levels of service with the No Action Alternative for 1983 to 1992.

3.1.6.4.4.4 Laramie County Proposed Action

With substantial population increases expected to occur in Fire District No. 1 during portions of the analysis period as a result of the Proposed Action, additional firefighters, vehicles, and space will be required to prevent degradation of service levels. Table 3.1.6-5 illustrates that projected needs represent accelerations of baseline needs. Because of the fact that short-term needs for staff, a vehicle, and a small amount of space are induced, the short-term impact on the District and its customers is considered to be moderate and not significant. Since no longterm needs for staff, vehicles, or space were identified, long-term impact is considered to be negligible and not significant. Fire District No. 2 would require two additional volunteers by 1992, but no vehicles or station space, thus creating negligible, not significant short and long term impacts.

3.1.6.4.4.5 City of Cheyenne Proposed Action

In order to maintain levels of service in Cheyenne in the face of population increases projected to result from the Proposed Action, the Cheyenne Fire Department will need to add firefighters, a firefighting vehicle, and space as shown in Table 3.1.6-6. As the table indicates, the Proposed Action requirements up to 1992 represent accelerations of baseline future needs for staff, vehicles and space. The impact is thus considered to be high and not significant for the short term only. Long--term impact is considered to be moderate but not significant.

3.1.6.4.4.6 Kimball County and City of Kimball Proposed Action

The small and temporary population increases projected for the Kimball County Rural Fire District and the city of Kimball are projected to have negligible, not significant impacts on fire protection in both short and long term for both entities.

Table 3.1.6-5

PROJECTED STAFF, VEHICLE, AND SPACE NEEDS FOR
LARAMIE COUNTY FIRE DISTRICT NUMBER ONE
DUE TO THE PROPOSED ACTION
1984 TO 1992

	Firefighters		Firefighting Vehicles		Station Space (sq ft)	
	No Action Alternative	Increase Due to the Proposed Action	No Action Alternative	Increase Due to the Proposed Action	No Action Alternative	Increase Due to the Proposed Action
1984	13	0	4	0	3,600	0
1985	13	4	4	1[a]	3,600	500[a]
1986	14	4	4	1[a]	3,600	0
1987	14	4	4	1[a]	3,600	0
1988	14	2	4	1[a]	3,600	0
1989	15	1	5	0	4,100	0
1990	15	1	5	0	4,100	0
1991	15	1	5	0	4,100	0
1992	16	0	5	0	4,100	0

Note: a This represents an acceleration of baseline needs.

Source: Projections derived from current Laramie County Fire District Number One data, based on two firefighters per thousand population.

Table 3.1.6-6

PROJECTED STAFF, VEHICLE, AND SPACE NEEDS
FOR THE CHEYENNE FIRE DEPARTMENT
DUE TO THE PROPOSED ACTION
1984 TO 1992

	Firefighters		Firefighting Vehicles		Station Space (sq ft)	
	No Action Alternative	Increase Due to the Proposed Action	No Action Alternative	Increase Due to the Proposed Action	No Action Alternative	Increase Due to the Proposed Action
1984	90	0	10	0	32,948	0
1985	91	3	10	0	32,948	1,212
1986	92	4	10	1[a]	32,948	3,976[a]
1987	94	3	11	0	36,924	0
1988	95	2	11	0	36,924	0
1989	96	2	11	0	36,924	0
1990	97	1	11	0	36,924	0
1991	98	1	11	0	36,924	0
1992	99	1	11	0	36,924	

Note: a This represents an acceleration of baseline needs.

Source: Projections derived from current Cheyenne Fire Department data. Projections based on existing level of service of 1.8 firefighters per thousand population.

3.1.6.4.5 Health Care

3.1.6.4.5.1 Laramie County Baseline Future - No Action Alternative

Baseline population projections for Laramie County indicate that by 1992 there will be a total need for 350 hospital beds, or 50 more than currently available in the 2 civilian hospitals. However, neither hospital is currently proposing any additions to existing facilities. County Memorial Hospital is projected to receive most of the demand from the additional baseline population. This will be most readily seen in four areas: expansion of the obstetrics unit, expansion of the radiation therapy unit, need for a heliport for emergency air transport, and the development of a 10 to 15-bed closed psychiatric unit.

The number of primary care physicians will need to be increased to maintain existing health care service levels. An additional 11 to 12 physicians will be required by 1992. Approximately seven to nine more dentists are also projected as being needed during this same period.

The Public Health Department is projected to continue to have problems with service provision if the Department remains at its present location. Currently there is a need for a public health nurse and a field sanitarian. Additional staffing of a sanitarian for the Environmental Health Division of the Health Department with associated equipment and office space, and an animal control officer, will further strain an already inadequate facility.

An additional problem facing the Health Department is the decision by School District No. 1 to no longer provide throat cultures at the schools. The Health Department will be impacted to an undetermined extent by the decision.

3.1.6.4.5.2 Kimball County Baseline Future - No Action Alternative

Baseline population projections for Kimball County indicate a decrease in population between 1983 and 1992. This reduction should not affect hospital services in the county. Existing levels of physicians, dentists, and other health personnel are not expected to change over the baseline period.

3.1.6.4.5.3 Laramie County Proposed Action

The inmigrant population will cause short-term impacts on hospital facilities and personnel; however, existing levels of service are generally adequate to accommodate the increase. The number of licensed beds will not be increased because of the project; project-related population will create a demand for a total of only 15 beds in 1987, the peak year of construction. However, the project may require an acceleration in the provision of certain services. In particular, the obstetrics unit of County Memorial Hospital may have to expand bed capacity to accommodate the inmigrating population.

The project-related population will result in increased demands on emergency medical services, particularly during peak years of construction (1985 to 1987). Existing services are generally adequate according to state standards, and would be able to accommodate the increased service levels. Between 1985 and 1990, project-related population will place increased demands on the Public Health Department. Demands will peak in 1987 when the peak construction workforce is in Laramie County; by 1991 demand will return to baseline levels. Increased demands from construction workers and their families will be for immunizations, well-child clinics, blood pressure clinics, and similar services. Incoming transients seeking jobs on the project are of particular concern because they may need assistance to pay for health care. The projected trend of a younger population represents higher birth rates for an area that already has a high rate. With this trend comes increased demands for pregnancy tests, prenatal classes, immunizations, etc. There is also concern over higher incidences of teenage pregnancy and communicable diseases.

Additional staffing under the No Action Alternative should accommodate the service demand increase due to the Proposed Action. Some additional short-term workload can be anticipated, but not enough to warrant additional staffing for project-related inmigrants. Impacts on health services are rated low and not significant in the short term. Long-term impacts are negligible and not significant.

3.1.6.4.5.4 Kimball County Proposed Action

The Proposed Action will have a negligible impact on hospital facilities, personnel, and services. Based on a maximum increase of 119 persons in the peak year, health services will be able to accommodate increased demands without additions to staff, budget, or facilities. Impacts on health services in Kimball County were determined to be negligible and not significant in both short and long terms.

3.1.6.4.6 Human Services

3.1.6.4.6.1 Laramie County Baseline Future - No Action Alternative

Projected baseline future population for Laramie County under the No Action Alternative indicates increases which will create additional demand for human services. Clientele increases will necessitate additions to staffing and will increase the length of waiting lists for those agencies currently at capacity. These will include the Alcohol Receiving Center, Youth Alternatives, and the Community Center on Domestic Violence and Grandma's Safe House. Eight of these agencies are projected to require additional staffing during the No Action period. These agencies are: Department of Public Assistance and Social Services, Pathfinder, Alcohol Receiving Center, Salvation Army, Mental Health Center, the Community Center on Domestic Violence and Grandma's Safe House, Stride Learning Center, and day care centers.

3.1.6.4.6.2 Kimball County Baseline Future - No Action Alternative

The projected decrease in the baseline future population will lessen demand for

those human services available in Kimball County. Consequently, service provision is expected to marginally improve unless the decline in population triggers a response where the tax base and community contributions fail to support present service levels.

3.1.6.4.6.3 Laramie County Proposed Action

The agencies projected to experience baseline increases in the length of their respective waiting lists are also projected to increase those waiting lists under the Proposed Action.

The greatest impact is projected for the Laramie County branch of the Southeast Wyoming Mental Health Center. The impact is projected to be moderate. Client increases are expected for the 25 to 39 age group in 1985 and for ages 0 to 39 in 1986. These increases range from 5 to 9 percent over No Action projections. With an increase in client caseloads, two professional staff members will be required. This will include an additional staff member for the 24-hour emergency clinic. The addition of these staff members will need to occur by 1987, thus creating a local short-term, moderate impact for this agency. This impact on the center will be significant due to the potential for increased unmet needs which could potentially cause controversy in the community.

Types of treatment problems expected to be encountered include call counseling/therapy dealing with marital maladjustment, neuroses, and depressive and effective disorders. Added demands for testing, evaluation, and therapy for younger clients are projected to begin in 1986 and 1987. Frequent diagnoses at these ages are transient disturbances and deferred diagnosis.

Private day care centers may require some additional staffing. Any staffing increases will be met by user fees and will therefore not be considered a Public Service impact. The impact on day care public certifications will be negligible and not significant.

Transient inmigration resulting from individuals seeking but not necessarily finding employment will impact to a low extent numerous public service agencies. Under Department of Public Assistance and Social Services programs, needs for assistance from the emergency food and shelter program are anticipated.

The welfare caseload, including the demand for food stamps, may slightly increase during the project period as local project-related employment offsets additional welfare demand associated with inmigrants. Welfare caseloads could increase as construction on the project comes to an end. The existing organizational structure of the Department of Public Assistance and Social Services should, however, be able to accommodate the increased demand for welfare services at project's end. The project impacts on Department of Public Assistance and Social Services will be low but significant in the short term, and low, not significant in the long term.

Other agencies potentially affected by project-related transient inmigration include the Alcohol Receiving Center and its 24-hour detoxification facility, the COMEA Shelter, Salvation Army, Pathfinder, and the Community Action Agency of Laramie

County, Youth Alternatives, Community Center on Domestic Violence and Grandma's Safe House, Stride Learning Center, and the Attention Home. The projected impacts on these agencies' service delivery will be low but significant in the short term, and negligible, not significant in the long term. Short-term significance is based on the potential for providing additional human services to new residents and those individuals seeking employment. This could create increased competition for already limited resources, causing an increase in unmet demand for human services. This could potentially affect current residents who utilize the services resulting in controversy over the provision of human services in the county.

3.1.6.4.6.4 Kimball County Proposed Action

A negligible impact on the human services agencies, including the Community Action Agency, Panhandle Mental Health and Department of Social Services, is anticipated for Kimball County under the Proposed Action for both short and long terms. The peak impact population is projected to be low, representing an increase of 4.7 percent over the projected baseline low, representing an increase of 4.7 percent over the projected baseline population for that year. Because weekly commuters are not likely to use services such as the Department of Social Services and the Community Action Agency, only projected inmigrants to Kimball are expected to have any effect on agency caseload.

3.1.6.4.7 General Government

3.1.6.4.7.1 Laramie County Baseline Future - No Action Alternative

Laramie County general government is not projected to make any major organizational or administrative changes under the No Action Alternative for 1983 to 1992. Staffing levels are projected to increase with population, but only 50 percent as fast since about this amount of the general government workload is related directly to population. Projected general government staffing increases are shown in Table 3.1.6-7.

3.1.6.4.7.2 City of Cheyenne Baseline Future - No Action Alternative

For Cheyenne, revenue and expenditure projections indicate that general government expenditures will increase only slightly during the analysis period. For this reason, general government staffing could hold constant. Demand, however, would increase over existing levels. Table 3.1.6-8 illustrates the staffing projections for Cheyenne general government with the No Action Alternative for 1983 to 1992. Space requirements for Cheyenne general government are expected to increase slightly over the analysis period.

3.1.6.4.7.3 Kimball County and City of Kimball Baseline Future - No Action Alternative

Based on stable but slightly decreasing population projections, no changes in

Table 3.1.6-7

PROJECTED STAFFING REQUIREMENTS FOR LARAMIE COUNTY GENERAL GOVERNMENT
DUE TO THE PROJECT 1984 To 1992

	1984	1985	1986	1987	1988	1989	1990	1991	1992
Baseline Staff	97.0	98.0	99.0	100.0	101.9	101.9	102.9	103.9	104.4
Additional General Government Staff due to Project Impacts	0	1.8	2.3	2.5	1.4	1.3	0.8	0.8	0.7
Total General Government Staffing	97	99.8	101.3	102.5	102.3	103.2	103.7	104.7	105.6

Note: Projections derived from 1983 Laramie County government data with a 1983 population-to-staff ratio of 765:1.

Table 3.1.6-8

PROJECTED INCREASED DEMAND FOR GENERAL GOVERNMENT SERVICES FROM THE CITY OF CHEYENNE DUE TO THE PROJECT 1984 - 1992

	1984	1985	1986	1987	1988	1989	1990	1991	1992
Baseline General Government Staff	97.3	98.6	99.8	101.1	102.4	103.7	105.0	106.3	107.5
Demand for Additional Staff	0	3.5	3.8	3.8	1.9	1.8	0.7	0.6	0.6
TOTAL STAFF:	97.3	102.1	103.6	104.9	104.3	105.5	105.7	106.9	108.1

Note: Projections derived from 1983 data on City of Cheyenne general government with a 1983 population-to-staff ratio of 514:1.

staff, vehicles, space, or level of service delivery are projected for either Kimball County general government or the City of Kimball general government with the No Action Alternative.

3.1.6.4.7.4 Laramie County Proposed Action

Laramie County general government is projected to need additional staff in order to serve the increased population projected to result from the Proposed Action. In order to prevent degradation of service, increased staffing needs due to the Proposed Action were projected. Table 3.1.6-7 illustrates staffing needs for Laramie County general government due to the Proposed Action. There will also be a need for approximately 300 sq ft of additional space in the peak year for additional staff. No capital equipment needs for Laramie County general government due to the Proposed Action are anticipated.

Based on projected needs, the short-term impact on general government service level is considered to be moderate but not significant. In the long term, the impact is considered to be low and not significant.

3.1.6.4.7.5 City of Cheyenne Proposed Action

Based on the population increases projected for the city of Cheyenne due to the Proposed Action, Cheyenne general government, in order to maintain service levels, will need to increase staffing from 1985 to 1992. Table 3.1.6-8 illustrates staffing needs due to population increases. It is also anticipated that additional general government space will be needed as a result of the Proposed Action. However, the spatial requirement is less than 500 sq ft of office space.

Based on these projections, impact on general government service level in the city of Cheyenne is considered to be moderate but not significant in the short term and low, not significant in the long term.

3.1.6.4.7.6 Kimball County and City of Kimball Proposed Action

Population increases are projected to be low, and County and City governments have historically been able to successfully accommodate large population influxes. Therefore general government impacts due to the Proposed Action are projected to be negligible for both Kimball County and the city of Kimball.

3.1.6.4.8 Libraries

3.1.6.4.8.1 Laramie County Baseline Future - No Action Alternative

Since no new facilities are planned for the Laramie County Library system and population is projected to increase, library space is projected to decline from 0.5 to 0.4 sq ft per capita from 1983 to 1992. This equates to an unmet demand for 7,638 sq ft of space when projected at 1982 levels. Similarly for

books and staff, book needs by 1992 will total 26,400 more than in 1983 and the staff will need to work approximately 30 hours per week more in each of the 10 years of 1983 to 1992 to maintain 1982 levels of service.

3.1.6.4.8.2 City of Kimball Baseline Future - No Action Alternative

With slight declines in population projected for Kimball County and the city of Kimball, service levels are expected to increase slightly for the users of the Kimball Public Library during 1983 to 1992 with the No Action Alternative.

3.1.6.4.8.3 Laramie County Proposed Action

Increased demands on what are projected to be inadequate service levels for the Laramie County Library system will result from the Proposed Action. During 1987, the peak year of population increase in the county, service levels are expected to decline from 1982 levels of 1.69 books per capita and 1 staff person (full time) per 2,083 population to 1.5 per capita and 1 to 2,201 population, respectively. Of this decline, one-third is due to the Proposed Action. This would translate into a project-related demand for approximately two additional staff persons. The effects of the Proposed Action are less in other years and have a long-term impact of less than 2 percent on service levels. In addition to these impacts, the Proposed Action is also projected to result in disproportionate increases in lost books and demands on staff time.

Based on these projections, impacts on the Laramie County Library system are considered to be moderate and not significant in the short term and low, not significant in the long term.

3.1.6.4.8.4 City of Kimball Proposed Action

With small population increases projected under the Proposed Action in Kimball County and the city of Kimball for 1987 to 1989, the projected increases in the service levels with No Action are altered for this 3-year period, but return to projected baseline levels in 1990. Impacts on the Kimball Public Library and its users are considered to be negligible and not significant in the short and long terms.

3.1.6.4.9 Consideration of Alternatives

No changes in population impacts are projected for alternative staging, roads, or cable routings. Therefore, no differences in impacts on public services are projected, since the level of public services is based on population changes.

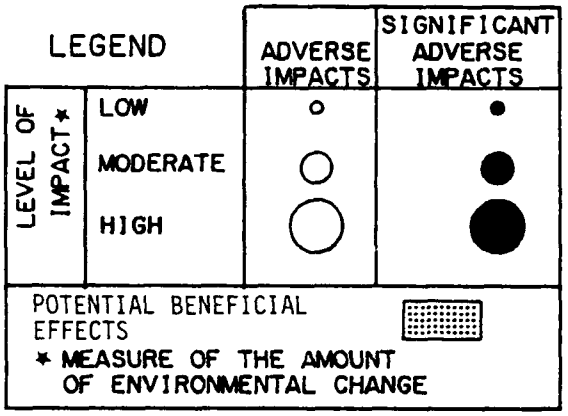
3.1.6.5 Summary of Impacts

3.1.6.5.1 Explanation of Detailed Impact Matrix

As Figure 3.1.6-1 illustrates, the highest significant impacts are projected for

FIGURE 3.1.6-1

PUBLIC SERVICES AND FACILITIES SUMMARY IMPACT MATRIX



	PROJECT IMPACTS					
	SHORT TERM			LONG TERM		
	SITE	LOCAL	REGIONAL	SITE	LOCAL	REGIONAL
PUBLIC SERVICES AND FACILITIES		●			○	
Education		●			○	
Laramie County School District No. 1		●			○	
Laramie County School District No. 2						
Kimball County School System		○				
Law Enforcement		●			○	
Laramie County		●				
City of Cheyenne		●			○	
Kimball County						
City of Kimball						
Criminal Justice		○				
Laramie County		○				
City of Cheyenne		○				
Kimball County						

FIGURE 3.1.6-1 CONTINUED

PUBLIC SERVICES AND FACILITIES SUMMARY IMPACT MATRIX

LEGEND		ADVERSE IMPACTS	SIGNIFICANT ADVERSE IMPACTS
LEVEL OF IMPACT*	LOW	o	•
	MODERATE	○	●
	HIGH	◯	⬤
POTENTIAL BENEFICIAL EFFECTS			

* MEASURE OF THE AMOUNT OF ENVIRONMENTAL CHANGE

	PROJECT IMPACTS					
	SHORT TERM			LONG TERM		
	SITE	LOCAL	REGIONAL	SITE	LOCAL	REGIONAL
Fire Protection		o				
Laramie County Fire District		○				
City of Cheyenne		◯				
Kimball Rural Fire District						
City of Kimball						
Health Care		o				
Laramie County		o				
Kimball County						
Human Services		•				
Laramie County		•				
Mental Health Center		●				
Day Care		•				
Department of Public Assistance & Social Services		•				
Alcohol Receiving Center		•				

FIGURE 3.1.6-1 CONTINUED

PUBLIC SERVICES AND FACILITIES SUMMARY IMPACT MATRIX

LEGEND		ADVERSE IMPACTS	SIGNIFICANT ADVERSE IMPACTS
LEVEL OF IMPACT*	LOW	○	●
	MODERATE	○	●
	HIGH	○	●
POTENTIAL BENEFICIAL EFFECTS			

* MEASURE OF THE AMOUNT OF ENVIRONMENTAL CHANGE

	PROJECT IMPACTS					
	SHORT TERM			LONG TERM		
	SITE	LOCAL	REGIONAL	SITE	LOCAL	REGIONAL
COMEA		●				
Salvation Army		●				
Pathfinder		●				
Community Action Agency		●				
Youth Alternatives		●				
Domestic Violence		●				
Stride Learning Center		●				
The Attention Home		●				
Kimball County						
Community Action Agency						
Panhandle Mental Health						
Department of Social Services						
Head Start						

FIGURE 3.1.6-1 CONTINUED

PUBLIC SERVICES AND FACILITIES SUMMARY IMPACT MATRIX

LEGEND		ADVERSE IMPACTS	SIGNIFICANT ADVERSE IMPACTS
LEVEL OF IMPACT*	LOW	○	●
	MODERATE	◯	⬤
	HIGH	◯	⬤
POTENTIAL BENEFICIAL EFFECTS		▦	

* MEASURE OF THE AMOUNT OF ENVIRONMENTAL CHANGE

	PROPOSED ACTION					
	SHORT TERM			LONG TERM		
	SITE	LOCAL	REGIONAL	SITE	LOCAL	REGIONAL
General Government		◯			○	
Laramie County		◯			○	
City of Cheyenne		◯			○	
Kimball County						
City of Kimball						
Libraries		◯			○	
Laramie County		◯			○	
City of Kimball						

Laramie County School District No. 1. With the exception of the City of Cheyenne Fire Department where a short-term, high, and not significant impact is projected, all other impacts are moderate or less.

Public Services analysis indicates a high, short-term significant impact on education in Laramie County School District No. 1 due to increased enrollments for all primary and secondary grade levels from 1985 through 1992. Peak year increase in student enrollment is projected to be 7 percent over baseline forecasts. Mitigations to alleviate these impacts could consist of remodeling existing facilities, hiring additional teachers, and utilizing modular units, among others.

High, short-term not significant impacts are indicated for fire protection in the City of Cheyenne due to the need for additional firefighters, vehicles, and space. Mitigations, such as additional funding to the Fire Department to aid in the accelerated purchase of equipment and space, could be utilized to alleviate these high impacts.

Impacts for law enforcement are projected in the short term to be moderate due to the need for an increase in staffing and significant because of potential effects on public safety. Mitigations could include special training for local law enforcement personnel. General government, library, and criminal justice impacts are projected to be moderate because of additional staffing requirements, but not significant. Health Care impacts are low and not significant in that the inmigrant population can be absorbed with the existing local and regional health care and services system.

The Human Services element is rated low and significant due to the criteria for level of impact. Many of the human service agencies are expected to receive low impacts. The majority of these agencies are operating at capacity, and an unmet, but unmeasured, demand is known to exist. This unmet need will most likely exist in the future and be exacerbated by project-related inmigration. Because the current level of demand is not known, the future demand can be neither measured nor projected. This situation represents an issue regarding the degradation of social well-being in the area. Consequently, these low impacts must be examined within the context of both Public Services and Social Well-Being within the Socioeconomics resource. Therefore, human service agencies operating at capacity which cannot expand institutionally in response to increases in demand may be indicative of a need for additional support for human services in the community.

3.1.6.5.2 Aggregation of Elements, Impacts, and Significance

The overall level of impact on Public Services and Facilities is locally moderate and significant in the short term and locally moderate and not significant in the long term. Determination of the overall impact rating for Public Services and Facilities involved aggregation of the impact ratings for the elements and subelements of the resource. Subelements were derived either on a jurisdictional basis or on an organization basis. For each element (as described in Section 2.1.6), the counties of Laramie and Kimball, and the cities of Cheyenne and Kimball were utilized. In addition to a jurisdictional breakdown, human services were further evaluated on a service organization basis. The subelements were aggregated

to the element level for impacts and significance through the qualitative consideration of four primary factors. These are the size of the jurisdictions in relation to each other, the magnitude of the impacts, the proportion of the impact population to the total population, and whether the impact warranted further attention by identification of significance (as described in Section 3.1.6.3). The human services organizations were aggregated to the jurisdictional and element level by the magnitude of impacts associated with the project.

3.1.6.6 Mitigation Measures

Potential mitigation measures that will be considered are identified below. One, some, or all of the mitigation measures may ultimately be selected. Each measure identifies the party responsible to implement, but not necessarily to pay for, the measure.

3.1.6.6.1 Education

The following mitigation measures for impacts on education are presented for consideration:

- The short-term hiring of approximately 50 full-time equivalent classroom teachers (Laramie County School District No. 1);
- The hiring of approximately 12 additional certified staff (some in the area of special education and counseling) and 25 noncertified staff, including bus drivers (Laramie County School District No. 1);
- The rental or purchase of modular units to increase available space not necessarily to be used as classrooms, but rather, as office or special program space (Laramie County School District No. 1);
- The remodeling of existing facilities to increase space (Laramie County School District No. 1);
- The renovation of existing facilities to increase space, such as Johnson Junior High (Laramie County School District No. 1);
- The rental or purchase of additional buses, since transportation is a function of where families choose to live and it is projected that approximately 200 students will be located in South Cheyenne and will require busing (Laramie County School District No. 1);
- Adopting different scheduling such as adding another period to the day at the secondary schools or going to a track system similar to Concept 6 in Jefferson County, Colorado (Laramie County School District No. 1);

- o Temporary reassignment of special program space to general classroom use and share special program space with other facilities. Laramie County Community College could be used for such programs as music or physical education; however, this measure would require even more busing (Laramie County School District No. 1);

- o The payment of tuition to some of the projected impact students to enable them to attend private schools (U.S. Department of Education);

- o School Assistance in Federally Affected Areas-Construction (Impact Aid/Disaster Aid). Assistance in the form of project grants is available for the construction or equipping of urgently needed school facilities in school districts which have had substantial increases in school membership as a result of new or increased federal activities. Local educational agencies which provide free public elementary or secondary education in federally impacted areas are eligible for this type of assistance (U.S. Department of Education); and

- o School Assistance in Federally Affected Areas-Maintenance and Operation (Impact Aid/Disaster Aid): assistance grants are available to provide financial support to local educational agencies affected by sudden and substantial increased school attendance. Funds may be used for maintenance and operation expenditures. Eligible applicants are local educational agencies which provide free public elementary or secondary education (U.S. Department of Education).

3.1.6.6.2 Law Enforcement

The following mitigation measures for law enforcement are presented for consideration:

- o Consultation with law enforcement officials who have had previous experience dealing with civil disturbances related to military questions (law enforcement agencies);

- o Special training for local law enforcement personnel in crowd control and other techniques related to civil disturbances (Law Enforcement Assistance Association);

- o Special training for local law enforcement personnel in dealing with the types of law enforcement problems that can accompany construction projects, particularly the increase in minor, alcohol-related offenses including disorderly conduct and traffic accidents (Law Enforcement Assistance Association);

- o Appropriate assistance by local law enforcement agencies in development of publicity programs to minimize the number of excess job seekers coming to the area. Such a program might best be undertaken in conjunction with the Wyoming Employment Security Commission and

appropriate local labor unions, and could be patterned after a similar program initiated by the State of Alaska during construction of the Alaska Pipeline (Wyoming Employment Security Administration);

- Development and implementation of a brief, direct educational/ informational program for construction workers in close cooperation with project contractors to inform project-related employees about laws and law enforcement practices in the various jurisdictions (U.S. Air Force);

- Any appropriate assistance by local law enforcement agencies regarding availability (through project contractors or other sources) of alternative sources of transportation to and from work sites in order to reduce traffic congestion and the likelihood of accidents (City of Cheyenne and Laramie County); and

- Close cooperation between local law enforcement agencies and project contractors regarding the work location of project-related employees for the purposes of access to those employees by law enforcement personnel if necessary (U.S. Air Force).

3.1.6.6.3 Criminal Justice

The following mitigation measures for criminal justice are presented for consideration:

- Addition of part-time judge positions to avoid the need for additional office space (county and municipal courts);

- Intensify computerization or microfilming of court records to reduce processing time and to alleviate storage problems (county and municipal courts);

- Modification of filing systems and facilities (county and municipal courts);

- Devote certain staff to particular cases or duties to promote efficiency-enhancing specialization (county and municipal courts);

- Start of a more expeditious system for processing traffic offenses (county and municipal courts); and

- Expand and stagger hours of court operation, e.g., night court hours (county and municipal courts).

3.1.6.6.4 Fire Protection

The following mitigation measures for fire protection are presented for consideration:

- Additional funding to the City of Cheyenne Fire Department and Laramie County Fire District No. 1 to assist in the early acquisition of needed equipment and space (City of Cheyenne, Laramie County, U.S. Department of Agriculture loans or Department of Commerce grant funding); and

- Educational programs for firefighting personnel in special fire-related problems that might result as a consequence of the Proposed Action (U.S. Air Force).

3.1.6.6.5 Health Care

The following mitigation measures for health care are presented for consideration:

- Provision for a clinic to provide preventive medicine services for workers and their families (Laramie County Public Health Department);
- Provision of immunization clinics as facilities to take throat cultures and to test for other illnesses to alleviate the strain on the public health units (Laramie County Public Health Department);
- Provision of emergency medical transfer capabilities at the staging areas (project contractor);
- Provision of health insurance to employees (project contractors); and
- Ongoing coordination with the Laramie County Health Planning Committee and other appropriate agencies to ensure that the proper level of planning can be achieved prior to impact conditions (U.S. Air Force and Laramie County Health Planning Committee).

3.1.6.6.6 Human Services

The following mitigation measures for human services are presented for consideration:

- Meet the agency needs for staffing and facilities where impacts will result in additional local needs that exceed current capacity (Department of Health and Human Services);
- Institute a cooperative monitoring program that allows determination of those agencies whose capacity has been exceeded by the impact population as well as those unmet needs that, left unmet, will lead to major problems in the community's well-being (human service agencies);
- Within the context of the above cooperative monitoring program, provide for an evaluation of impacts on each agency in order to determine if the level of demand is greater or less than projected. This will allow for a modification of mitigation measures if actual conditions warrant such a modification (human service agencies); and
- Provide health insurance that allows employees to seek private assistance for dealing with mental health, alcohol, and family problems in order to alleviate demands on public service providers (project contractor).

3.1.6.6.7 General Government

The following mitigation measures for general government are presented for consideration:

- Temporary leasing of additional office space (City of Cheyenne and Laramie County);
- Combined microfilm services (City of Cheyenne and Laramie County);
- Increased use of private vehicle and equipment maintenance companies (City of Cheyenne and Laramie County);
- Increased utilization of temporary and permanent part-time personnel (City of Cheyenne and Laramie County);
- Temporary increase in overtime work (City of Cheyenne and Laramie County);
- Relocation of the county shops to a more suitable facility and location (City of Cheyenne and Laramie County); and
- Reorganization of certain Public Works Department spaces (City of Cheyenne and Laramie County).

3.1.6.6.8 Libraries

The following mitigation measures for libraries are presented for consideration:

- Priority implementation by Wyoming State Library of planned automated circulation system (Wyoming State Library);
- Increased use of Inter-Library Loans to share library resources available statewide with affected county libraries (State and County libraries);
- Increased coordination between public libraries and school libraries to share access to books and program offerings (County Libraries and School Districts); and
- Institution of book deposit requirements on new or often-borrowed books and by new borrowers to alleviate book loss problems (Laramie County libraries).

3.1.6.7 Unavoidable Adverse Impacts

There are no Public Services and Facilities unavoidable adverse impacts.

3.1.7 Utilities

3.1.7.1 Introduction

This section describes the impacts of the Proposed Action on water supply, wastewater, solid waste, stormwater, and telephone facilities and services. Descriptions of the criteria used to classify impacts and their significance, as well as the procedures used to estimate impacts, are contained in the following subsections.

It should be noted that the emphasis in all Utilities sections of this report is on physical works, facilities now in place and to be added. The distinction of importance is that additional gallons of water to be supplied or pounds of garbage to be collected, while they may be positive numbers, are not necessarily impacts requiring mitigation. Only the needs for additional pumps or pipelines or additional garbage trucks or disposal-site equipment, as examples, are the impacts being sought.

It should also be noted that the population projections for the Proposed Action alternatives were all assigned to individual communities within the Region of Influence and no project-induced growth was assigned to Banner County, Nebraska. It became obvious that the only possible Utilities impacts will occur in towns and cities. Accordingly, analysis was focused on the Area of Concentrated Study defined earlier (specific towns, cities, and the Cheyenne Urban Area as defined for Utilities). For some cities, analyses were performed for only those elements of Utilities (e.g., water supply or solid waste) whose existing capacities were not clearly in excess of all foreseeable needs with and without the project through 1990.

3.1.7.2 Definition of Levels of Impacts

Impacts on Utilities are directly related to increased service populations and population-induced development and less directly to specific construction activities. Levels of impact are related to effects on operations and induced requirements for new facilities and equipment as follows:

- Negligible Impact - Will have no noticeable effect on operating practices and will not require additional equipment or facilities. No degradation of existing performance parameters or service levels will be noted.

- Low Impact - Will require changes in operating practices and cause temporary operating deficiencies and degradation of existing performance or service to occur. Minor additions of equipment might be required.

- Moderate Impact - Will overload existing facilities for protracted periods, causing isolated failures and corresponding reductions in service. New equipment or minor additions of facilities or expansions of existing facilities will be needed.

- o High Impact - Will cause major disruptions of service and serious degradation of existing performance characteristics. Major new facilities and equipment will be required.

An elaboration for each element of Utilities is given below.

3.1.7.2.1 Water Treatment and Distribution

Increased service populations will increase water demand. Effects of the project might be of such duration and extent that public health and vital services, such as firefighting, could be threatened.

3.1.7.2.2 Wastewater

Increased service populations will increase requirements for collection and treatment facilities. With increasing levels of impact, deficiencies may first impact water quality in receiving waters. Ultimately they may produce adverse impacts on public health and safety in a widespread area.

3.1.7.2.3 Solid Waste

Increased generation of solid waste associated with increased population and construction-related activity could accelerate the need for new equipment and facilities.

3.1.7.2.4 Stormwater

Increased land development, rather than population growth, affects the need for stormwater facilities. With increasing levels of impact, first minor local flooding and ultimately major widespread flooding could occur. Financial loss and threats to public health and safety could result.

3.1.7.2.5 Telephone Service

Increased demand for telephone service will be met first with existing facilities. With increasing demand, additions of new equipment and facilities will be necessary. During construction, high impacts might result from inadvertent ruptures to buried cable or needs for moving overhead wires.

3.1.7.3 Determination of Significance Criteria

If any of the following conditions were present, impacts have been considered significant:

- o The impact will worsen, either slightly or considerably, a preexisting deteriorated environmental condition or overload an already inadequate facility.
- o The impact affects public health or safety.
- o The impact is likely to be highly controversial.

- o The impact is highly uncertain or involves unique or unknown risks.

- o The project-induced result and its impact are related to other project-induced results with individually unimportant but cumulatively important impacts.

- o The project-induced result or its impact threatens the violation of some federal, state, or local law or regulations imposed for the protection of the environment.

- o Extensive institutional responses to the impact would be necessary (e.g., if a wastewater agency would have to commit to a major or unusual planning or reprogramming project to ameliorate the induced impacts).

3.1.7.4 Environmental Impacts of the Proposed Action and Project Alternatives

For each community in the Area of Concentrated Study, water demands were computed as functions of today's unit per capita usage rates and baseline future and Proposed Action populations. These demands were then compared to existing capacities of supply facilities, and any needed expansions were indicated. Additionally, because Cheyenne will receive by far the greatest project-induced population growth, detailed computer simulations with the WATSIM model were made to examine the basic delivery capacity and the firefighting capability of that city's distribution network.

For each community in the Area of Concentrated Study, wastewater quantities have been computed as functions of today's unit per capita rates of discharge and baseline future and Proposed Action populations. These wasteloads were then compared to existing capacities of waste treatment facilities, and any needed expansions were indicated. CAPDET modeling was used for treatment plants in several communities. Additionally, detailed computer simulations with the Storm Water Management Model were made to examine the sanitary sewer networks in Cheyenne.

Solid wasteloads have been computed as functions of unit waste generation rates and expected populations under baseline future and Proposed Action conditions. A nominal value of 5.0 pounds per person per day was used for all communities, and 2.76 pounds per person per day was used for F.E. Warren AFB. Wasteloads of construction debris generated on the base during 1984 and 1985 were estimated from construction schedules and plans for various building sites. The basic quantity estimates were made by Corps of Engineers personnel working on the project.

Peak flow rates were converted to equivalent storm sewers necessary, and these numbers were compared with storm sewers in place or needed under existing conditions. New storm sewers, if any, were noted. Except in Cheyenne, the project did not induce needs for more storm sewers than were needed under baseline conditions.

Existing phone service capacities owned by Mountain Bell or United Telephone System, Western Division, were compared with telephone customer demands in the peak year of project inmigration in each community. Necessary additions to telephone service capacity, if any, were noted. Particularly scrutinized were the telephone connections and equipment needed to be added at F.E. Warren AFB during the early construction period. New Mountain Bell equipment needs were noted.

3.1.7.4.1 Water Treatment and Distribution

3.1.7.4.1.1 Baseline Future - No Action Alternative

Cheyenne Urban Area. Water treatment capacity at both of Cheyenne's water treatment plants totals 26.0 million gallons per day (mgd). This treated water can be supplemented with groundwater, which does not require treatment other than chlorination, from City well fields. The sustained capacity for summer periods has been estimated here to be 5.0 mgd, although the City would prefer to operate these wells at less than half this rate on a year-round basis (around 2 mgd). So total supply capacity is 31.0 mgd. Peak-day demands in 1983 will be over 27 mgd. By 1987, under baseline conditions, peak-day demands will reach 30.9 mgd, essentially the total capacity available. By 1990, peak-day demands will be above 32.0 mgd and nominal available treatment capacity will be exceeded. It should be mentioned that average-day demands are only 13.2 mgd today, and they will reach only 15.0 mgd by 1990. Moreover, it is possible that for short periods (such as the peak week or the peak month) the well fields could deliver as much as 9.0 mgd and make up the shortfall in supply. Nonetheless, it seems prudent for the City to be planning now for expansions to treatment capacity. (It should also be noted that 31.5 mgd were delivered on the peak day in 1980, so available capacity has already been strained.)

With respect to the distribution system, computer simulations have shown that the existing system can supply water to virtually all places with adequate pressures during a 1990 peak-day demand and with firefighting demands imposed as well. The exception noted was very low pressures of 0 to 2 pounds per square inch (psi) in an area around the Frontier Mall shopping center when a 5,400 gallons per minute (gpm) firefighting event was simulated during 1983 and 1990 peak-day demand conditions. Further in-filling development in the immediate area may provide sufficient interconnection and looping with the suspect 8-inch pipe to cause sustainable, higher, and safer pressures in that neighborhood.

Firefighting events as far away from the City's storage reservoirs as Laramie Community College in South Cheyenne were modeled with flows of 750 to 1,000 gpm, and safe pressures (20 psi or above) were maintained with 1990 peak-day demands imposed. An 8,000-gpm fire event was simulated in the downtown area, and pressures there remained at 76 psi or above, a very safe level.

Other Communities. All other communities in the Area of Concentrated Study, except one, have more than adequate water supply, treatment, and distribution capacity to supply the needs of their populations throughout the baseline period. Greeley has considerable excess treatment capacity (60 mgd vs. 44 mgd peak demand), but one of its plants (30 mgd) is limited in production by the capacity

of its transmission main to the city (18 mgd). Peak-day demands approach the available transmission capacity (48 mgd). As a result, water rationing for sprinkling use is in effect, and plans are being made now for increasing the transmission capacity to serve the additional demands during the baseline growth period (20 percent growth expected by 1990).

3.1.7.4.1.2 Proposed Action

The populations induced by the project nowhere will be large enough to require new facilities for water treatment and distribution. But it should be noted that in 1987, the project's peak year, Cheyenne's supply capacity, assumed conservatively here to be 31 mgd, will be just equal to the peak-day demands under baseline conditions; and it will be 1 to 2 mgd less than demands with the project. This is the same shortfall in supply estimated for 1990 under baseline conditions. However, the Cheyenne water system is in fact resilient to high demands, as evidenced by the successful delivery of 31.5 mgd 3 years ago. Reasons to believe that the well fields can supply 4 mgd more than have been assumed here have been cited previously herein. And other sources than used here give the capacities of the Happy Jack and Round Top plants as 20 mgd and 8 mgd, respectively, not 19 and 7 mgd. Hence, 6 mgd of additional available capacity to supply a mixture of ground and surface waters appears relatively easy to achieve through routine operational modifications. The total capacity of 37 mgd thus available could supply all the peak-day demands with the project throughout the 1983 to 1990 period. (Nonetheless, additions to treatment capacity for surface waters should be pursued.) But, because flow rates and pressures throughout the system will not be affected and quality will not be deteriorated, the project will have a negligible and not significant impact on water treatment and distribution in Cheyenne, as it will in all other communities. No irreversible or irretrievable commitments of resources will be involved; and no short-term or long-term uses of man's environment will be necessary beyond those areas already committed to water treatment plants, storage reservoirs, and distribution pipes.

3.1.7.4.2 Wastewater

3.1.7.4.2.1 Baseline Future - No Action Alternative

Cheyenne Urban Area. With the exception of the surcharging of a 12-inch sewer in Cheyenne which accepts F.E. Warren AFB waste flows from a 15-inch sewer, all sanitary sewers in the area can accommodate baseline flows throughout the baseline period. This has been corroborated through computer simulation. Peak-day sewage flows were used.

Treatment plants in Cheyenne need immediate relief or expansion, if baseline flows in 1 or 2-month periods of each year are to be accommodated. The South Cheyenne plant in particular is overloaded.

By 1987 (the peak project year), the baseline flows to the Crow Creek plant (capacity = 4.0 mgd) and the Dry Creek plant (capacity = 4.5 mgd) will have reached 9.6 mgd in peak months. By 1990, the excess flows over available

capacity will have reached 1.5 mgd in peak months. The South Cheyenne plant will have peak monthly (or bimonthly) flows of 0.78 mgd by 1990, in comparison with the 0.6 mgd of useful capacity there now.

A U.S. Environmental Protection Agency (EPA) mandated construction grant municipal wastewater planning document known as a 201 Facilities Plan (Banner Associates 1982), has been filed with the State of Wyoming and the EPA, which describes solutions local officials wish to implement immediately for all these problems. The Plan calls for abandonment of the South Cheyenne plant and diversion of wastewater from that District to the Dry Creek plant, which would be expanded to 7.0 mgd. This Plan's features would accommodate all baseline future flows (1990 peak month = 10.0 mgd) with the new available capacity (11.0 mgd).

The year in which the 201 Plan will be fully implemented remains problematical. It is on the State's funding priority list for 1984, but its priority rating is low enough that sufficient monies to implement the Plan may not be available until FY 1985 or beyond. Hence, there are two baseline effects pathways. If the 201 Plan is implemented by 1987 (probably the earliest plausible date for its on-line operation), discharge violations in the last half of the project period and beyond will be avoided. If the Plan cannot be implemented until much later, perhaps in the post-1990 time frame, current violations at the South Cheyenne plant will continue to worsen, and the plants in the city of Cheyenne will reach and begin to exceed their current capacities by 1990.

Gering, Nebraska. Gering has a multiple-cell lagoon system for waste treatment. On an average-day basis, it has capacity for twice the city's current population (8,480 people). Unfortunately, although Gering has recently expanded its plant, peak flows already equal the available capacity (3.862 mgd). The accuracy of the data collected for Gering is uncertain, but they indicate that with an annual growth of 250 people, additional capacity planning should be performed.

Pine Bluffs, Wyoming. Pine Bluffs has a two-cell, evaporative lagoon system. It is designed for 0.09 mgd, but the current flow is 0.1 mgd. The Town is aware of the overload condition and has applied for grants to help finance expansion by 10 acres of ponds. The CAPDET model has indicated that 35 to 37 acres of ponds will be necessary to evaporate all the water expected over a nominal 20-year design period, since discharge is not permitted. But numerous local data and different design criteria not available for use by the generic CAPDET model may well prove that the model was led to a conservative over-design. The model corroborated, however, that expansion is necessary even for existing conditions, much less the 114-person growth expected during the baseline years.

Torrington, Wyoming. Torrington has a 64-acre lagoon system. Some of the wastewater (which is not permitted to discharge) evaporates and much of it seeps into the ground. The lagoons are near capacity now, and in wet years, such as 1983, groundwater actually seeps into the ponds. Expansion is indicated, and the Town has a 201 study underway to determine the improvements needed for baseline growth.

In this environmental impact study, CAPDET modeling and other analyses showed that 166 acres of ponds will be necessary for summer month evaporation of all the effluent to accommodate loads over a 20-year design period. The Town currently has only 80 acres available for expansion.

Again, more detailed study than the CAPDET modeling could provide in this effort is required to determine actual expansion needs and alternatives. The 201 study should provide such a determination. It has been assumed here, however, that because capacity has been attained already, improvements will be in place by 1987 to accommodate wasteflows to 1990 and beyond.

Other Communities. Sewers and waste treatment plants in all other communities in the Area of Concentrated Study were determined to be adequate now for collection and treatment of flows anticipated throughout the baseline period.

3.1.7.4.2.2 Proposed Action

F.E. Warren AFB. The additional people at F.E. Warren AFB with the project will negligibly contribute to the surcharging of the 12-inch sewer downstream of the base's 15-inch sewer. This preexisting condition is largely exacerbated, and perhaps solely caused, by infiltration and inflow to the base's sewer system, not a condition directly attributable to base population. However, this impact is rated as low, short-term but significant at the site and local level simply because the exacerbation is to a preexisting overloaded facility.

Cheyenne Urban Area. On a peak-day basis, the waste flow in 1987 (peak-project year with 3,781 inmigrants) will be 10.8 mgd, compared with today's capacity in place of 9.1 mgd. If the current 201 Plan is implemented prior to 1987, there will be 11.0 mgd capacity at the Crow Creek and Dry Creek plants.

The current 201 Plan's upgrades and expansions are needed as soon as possible just to accommodate baseline capacity needs, and they will accommodate baseline plus Proposed Action wasteflows, roughly 6 percent higher, equally adequately. The 6 percent addition of wastewater, which can be accommodated within the currently proposed facilities, is considered a low but significant impact at the local level. It is significant not because the impact will be particularly large, but because without implementation of the 201 Plan the added project-related waste discharge will worsen an already deteriorated condition, i.e., violations of discharge requirements, especially at the South Cheyenne plant. Over the long term, system improvements will reduce impacts to a negligible level.

Gering, Nebraska. Gering's population is expected to increase by 1,736 people between 1983 and 1990. The project will induce a peak inmigration of 168 people in 1987. The existing plant has capacity for an additional 8,480 people on an average-day basis. Peak flows, however, already equal the available capacity (3.862 mgd). The 168 people will add only 0.032 mgd to 1987 baseline average flows of 2.12 mgd. So the project will impact local waste treatment negligibly.

Pine Bluffs, Wyoming. The project will add 24 people to Pine Bluffs in 1987 through 1989, when baseline population will increase from 1,190 to 1,223. Hence, the project will add 2 percent or less to wastewater flows. Adequately sized

treatment facilities will scarcely be able to meter such a small increase (0.002 mgd compared with 0.1 to 0.2 mgd needed). However, the Town needs to expand its 0.09 mgd existing plant, and plans are underway to do that, even to accommodate already expected growth. Nonetheless, the project-induced wastewater impact will be negligible and not significant at the local level.

Torrington, Wyoming. The project will add 151 persons to a baseline population in 1987 of 5,973, a 2.5 percent increase. Waste flows will be directly increased by 2.5 percent, from 0.597 mgd to 0.612 mgd. The Town needs to expand its treatment capacity today to roughly 0.75 mgd to accommodate its baseline growth. When that is done, the project will have no impact on the facilities then in place. But because the local community will have to commit to a treatment-expansion plan to avoid baseline and project impacts, and because without this plan's implementation the baseline condition of lagoon discharge will worsen, the project's induced wastewater impact is rated low and significant at the local level. While some short-term and long-term uses of the environment for the additional lagoon space will be necessary, this use is neither irreversible nor irretrievable, since the land will be reclaimable for a variety of uses.

Other Communities. Project-induced inmigrations in all other communities in the Area of Concentrated Study can be accommodated by treatment plants and sewer systems now in place.

3.1.7.4.3 Solid Waste

3.1.7.4.3.1 Baseline Future - No Action Alternative

Community Garbage Disposal. Household garbage and other refuse generated throughout the baseline period can be collected and buried in landfills with collection equipment and disposal sites now in existence, with one exception. The City of Cheyenne now operates an 11-route collection fleet and is near that capacity. A twelfth route is to be added soon. By 1990, another 15 tons per day will be generated in the city as a result of baseline growth. Another collection crew and vehicle will be required, for a total of 13 routes, when an additional 9.4 tons per day are generated. At the same time, an additional compactor vehicle will be needed at the disposal site. This will occur by 1988. All other communities have collection equipment and disposal sites adequate to handle all baseline solid waste loads, which are summarized in Table 3.1.7-1.

Toxic and Hazardous Wastes. Toxic and hazardous wastes generated within the private sectors of the Region of Influence are collected and recycled or disposed of by private waste haulers. These activities are strictly regulated by state and federal laws. No per capita increases during the baseline years can be anticipated, and current private disposal methods are expected to continue. Community waste disposal landfills throughout the Region of Influence do not and will no accept toxic or hazardous materials for disposal.

No changes in operation of dilute sodium chromate storage at F.E. Warren AFB are anticipated under baseline conditions. About 500 pounds are generated and stored each month, and that would continue. Spent lubricants, contaminated helicopter

Table 3.1.7-1

SOLID WASTE GENERATION WITHIN THE REGION OF INFLUENCE

Location		Tons/Day 1983	1984	1985	1986	1987	1988	1989	1990
Cheyenne	N.A.[1]	152	154	156	158	161	163	165	167
	P.A.[2]	152	154	163	167	170	167	169	169
Laramie	N.A.	62	62	63	63	64	64	64	65
	P.A.	62	62	63	64	64	64	64	65
Pine Bluffs	N.A.	2.8	2.8	2.9	2.9	3.0	3.0	3.1	3.1
	P.A.	2.8	2.8	2.9	3.0	3.0	3.0	3.1	3.1
Fort Collins	N.A.	240	248	257	265	274	282	291	299
	P.A.	240	248	258	267	276	282	291	299
Greeley	N.A.	190	195	201	206	212	217	22[illegible]	228
	P.A.	190	195	201	208	213	217	222	228
Kimball	N.A.	7.8	7.8	7.8	7.8	7.8	7.7	7.7	7.7
	P.A.	7.8	7.8	7.8	7.8	7.8	7.8	8.0	7.7
Gering	N.A.	21	22	22	23	24	24	25	26
	P.A.	21	22	22	23	24	25	25	26
Scottsbluff	N.A.	35	36	36	36	36	36	36	36
	P.A.	35	36	36	36	36	36	36	36
Torrington	N.A.	14	14	15	15	15	15	15	16
	P.A.	14	14	15	15	15	15	15	16
Wheatland	N.A.	11	11	11	11	11	11	11	11
	P.A.	11	11	11	11	11	11	11	11
F.E. Warren AFB	N.A.	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
	P.A.	5.0	6.2	6.4	5.2	5.2	5.2	5.2	5.2
Weekly Commuters	P.A.	0	0	2.4	1.3	0.8	0.4	0.5	0
TOTALS:	N.A.	742	759	777	794	811	829	846	863
	P.A.	742	760	488	808	827	835	852	865

Notes: 1 N.A. = No Action

2 P.A. = Proposed Action

fuels, and spent battery acids would continue to be removed from the base for reuse, recycle, or reclamation by private parties and the Defense Property Disposal Office.

3.1.7.4.3.2 Proposed Action

Community Garbage Disposal. With the exception of Cheyenne, projectinduced increases in garbage and other refuse loads would not require new equipment, crews, or disposal-site acreage at any community in the Area of Concentrated Study between 1983 and 1990. This includes conditions with the project or any of its alternatives, none of which would generate greater solid waste loads. Therefore impacts to other communities will be negligible.

Cheyenne's solid waste loads will be increased by another truckload's capacity (9.4 tons per day) by 1985, 3 years earlier than under baseline future conditions. Moreover, loads at the City's landfill site will have reached an equipment threshold (200 tons per day) by 1986. (This projection includes consideration of loads of 35 tons per day now accepted from outlying areas not within the Area of Concentrated Study but in nearby Laramie County.)

In summary, the project will accelerate the need for one additional collection vehicle and crew by 3 years (1988 to 1985) and will accelerate the need for a new compactor at the disposal site by 2 years (1988 to 1986). This impact is rated as low and not significant at the local level, because this impact has been predicted already at the local level, and because the added equipment can be purchased easily by the City with the costs passed to the customers almost unnoticeably. (A $75,000 truck and an $80,000 compactor, financed at 8 percent interest, would add roughly 75 cents per month to the household costs of only the 3,781 project-induced new customers. Spread to the baseline customers as well, who will require the equipment eventually, the homeowner's cost would be even less). No irreversible or irretrievable commitments of resources or long-term or short-term uses of the environment will ensue.

All project-induced solid waste loads, along with baseline loads, were also shown in Table 3.1.7-1. (The "Weekly Commuters" shown in the table are project workers assumed to be in Cheyenne 4 days per week.)

Toxic and Hazardous Wastes. Hazardous waste generation at F.E. Warren AFB specifically related to the project is expected to be much the same in quantity and character as the materials generated in the Minuteman program now.

The materials generated with the project will be expended oils and lubricants, paints and thinners, hydraulic and machining fluids, cleaning agents, and adhesives. Federal and state laws regarding the handling and disposal of these wastes will be followed, as they are now. No nuclear waste will be produced or stored at F.E. Warren AFB. Hence, there will be negligible impacts to toxic and hazardous waste at the base.

Toxic and hazardous waste generation in the remainder of the Region of Influence is not expected to change with the project, and baseline collection and recycling activities are projected to remain the same.

Construction-Period Wastes from F.E. Warren AFB. During the most intense construction period (1984 and 1985) at F.E. Warren AFB, considerable renovation or removal of existing buildings and removement of pavement will occur.

A Corps of Engineers' estimate of building materials to be discarded has placed the volume at 580 cubic yards (cy). This material will include broken pavement that must be removed (over half the load) and structural members, walls, and roofing from some small buildings that are to be removed and some large buildings that are to be renovated. At a compacted weight of 80 pounds per cubic foot (lb/cf), the total load of discarded material would be 626 tons over the 2 years.

The disposal practice most predictable will be the use of 25-cy dumpsters placed at individual building sites on the base by construction contractors doing the work. The 580 cy of material will require 23.2 such dumpsters, which could be hauled, one at a time, to the City's disposal site once per month over the 2 years (24 months). Cheyenne's City Engineer has given assurance that wastes in this low volume would have no impact on the disposal-site operation.

3.1.7.4.4 Stormwater

3.1.7.4.4.1 Baseline Future - No Action Alternative

Only the Cheyenne Urban Area will need additional storm sewers to accommodate its baseline growth into new areas of developing land. All other communities have adequate storm drainage facilities in place to hold the peak runoff rates computed.

Cheyenne has ordinances that require stormwater detention to historical levels of outflow for new developments. In this stormwater study, the baseline population growth (6,060 people) was converted to 1,864 new homesites (after an assumed 1.5 percent vacancy rate had been filled) and to 466 acres of new development in single-family homes. Such an estimate was purposely conservatively high. Nonetheless, a peak rate of runoff of 210 cubic feet per second (cfs) was computed for such an area, and the indication was that 4 storm sewers of equivalent 60-inch diameter will be needed to drain such an area. This represents the baseline need for storm sewers, which developers are expected to add, and against which the Proposed Action is to be contrasted.

Modeling of storms in the developed parts of the Crow Creek watershed indicated that existing storm sewers should be 1.5 to 2.0 times larger. While no new population is projected to move to these subbasins, with or without the project, considerable flooding nuisance and damage there will be offset by improvements (enlargements) of the existing storm drains during the baseline period.

3.1.7.4.4.2 Proposed Action

Needs for storm sewers have been computed for South Cheyenne (where 60 percent of the project-induced population is expected to live) and for the Dry Creek basin of Cheyenne (where the balance are projected to live). Based on an *ad hoc* analysis of needed homesites for baseline plus project-induced growth in

each place, 172 acres of additional acres of mobile home development were computed for South Cheyenne, and 230 acres of single-family homesites were estimated for northeastern Cheyenne. Applications of 2-year, 1-hour storms (0.9 in/hr) to each place indicated a need for six 60-inch storm sewer systems in addition to today's need, four in South Cheyenne, and two in northeastern Cheyenne. The net impact, therefore, is two equivalent storm sewer systems over the entire Cheyenne Urban Area, the six computed here less the four indicated under No Action. (The 402 acres of single-family and mobile-home land uses estimated for this purpose compare to 405 such acres estimated separately and subsequently by the Land Use task group for these two land classifications. See Sections 3.1.10.4.1 and 3.1.10.4.2, where 155 acres of project-induced single-family and mobile-home lands are discussed and where 50 acres per year of the lands are prescribed for baseline growth for 5 years, 1983 through 1987.)

The need for two storm sewer systems as a result of the project is rated as a low impact and not significant at the local level. The installation of storm sewers will require some long-term and short-term uses of man's environment for the space in which the sewers will be placed, and the resources involved (the pipes) will be likely irreversibly and irretrievably committed to this single use, since the likelihood of their recovery for further use is so remote.

3.1.7.4.5 Telephone Service

3.1.7.4.5.1 Baseline Future - No Action Alternative

Capacities of telephone exchange equipment in each community in the Area of Concentrated Study were found to be adequate, or plans for expansion were underway to accommodate all baseline growth. In one case (Kimball, Nebraska), United Telephone System has some excess capacity today and expects 2.2 percent growth per year, which is its system-wide rate of growth. However, the baseline population projected for Kimball in this study will actually decrease.

3.1.7.4.5.2 Proposed Action

To serve the Cheyenne Urban Area, expansions to the central office equipment will probably be needed sooner than is currently planned by Mountain Bell. But installation charges and monthly rates charged by Mountain Bell are already designed to recover such periodic costs for expansion. No increase in customer rates is expected to result from this expansion (Mountain Bell 1983). Nearly 1,400 new customers will be added in 1985 in Cheyenne, in addition to 900 new baseline customers.

During the construction period (1985 to 1989) at F.E. Warren AFB, 600 additional telephones will be required. The long-term additional needs will drop to only 100 to 150 telephones. Because the Mountain Bell cable system onto the base is near capacity, these needs will have to be provided by Mountain Bell and purchased by the Air Force. This is considered a low, short-term impact and a not significant one at the site and in the local telephone-service context. No irreversible or irretrievable commitments of resources will be involved.

In all other communities excess capacity for telephone service exists, or plans for expansion under baseline conditions will more than accommodate expected inmigrant populations.

3.1.7.4.6 Consideration of Alternatives

Since there are no projected changes in population impacts related to any of the staging, road, or cable alternatives, the alternatives will not cause any different Utilities impacts from the Proposed Action.

3.1.7.5 Summary of Impacts

3.1.7.5.1 Explanation of Detailed Impact Matrix

Figure 3.1.7-1 summarizes all the Utilities impacts identified. All impacts, except telephone service needs and the surcharging sewer at F.E. Warren AFB, will be local and do not have site-specific or regional relevance. The site-related impacts regarding the F.E. Warren AFB sewer and its telephone cable capacity also have relevance in the local infrastructures to which these facilities are connected.

In all cases, impacts that are significant will be short-term impacts. This means they will occur (problems must be solved) during the baseline period (1983 to 1990).

Finally, it should be noted that the low but significant rating for Cheyenne's (baseline) treatment capacity was given a low rating only because the project's impact will be low if, but only if, the current 201 Plan for capacity expansion at Dry Creek and abandonment of the South Cheyenne plant is implemented virtually immediately. If that is not the case, the project will merely exacerbate the already deteriorated treatment capacity at South Cheyenne and add more flow to the Dry Creek plant, which, by virtue of receiving more and more flow from Crow Creek, will be reaching its current capacity as well. There is no question but that implementation of the 201 Plan which is already needed for baseline conditions, will involve a high impact on the local community, even with funding support from the state and federal governments. But it is worth noting that local officials are eager to proceed with the indicated improvements, despite the local funding impacts, and they anxiously await final funding approvals and the beginning of necessary construction.

3.1.7.5.2 Aggregation of Elements, Impacts, and Significance

Figure 3.0-1 presented the aggregation of impacts for Utilities as a whole. The aggregated rating for Utilities overall is: 1) low and not significant impacts at the site level in the short term, and 2) low and significant impacts at the local level for the short term. All regional short-term and all long-term impacts are considered negligible and not significant.

This overall rating has been reached through a professionally judged, qualitative averaging of the element and subelement ratings given in Figure 3.1.7-1. The short-term site impacts are rated low but not significant because most elements were not affected at the site level, and only one of those impacts (the surcharging

FIGURE 3.1.7-1

UTILITIES SUMMARY IMPACT MATRIX

LEGEND		ADVERSE IMPACTS	SIGNIFICANT ADVERSE IMPACTS
LEVEL OF IMPACT*	LOW	o	●
	MODERATE	○	●
	HIGH	◯	●
POTENTIAL BENEFICIAL EFFECTS		▦	

* MEASURE OF THE AMOUNT OF ENVIRONMENTAL CHANGE

	PROJECT IMPACTS					
	SHORT TERM			LONG TERM		
	SITE	LOCAL	REGIONAL	SITE	LOCAL	REGIONAL
UTILITIES	o	●				
Water Treatment and Distribution						
Wastewater		●				
Cheyenne Treatment Capacity		●				
Gering Treatment Capacity						
Pine Bluffs Treatment Capacity						
Torrington Treatment Capacity		●				
F.E. Warren Sewer	●	●				
Solid Waste						
Cheyenne Collection/Compaction Equipment		o				
All Other Communities						
Stormwater						
Cheyenne Urban Area Sewers		o				
All Other Communities						
Telephone Service	o					
F.E. Warren AFB	o	o				
Cheyenne Residential Service						
All Other Communities						

sewer) was considered significant. The local level impacts were rated low because many Utilities subelements had low ratings and significant because Cheyenne's wastewater situation and early implementation of the 201 Facilities Plan are so highly critical.

Cheyenne Urban Area impacts are generally higher and often more significant than the impacts for all other communities. Site level impacts for the Cheyenne Urban Area are considered low but not significant. The local level impacts are low but significant, again because the significant rating for wastewater dominated the others. No other impacts are applicable except for the long-term local impacts which are negligible.

For all other communities there are only local impacts which will have to be rated negligible and not significant overall, despite the single low and significant impact given to Torrington's wastewater situation.

The cable and road-siting alternatives to the Proposed Action do not impact the utilities in urban areas, and the staging alternatives involve so few people that their impacts are all negligible and not significant.

3.1.7.6 Mitigation Measures

Potential mitigation measures that will be considered are identified below. One, some, or all of the mitigation measures may ultimately be selected. Each measure identifies the party responsible to implement, but not necessarily to pay for, the measure.

o Cheyenne Waste Treatment Capacity	Implement the extant 201 Plan (Local agencies and funding sources).
o Torrington Waste Treatment Capacity	Finalize and implement 201 Plan expansion recommendation (Town of Torrington).
o F.E. Warren AFB Surcharging Sewer Connection to City	1) City of Cheyenne to enlarge downstream sewer; or 2) Air Force to institute water conservation or water reclamation on the base; or 3) Air Force to solve inflow/infiltration problems on the base.
o Cheyenne Solid Waste Equipment	Implement accelerated equipment purchases and pass along costs as appropriate (City of Cheyenne).

3.1.7.7 Unavoidable Adverse Impacts

There will be no unavoidable adverse Utilities impacts from the Proposed Action.

3.1.8 Energy Resources

3.1.8.1 Introduction

This section presents a quantitative comparison of energy demands projected with and without the project. Project energy demands will be calculated in terms of resources needed to construct and operate the project (direct impacts), and induced energy demands exerted by people moving into the Region of Influence because of the project (indirect impacts). Specifically, this section will examine the impacts of the proposed project on electrical power, natural gas, petroleum products, and coal.

As discussed in Section 2.1.8.1.2, energy impacts within the Region of Influence, with the possible exception of petroleum products, are likely to be concentrated within relatively few locations. The rationale for selection of these Areas of Concentrated Study is based upon a preliminary comparison of peak-year induced energy demands with known 1982 demands for each town or city where Socioeconomic analysis indicates inmigration due to the project. In virtually every case, future growth in baseline energy demand above 1982 levels is projected. Therefore, comparison of project-related demands for some future year with energy consumption statistics in 1982 is a conservative approach.

Cheyenne and Kimball are projected to receive the highest percentage of growth due to project-induced population influx (5.9% and 3.9%, respectively during peak year). They are therefore carried forward for detailed analysis for all four energy categories. Other communities which will be a part of the Area of Concentrated Study analyzed in Section 3.1.8.4 are shown in Table 3.1.8-1. In addition, any area which will supply energy for project construction or operation is included within the Area of Concentrated Study. This specifically includes the service areas of the three rural electric associations which supply electricity to 96 of the 100 Launch Facilities in the Deployment Area. The Area of Concentrated Study for gasoline and diesel was determined in a different manner. It is probable that construction contractors will draw their bulk fuel requirements from local wholesalers in the larger towns such as Cheyenne or Scottsbluff. However, many of the smaller construction vehicles and workers who commute through the Deployment Area will refuel at gasoline service stations over a wide area in and around the Deployment Area Therefore, the five-county Deployment Area (Cheyenne, Platte, and Goshen counties, Wyoming, and Banner and Kimball counties, Nebraska) plus Scotts Bluff, Nebraska are selected as the Area of Concentrated Study for petroleum products.

3.1.8.2 Definition of Levels of Impact

The levels of impact are similar for the four energy categories and are defined as follows:

- Negligible Impact - No increase in energy demand will be caused by the project. Price and reliability of the energy resource are unaffected.

Table 3.1.8-1

COMPARISON OF PEAK, INDUCED ENERGY DEMANDS WITH 1982 DEMAND BY COMMUNITY
(Expressed as Percentage Increases)

	Electricity Consumption	Peak Demand	Natural Gas	Diesel/[d] Gasoline	Coal
Wyoming					
Cheyenne	2.0	2.3	1.3	6.5	14[c]
Pine Bluffs	1.1	(b)	1.3	1.1	0
Laramie	(a)	(a)	0.3	0.5	0
Torrington	0.7	0.8	1.8	2.8	0
Wheatland	0.8	0.9	1.4	1.5	0
Nebraska					
Kimball	1.6	1.5	2.1	3.9	0
Gering	0.7	0.5	1.5	2.1	0
Scottsbluff	0.3	0.3	0.8	1.4	0
Colorado					
Greeley	0.3	0.3	0.5	0.9	0
Fort Collins	0.5	0.4	0.9	0.9	0

Notes: The underlined values within a column indicate the Area of Concentrated Study for that energy category.

a Data on the electrical system of Laramie was not available. The small, induced population increase (0.5%) leads to its elimination from the Area of Concentrated Study for electricity.

b Current peak demand data not available for Pine Bluffs.

c Long-term operational increase in coal use at F.E. Warren AFB.

d See text for explanation of the Area of Concentrated Study.

- Low Impact - An increase in demand will be caused by the project. However, existing and planned facilities and/or suppliers will be adequate to handle the increase. The cost of the resource might rise, but by such a small amount that the increase will be imperceptible to the average consumer. Reliability of service will be unaffected.

- Moderate Impact - The increase in energy demand resulting from the project will cause one or more of the following: the construction of minor new facilities such as additional local powerlines, small electric transformer sites, local extensions of gas mains, or sizeable increases in demand upon local private distributors of diesel and gasoline; price increases large enough to be noticeable by the average consumer, but without predictable economic hardship; or deterioration in service reliability over the long term or periodic interruptions of service.

- High Impact - The increase in energy demand resulting from the project will cause one or more of the following: the increase in energy demand to exceed the planned capability of a regional, wholesale supplier to provide the energy; a need for major new facilities by the local utility to generate or distribute the additional energy (e.g., large electrical generators, high voltage powerlines, major new gas mains, or major storage and distribution equipment for fuel suppliers); an increase in energy price, resulting in hardships to low-income persons or a reduction in energy-dependent economic activities; or substantial service deterioration or frequent interruptions of service.

3.1.8.3 Determination of Significance Criteria

An impact is considered significant if it affects public health or safety; if it threatens federal, state, or local laws or requirements imposed for the protection of the environment; if institutional responses to the impact will be extensive; or if the impacts to the resource user are (in the judgment of the analyst) of such intensity or geographic coverage as to adversely affect the quality of life in the region or greatly reduce the availability of that resource. The rationale for this judgment will be explicitly described.

3.1.8.4 Environmental Impacts of the Proposed Action and Project Alternatives

Baseline growth data (e.g., growth in the absence of the project) in electrical consumption and demand were obtained from reports filed with the Wyoming Public Service Commission. For Kimball, a utility-supplied growth estimate of 3 percent was applied to 1982 consumption data. Project-induced demand due to inmigration was estimated by multiplying the calculated new residences by the appropriate average residential consumption figure (Table 2.1.8-2). Using Cheyenne Light, Fuel and Power Company's experience, peak demand was estimated by multiplying induced population by 0.5 kilowatt (kW) per person. Direct project electrical requirements were obtained from the Air Force.

To calculate potential cost impacts to Cheyenne Light, Fuel and Power Company's customers, the rachet charges contained in the wholesale electrical contract with Pacific Power and Light Company (lasting through 1989) were used.

Baseline natural gas projections were obtained from Cheyenne Light, Fuel and Power Company. Specific projections do not exist for the service areas of Kimball, Gering, Torrington, and Wheatland. These towns are all served by Kansas/Nebraska Natural Gas Company which projects an average annual increase in natural gas consumption of 3 percent per year for the towns; 1982 consumption levels were therefore increased by this amount annually through 1990. Estimates of project-induced consumption were calculated on the basis of increases in the number of residences, by year, similar to electricity. Mean, annual residential consumption values for each community (Table 2.1.8-3) were then applied to derive induced gas usage.

The increase in natural gas at F.E. Warren AFB was calculated from heat load data (provided by the Air Force) on new buildings to be heated by natural gas. A conversion factor of 1 cubic foot (cf) of natural gas per 1,020 Btus was used. A gas furnace efficiency factor of 0.85 was assumed.

Projections of vehicular miles traveled in the Area of Concentrated Study were not available from the Transportation study. Therefore, baseline gasoline projections were based upon the application of 1982 per-capita use rates to population projections. The great majority of diesel use in both states is for industrial, agricultural, rail, and trucking activities in which project-associated people will not be involved. Per capita factors applied to project-induced population would greatly overestimate the amount of project-induced diesel use. Therefore, no attempt was made to quantify indirect diesel consumption.

Total petroleum product requirements associated with project construction were provided by the Air Force. Gasoline and diesel fuel breakdowns were derived by assuming construction at F.E. Warren AFB will require a 25 percent diesel and a 75 percent gasoline split. Construction in the Deployment Area was assumed to require a 75 percent diesel and a 25 percent gasoline split.

There will be no indirect or construction requirements for coal. Data on long-term operational use of coal at F.E. Warren AFB was provided by the Air Force.

A number of assumptions have been made in the assessment of energy impacts. These are summarized as follows:

- Western Area Power Administration will supply the increased operational electrical needs at F.E. Warren AFB following construction at the base.
- Onbase electrical needs for construction will be furnished directly through a contract with a regional supplier. Bulk fuel requirements will be supplied by local wholesalers.

- Statewide, per-capita consumption values are adequate for projecting future baseline and induced gasoline demand within the Region of Influence. However, equivalent figures for diesel use would greatly overestimate the diesel demand from the induced population.

- Current (1982) per-capita consumption rates were assumed to remain constant over the entire construction and deployment period. In light of recently declining consumption rates, this is a conservative assumption.

- All additional energy demand will be met through the existing energy infrastructure and from conventional energy sources.

- Since Socioeconomic analysis projects that inmigrants will be living in towns or cities in the Region of Influence, it is assumed that indirect energy needs in the rural areas as a result of the project will be negligible.

- All indirect electrical demand in the Cheyenne area due to the project will be supplied under the rachet charge portion of Cheyenne Light, Fuel and Power Company's contract with Pacific Power and Light Company. This is a worst-case assumption in terms of potential price impact to the local consumer.

- Adequate petroleum products will be available at the regional and national level through 1990.

In analyzing energy impacts, the following mitigation measures are assumed during and following the construction period:

- Energy planning will be coordinated with local and/or regional suppliers to ensure a timely and efficient energy supply.

- Air Force energy conservation design requirements will be incorporated into all new buildings.

- In digging and laying the buried communication cables, special care will be taken to avoid damage or interruption to buried energy pipelines. The cable will be buried a minimum of 36 inches below the bottom of all existing pipelines.

- The upgrading of the Western Area Power Administration electrical substation required to meet future demand of F.E. Warren AFB will be accomplished as part of the proposed project.

3.1.8.4.1 Electrical Power

3.1.8.4.1.1 Baseline Future - No Action Alternative

Table 3.1.8-2 shows the baseline increases in electrical consumption projected

for Cheyenne and Kimball. Between 1983 and 1990, consumption in the Cheyenne Light, Fuel and Power Company service area will increase 19 percent to nearly 600,000 megawatt hours (MWh). Rachet charges are already potentially in effect for wholesale purchases, although Cheyenne is currently avoiding such charges by purchasing nonfirm power from the Western Area Power Administration. The only major expansion plans involve a project which will double the capacity of the south side substation and associated feeder line.

Kimball is projected to experience a 15 percent increase in electrical consumption, approaching 21,000 MWh in 1990. Scheduled system improvements consist of a new 10 kilovolt ampere (kVA) substation on the south side of the town and 6 miles of high voltage (115 kVA) powerline. Neither power utility foresees any difficulty in adequately serving projected growth.

Electrical use at F.E. Warren AFB and in the Deployment Area is not projected to increase substantially in the absence of the proposed project.

3.1.8.4.1.2 Proposed Action

Table 3.1.8-2 shows the incremental increases in electrical usage due to induced demand in both Cheyenne and Kimball. During the peak project population year of 1987, additional consumption in Cheyenne will be 9200 MWh. Additional peak demand will be 1,890 kW. These represent increases of 1.6 percent and 2.0 percent, respectively, over baseline. Peak impact in Kimball will occur in 1989. In that year, induced consumption will be 278,000 kWh while additional peak demand will be 60 kW. These both represent a 1.4 percent increase over baseline.

The increase in wholesale electrical costs to the Cheyenne Light, Fuel and Power Company in 1987 will be about $350,000 or 2.4 percent above baseline, assuming all power is purchased from Pacific Power and Light Company. The increase in the cost to purchase wholesale electricity will be one-half of 1 percent due to the rachet charge effect. The potential increase in the consumer electrical rates will be somewhat less. It is not certain that a rate increase of this low magnitude will be passed to the consumers in the absence of other cost escalating factors. At the current electrical rates, the average residential customer will experience a maximum increase of about 12 cents per month or $1.42 per year attributable to induced demand.

Kimball currently buys its power from nonfirm sources and therefore is not faced with rachet charges. The utility manager does expect to negotiate a firm power contract within the next year. At that time the impact of the project upon electrical rates could be calculated. Under current conditions, wholesale power can be purchased at a constant rate of 2.5 cents per kWh.

Although construction at F.E. Warren AFB is scheduled to begin in 1984, initial work (surveys, site preparation, and foundation laying) will require little electricity. Therefore, the total construction power requirements of 2.27 million kWh are conservatively assumed to be evenly split among the two remaining years of construction occurring at the base, 1985 and 1986. Western Area Power Administration, the base's primary supplier, will not be able to supply this power (Power Resources Division-Director's Office Western Area Power Administration 1983). It is assumed

Table 3.1.8-2

ELECTRICAL USE PROJECTIONS FOR CHEYENNE AND KIMBALL

	1983	1984	1985	1986	1987	1988	1989	1990
Cheyenne LF&P								
Baseline Consumption[1]	503,000	518,000	533,000	547,000	559,000	572,000	584,000	596,000
% Increase[2]			(1.3)[1]	(1.6)	(1.5)	(0.8)	(0.7)	(0.4)
Baseline Load[3]	86	89	91	94	96	98	100	102
% Increase[2]			(1.5)	(1.8)	(2.0)	(0.9)	(0.9)	(0.5)
Kimball								
Baseline Consumption[1]	18,119	18,481	18,850	19,227	19,612	20,004	20,404	20,812
% Increase[2]					(0.3)	(0.4)	(1.4)	(0)
Baseline Load[3]	4.10	4.18	4.27	4.75	4.44	4.53	4.62	4.71
% Increase[2]					(0.3)	(0.4)	(1.3)	(0)

Notes: 1 Baseline consumption without project (MWh).
2 Percent increase induced by project (in parentheses).
3 Baseline load without project (MW).

that the construction contractor(s) at the base will contract directly with a wholesale electrical supplier. Therefore, it will not impact the Cheyenne Light, Fuel and Power Company rate structure.

Long-term operational use of electricity at F.E. Warren AFB is estimated by the Air Force to be 6.24 million kWh and 2,675 kW above current levels. These represent increases of 26 percent and 67 percent, respectively, over existing conditions. Due to the increased electrical load, the substation through which Western Area Power Administration power is supplied to the base will have to be expanded from the current 7,500 kVA, to 10,000 to 12,000 kVA. This will be accomplished as part of the project. It is expected that Western Area Power Administration will continue to supply the operational electrical needs of the base.

Construction electrical needs in the Deployment Area will total 1.5 million kWh. The rural electric associations can expect a reduction in electrical sales equivalent to at least 15,000 kWh per Launch Facility during its modification period. The largest percentage drop below baseline will be felt by the Rural Electric Company in 1988. In that year 23 modified Launch Facilities connected to its system will result in a temporary loss of about 570,000 kWh in sales. This amounts to only 0.35 percent of projected sales and should not be a noticeable loss to the utility. Following the modification of each Launch Facility, operational electrical consumption and peak demand will increase slightly to 219 MWh/year and 32 kW, respectively.

The use of the taller stage transporter for movement of project stages through the Deployment Area may require the raising of some powerlines. These lines will be identified further into the planning process and raised at government expense in cooperation with the affected power utilities.

Overall it is concluded that the change in electrical consumption associated with the project is low on the local level and very low at the regional level. Long-term usage at F.E. Warren AFB will increase substantially. Changes in consumer power rates (due to the project), if they occur at all, will be minimal and not noticeable to the rate payer. On the basis of the need for upgrading the electrical substation serving F.E. Warren AFB, the short-term local impact is judged to be moderate. The long-term local electrical impact is judged to be low. Regional impacts are judged to be negligible, both long and short term. None of the electrical impacts are considered to be significant.

No substantial electrical needs are associated with most of the project element alternatives (the ten buried cable routes and the three base road alternatives). If used by the contractor, the staging areas will each contain one or more small, portable buildings. The electrical requirements of these buildings are considered negligible on a project-wide basis.

3.1.8.4.2 Natural Gas

3.1.8.4.2.1 Baseline Future - No Action Alternative

Baseline projections of natural gas consumption in the Area of Concentrated Study are shown in Table 3.1.8-3. The two major purveyors, Cheyenne Light,

Table 3.1.8-3

NATURAL GAS USE PROJECTIONS IN THE AREA OF CONCENTRATED STUDY

	1983	1984	1985	1986	1987	1988	1989	1990
Cheyenne LF&P[1] (MMCF)[2]	7,220	7,300	7,390	7,480	7,570	7,660	7,740	7,810
% Increase[3]			(1.5)	(1.9)	(2.1)	(1.0)	(0.9)	(0.5)
Kimball (MMCF)	288	297	306	315	324	334	344	355
% Increase					(0.4)	(0.5)	(1.5)	(0.0)
Gering (MMCF)	493	507	523	538	554	571	588	606
% Increase					(1.2)	(0.6)	(0.1)	(0.0)
Wheatland (MMCF)	323	333	343	353	364	375	386	398
% Increase					(1.1)	(0.9)	(0.0)	(0.0)
Torrington (MMCF)	400	412	425	438	451	464	478	493
% Increase					(1.4)	(0.4)	(0.4)	(0.0)

Notes: 1 Cheyenne Light, Fuel and Power Company.
2 Baseline consumption without project.
3 Percent increase induced by project (in parentheses).

Fuel and Power Company and Kansas/Nebraska Natural Gas Company, foresee no difficulty in providing natural gas to meet future customer needs either in terms of supply or pipeline capacity (Operations Offices of Cheyenne Light, Fuel and Power Company 1983 and Kansas/Nebraska Natural Gas Company 1983). Cheyenne Light, Fuel and Power Company recently lost a major industrial consumer, Wycon, a manufacturer of nitrogen fertilizers. The 6,000 million cubic feet (MMCF) of gas used by Wycon represented a 45 percent drop in natural gas sales for Cheyenne Light, Fuel and Power Company. Baseline growth through 1990 will recoup only 10 percent of this. Thus, Cheyenne Light, Fuel and Power Company possesses a considerable surplus capability for delivery of natural gas to Cheyenne for other uses.

3.1.8.4.2.2 Proposed Action

A comparison of the indirect consumption values with the baseline figures for peak project years (Table 3.1.8-4) indicates that increased natural gas consumption induced by the project will boost baseline consumption by a maximum ranging from 0.4 percent in Torrington to 2.1 percent in Cheyenne. In no year does the induced consumption exceed the baseline increase in natural gas consumption. Regional and national events (as opposed to local demand) have tended to be the dominant factors in determining the price of natural gas in recent years. This trend is likely to continue into the future. Both of the natural gas distributors in the Area of Concentrated Study reported that local demand levels will not affect the consumer rate structure.

There will be no natural gas requirements for project construction. The only increase in operational gas usage will be to heat four buildings in the new Stage Storage Area at F.E. Warren AFB. It is calculated that an additional 690 thousand cubic feet (MCF) of gas will be used (the equivalent of five new residences in Cheyenne). This represents a 0.2 percent increase in base usage of natural gas.

The short-term impact of the project upon natural gas is concluded to be low locally and negligible on a regional basis. Long-term requirements for additional natural gas are less than short-term requirements and the Level of impact is concluded to be the same - low on the local level and negligible on the regional level. None of the natural gas impacts are considered to be significant.

None of the project element alternatives involve the use of natural gas.

3.1.8.4.3 Petroleum Products

3.1.8.4.3.1 Baseline Future - No Action Alternative

Baseline gasoline consumption for the Area of Concentrated Study is shown in Table 3.1.8-4. Since per-capita consumption was the basis of the projection, the consumption increases mirror the population increases in the six counties. The Area of Concentrated Study contains a well-developed system of local fuel distributors and retailers (i.e., gas service stations) operating in a competitive,

Table 3.1.8-4

GASOLINE AND DIESEL USE PROJECTIONS IN THE AREA OF CONCENTRATED STUDY

	1983	1984	1985	1986	1987	1988	1989	1990
Gasoline								
Baseline Consumption (10^6 Gallons)[1]	77.6	79.0	80.5	82.0	83.2	84.9	86.0	87.8
% Increase[2]		(0.2)	(2.9)	(4.3)	(3.4)	(1.7)	(1.4)	(0.8)
Diesel								
Baseline Consumption (10^6 Gallons)	23.5	24.0	24.5	25.0	25.4	26.0	26.3	26.9
% Increase		(0.3)	(4.0)	(3.8)	(2.3)	(0.8)	(0.5)	(0.3)

Notes: 1 The Area of Concentrated Study includes the counties of Laramie, Platte, Goshen, Banner Kimball, and Scotts Bluff.
2 Percent increase induced by project (in parentheses).

free-market system. This assures an adequate level of gasoline supply at the local level as long as regional and national supplies are available to meet demand. This appears to be the case for the foreseeable future.

Existing fuel use at F.E. Warren AFB (including Deployment Area use) was 79,000 gallons of diesel and 729,000 gallons of gasoline in 1982 and will continue at or slightly below these levels into the future. These fuels are purchased from a local distributor who buys from regional sources.

3.1.8.4.3.2 Proposed Action

Table 3.1.8-4 shows the percentage increase in gasoline and diesel use due to the combined requirements of direct and indirect use in the six-county Area of Concentrated Study. Peak year consumption will occur in the years 1985 to 1987. During that period, gasoline and diesel consumption attributable to the project will result in a 2 to 4 percent rise in demand. These estimates exclude induced diesel consumption (Section 3.1.8.4), but this use is expected to be confined to inmigrants who drive diesel vehicles and is considered to be comparatively low.

The only substantial change in operational fuel use following construction will be an increase in the number of round trips by the large stage transporter and associated erector needed for periodic missile replacement. This is estimated to increase annual diesel fuel need by just under 8,000 gallons, a 10 percent increase over existing operations.

There will be an increase of 4 percent in local demand for gasoline and diesel in the Area of Concentrated Study during the project. The local, short-term impact to petroleum products is therefore judged to be low. Long-term local impact will be low. Impact to the regional supply system will be negligible over both the short and long term. None of the impacts will be significant.

The staging areas, if used by the contractors, will not in themselves involve the use of fuels. Of the three base road alternatives, R2 will involve the use of the most fuel for its construction due to its 40 percent longer length. However, on a project-wide basis, all three alternatives are judged to have a low fuel impact. With regard to the buried cable routes, fuel consumption is directly proportional to length of the route, assuming equal ground conditions. Selection of the shorter routes will result in fuel savings. However, on a project-wide basis, substantial fuel consumption differences cannot be discerned among the ten routes. They are thus all assigned a low level of impact. Five routes (SC1, SC2, SB2, SB1, and RB1) each cross one buried petroleum products or natural gas pipeline. In these cases, construction practice will be to lay the cable 3 feet below the existing pipelines. Impact to pipe operations will be negligible.

3.1.8.4.4 Coal

3.1.8.4.4.1 Baseline Future - No Action Alternative

No substantial, additional use of coal within either Cheyenne or Kimball is forecast to occur in the future.

3.1.8.4.4.2 Proposed Action

No indirect use of coal will result from project-induced inmigration. No coal requirements have been identified for project construction. Following construction at F.E. Warren AFB, coal heating requirements will increase due to approximately 275,000 square feet (sq ft) of additional coal-heated building space, according to heating load estimates developed by the Air Force. The present Air Force estimate is that this will result in the burning of an additional 1,560 tons of coal annually, a 14 percent increase over existing coal use at the base heating plant. Given the existing rail delivery facilities adjacent to the plant, local, long-term impact is judged to be low. Short-term local impact and both short and long-term regional impact to the coal distribution system will be negligible. None of the impacts will be significant. None of the project element alternatives involves the use of coal.

3.1.8.5 Summary of Impacts

3.1.8.5.1 Explanation of Detailed Impact Matrix

Figure 3.1.8-1 summarizes the Proposed Action impact assessments for each of the four Energy categories. There are four possible levels of impact, ranging from negligible to high. Their definitions can be found in Section 3.1.8.2. Site-specific energy impacts are not considered generally applicable because energy supply and distribution systems are organized at the local and regional level and it is at these latter two levels that energy impacts will be felt.

The short-term impacts of the proposed project upon the four Energy elements (electricity, natural gas, petroleum products, and coal) are with one exception negligible to low. The short-term local impact upon the electrical distribution system was found to be moderate due to the need to expand the capacity of the Western Area Power Administration electrical substation to meet the increased electrical demand of F.E. Warren AFB. All long-term impacts were found to be negligible to low. All impacts were judged to be not significant.

Although not specifically addressed under the impact assessment of the individual energy categories, depletion of nonrenewable energy resources is a concern and is briefly treated here. Because of the highly developed regional energy distribution system, energy resource depletion is only considered potentially significant at the regional level. In no category does project-related energy consumption account for more than a fraction of 1 percent of the regional supply capacity. Thus overall impact to the nonrenewable resource base is concluded to be low and not significant over both the long and short term. None of the impacts shown in Figure 3.1.8-1 meet the significance criteria outlined in Section 3.1.8.3.

FIGURE 3.1.8-1

ENERGY RESOURCES SUMMARY IMPACT MATRIX

LEGEND		ADVERSE IMPACTS	SIGNIFICANT ADVERSE IMPACTS
LEVEL OF IMPACT*	LOW	o	●
	MODERATE	○	●
	HIGH	◯	●
POTENTIAL BENEFICIAL EFFECTS		▒	

* MEASURE OF THE AMOUNT OF ENVIRONMENTAL CHANGE

	PROJECT IMPACTS					
	SHORT TERM			LONG TERM		
	SITE	LOCAL	REGIONAL	SITE	LOCAL	REGIONAL
ENERGY RESOURCES		○	o		o	o
Electricity		○			o	
Natural Gas		o			o	
Petroleum Products		o			o	
Coal					o	
Depletion of Nonrenewable Energy Resources			o			o

Figure 3.0-2 compares the energy impact, from a total project perspective, of each of the project element alternatives. The low, not significant impact derives from the fuel requirements for the base road access and the buried cable alternatives. The staging area alternatives will have negligible energy impact. In general, no distinction can be made among the alternatives in terms of project-wide changes in energy use.

3.1.8.5.2 Aggregation of Elements, Impacts, and Significance

Overall impact of the Proposed Project upon Energy Resources is moderate and not significant for the short term, and low and not significant for the long term.

A conservative approach was used to aggregate the individual Energy category levels of impact to an overall Energy level of impact. In this manner due consideration was given to those Energy categories experiencing higher impact due to the proposed project. Thus, the need for reconstruction of an important electrical substation leads to a short-term local energy impact assessment of moderate (Figure 3.1.8-1). Long-term local energy impacts will be low. Regional short and long-term impacts are assessed as low due to the measurable level of depletion of nonrenewable energy resources. No significant energy impacts will result from the project.

3.1.8.6 Mitigation Measures

Potential mitigation measures that will be considered are identified below. One, some, or all of the mitigation measures may ultimately be selected. Each measure identifies the party responsible to implement, but not necessarily to pay for, the measure.

- Use of gasohol should be encouraged where practical as a measure to reduce the consumption of gasoline, a nonrenewable resource (Air Force and project contractors).

- Operational diesel fuel savings will be realized by operating the transport and support equipment to minimize the number of round trips needed to replace a missile. For example, the stage transporter might carry stages II and III as a single load (Air Force).

- The use of temporary worker living areas at several points around the Deployment Area may save substantial commuting mileage and should be investigated (project contractors).

3.1.8.7 Unavoidable Adverse Impacts

- The depletion of nonrenewable energy resources which are devoted to project construction and operation is considered to be an irreversible and irretrievable commitment of resources.

3.1.9 Transportation

3.1.9.1 Introduction

This section describes the impacts of the Proposed Action and alternatives on roads, railroads, aviation, public transit, and on pedestrian and bicycle facilities. A description of the criteria used to classify impacts, the criterion used to determine the significance of these impacts, and a description of the procedures used to estimate impacts are contained in the following sections.

In order to maximize the assessment process, data collection and analysis efforts focused on a smaller area of study within the Region of Influence where impacts were projected to be concentrated. This Area of Concentrated Study for Transportation is defined as an area approximately bounded by Interstate 25, U.S. Route 26, Nebraska State Highway 71, Interstate 80, and portions of Kimball County, Nebraska, and Laramie County, Wyoming, south of Interstate 80. This area was based on the location of F.E. Warren AFB and the 100 Launch Facilities. This area also focuses attention on those portions of the Region of Influence where project-induced population growth is anticipated since transportation systems in these areas would also be more directly affected by the project.

3.1.9.2 Definition of Levels of Impact

The basic objective of a transportation facility is to accommodate a quantity of traffic demand with an acceptable quality of service. Additional project-related traffic demand would have an impact on the quality of transportation service. Levels of impact are defined below for each of the Transportation elements.

3.1.9.2.1 Roads

For roads, the levels of impacts are measured primarily by changes in the traffic level of service and the physical condition of the roadway system. Also considered are the amount of delay, length of queues, and vehicular safety.

3.1.9.2.1.1 Level of Service

The measure of quality of service is a function of the ratio of the rate of flow to the capacity of the transportation facility. The level of service concept defines this function and generally describes the operating conditions a driver may experience while traveling on a particular roadway. Level of service on a particular roadway varies primarily with volume. Table 3.1.9-1 shows a range from level A (best) to level F (worst).

Table 3.1.9-1

LEVEL OF SERVICE

A Free flow with low volumes and high speeds.

B Stable flow with operating speeds beginning to be restricted somewhat by traffic conditions.

C Stable flow, but speeds and maneuverability are more closely controlled by high volumes.

D Approaches unstable flow with tolerable operating speeds being maintained though considerably affected by changes in operating conditions.

E Unstable flow with speeds lower than in level D and volumes at or near maximum possible capacity. Possible stoppages of momentary duration.

F Forced flow with low speeds and volume below maximum capacity resulting from queues of vehicles backing up from a restriction downstream. Possible stoppages for short or long periods of time.

Source: 1965 Highway Capacity Manual.

Levels of impact for level of service are characterized as follows:

- Negligible Impact - Will result in no change in level of service category for categories A, B, or C. Although actual traffic volumes may increase, the motorist will perceive no difference in traffic operations.

- Low Impact - Will result in level of service category changes from A to B, or B to C; but no changes in level of service categories D, E, or F. The motorist might perceive a slight change in traffic.

- Moderate Impact - Will result in level of service category changes from A to C, C to D, D to E, or E to F. The motorist will perceive a noticeable decrease in the quality of service in traffic operations.

- High Impact - Will result in level of service category changes from B to D, C to E, and D to F. The motorist will perceive a drastic decrease in quality of service in traffic operations.

3.1.9.2.1.2 Queues

The levels of impact for queues are as follows:

- o Negligible Impact - Will result in no change from projected baseline length of queues.
- o Low Impact - Will result in an increase from projected baseline length of queues. Vehicles will pass through signalized intersections within one cycle length (a complete change in signal indications from red to green to yellow to red).
- o Moderate Impact - Will result in an increase from projected baseline length of queues. Vehicles will pass through signalized intersections within two cycle lengths.
- o High Impact - Will result in an increase from projected baseline length of queues. Vehicles will pass through signalized intersections in two or more cycle lengths.

3.1.9.2.1.3 Delay

The levels of impact for delay are as follows:

- o Negligible Impact - Will result in no increase in delay or total travel time from projected baseline.
- o Low Impact - Will result in an increase in delay from projected baseline. Motorists will begin to reduce their gap acceptance (the acceptable space between cross traffic to be entered) for entering a stream flow of traffic.
- o Moderate Impact - Will result in an increase in delay from projected baseline. Motorists will begin to reduce their gap acceptance and occasionally use alternate travel routes.
- o High Impact - Will result in an increase in delay from projected baseline. Motorists will find and use alternate travel routes.

3.1.9.2.1.4 Safety

The levels of impact for safety are as follows:

- o Negligible Impact - Will result in no change from projected baseline accidents.

- o Low Impact - Will result in a change from projected baseline accidents, involving minimal property damage (less than $200), no injuries, and no loss of life.

- o Moderate Impact - Will result in a change from projected baseline accidents involving property damage over $200, minor injuries, and no loss of life.

- o High Impact - Will result in a change from projected baseline accidents, involving property damage over $200, major injuries, and/or loss of life.

The Manual on Uniform Traffic Control Devices (Federal Highway Administration 1978) recognizes an accident with property damage in the amount of at least $100 important enough to be considered in the warrants for traffic signal systems. However, the motor vehicle registries in various states require an accident with property damage of $200 or more to be reported in writing by the vehicle owners.

3.1.9.2.1.5 Physical Conditions

The levels of impact for physical conditions are as follows:

- o Negligible Impact - Will result in no change in existing roadway conditions.

- o Low Impact - Will result in minimum change in existing roadway conditions involving minor deterioration, which will be corrected during routine maintenance. Motorists might perceive a slight decrease in roadway conditions.

- o Moderate Impact - Will result in a noticeable change in existing roadway conditions requiring site-specific repairs or maintenance due to deterioration.

- o High Impact - Will result in a severe change in existing roadway conditions, requiring extensive reconstruction or a substantial increase in the overall maintenance cycle.

3.1.9.2.2 Railroads

For railroads, the levels of impact are measured by changes in various aspects of transportation, such as frequency of service, number and capacity of trains, holding facilities and rail yards, and system of operations.

- o Negligible Impact - Change in projected baseline that will result in no increase in regular services and volumes.

- o Low Impact - Change in projected baseline that will require no additional manpower to handle additional freight with present schedules and physical facilities.

- o Moderate Impact - Change in projected baseline that will require additional manpower and modifications to system of operations to handle additional freight.

- o High Impact - Change in projected baseline that will require additional manpower and the use of all present capacity of holding facilities, rail yards, and other physical facilities to handle additional freight. Enlargement or relocation of facilities will be necessary.

3.1.9.2.3 Aviation

For airports, the level of impact is measured by changes in air operations, safety, and land-side facilities.

- o Negligible Impact - Change in projected baseline that will cause no increases in airport operations or land-side volumes.

- o Low Impact - Change in projected baseline that will permit increased air operations to remain within limits of safety regulations and not appreciably change demand for land-side facilities.

- o Moderate Impact - Change in projected baseline that will require appreciable enlargement of airport land-side facilities, but air traffic operations will remain within safety limits.

- o High Impact - Change in projected baseline that will approach limits of air traffic operations safety, requiring changes in projected baseline operation procedures. Land-side facilities will approach capacity of any expansion at the present airport site.

3.1.9.2.4 Public Transit

For local commuter bus transportation, quality of service is measured by scheduling, passenger comfort, and ease of travel. At some point, bus capacity can be exceeded and additional buses should be placed in service. Additional buses could offer a higher level of passenger comfort, but might have a slight adverse effect on overall traffic flow.

- o Negligible Impact - Change in projected baseline that will cause an increase in the number of passengers, but require no schedule modifications.

- o Low Impact - Change in projected baseline that will require modifications to schedules due to increased passengers, but all passengers will be seated.

- o Moderate Impact - Change in projected baseline that will require schedule changes due to increased passengers, and there will be standees at peak hours.

- o High Impact - Change in projected baseline that will require acquisition of additional rolling stock (transit vehicles); standees will approach bus capacity.

For taxis, the level of impact is measured by response and travel time, and size of fleet.

- o Negligible Impact - Change in projected baseline that will cause no increase in response time or travel time.

- o Low Impact - Change in projected baseline that will cause minor increases in response and travel times.

- o Moderate Impact - Change in projected baseline that will cause noticeable increases in response and travel times; vehicles may be added to the fleet.

- o High Impact - Change in projected baseline that will increase response time beyond reasonable customer acceptable levels; vehicles will be added to the fleet.

3.1.9.2.5 Pedestrian and Bicycle Facilities

For pedestrians and bicyclists, the level of impact is measured by the safety of the pedestrian or bicyclist.

- o Negligible Impact - Change in projected baseline that will increase traffic volumes but will not affect safety of pedestrians or bicyclists.

- o Low Impact - Change in projected baseline that will increase frequency of accidents resulting in minimal property damage (less than $200), no injuries, and no loss of life.

- o Moderate Impact - Change in projected baseline that will increase frequency of accidents resulting in property damage over $200, minor injuries, and no loss of life.

- o High Impact - Change in projected baseline that will increase frequency of accidents resulting in property damage over $200, major injuries, and/or loss of life.

The Manual on Uniform Traffic Control Devices (Federal Highway Administration 1978) recognizes an accident with property damage in the amount of at least $100 important enough to be considered in the warrants for traffic signal systems. However, the motor vehicle registries in various states require an accident with property damage of $200 or more to be reported in writing by the vehicle owners.

3.1.9.3 Determination of Significance Criteria

Once the level of impact is identified, the significance of the impact can be determined. Significance is a measure of the importance of an impact. It is a function of the interaction between level of service and the context in which the impact occurs. Context represents the various qualitative conditions present in the existing environment which operate to magnify or diminish the importance of the impact. If one or more of the following conditions is present, the impact will be considered significant: whether the impact affects public safety, whether the impact is likely to be highly controversial, whether the action and its impact is related to other actions with individually insignificant but cumulatively significant impacts, and whether institutional responses to the impact will be extensive.

A more detailed rationale for determination of significance for each of the transportation criteria is presented below. As can be seen, they address the public safety and institutional conditions cited above.

3.1.9.3.1 Roads

- Level of Service - A reduction in level of service will occur for more than 1 hour (an accepted criteria for analysis and design of roadway facilities) or the level of service will be reduced below minimum desirable design standards.

- Queues - An increase in length of queues will occur for more than 1 hour (an accepted criteria for analysis and design of roadway facilities) or will begin to extend to adjacent intersections.

- Delay - An increase in delay of more than 5 minutes (an accepted criteria for analysis) will occur or alternate travel routes will become congested.

- Safety - An increase in number of accidents per year will occur and warrant change of traffic control device or geometric improvements.

- Physical Condition - A decrease in existing roadway conditions will occur over an extended period requiring physical improvements or increased maintenance.

3.1.9.3.2 Railroads

An impact will be considered significant if it could result in increased railroad traffic for a continuous extended period of time which will require modification to facilities or could begin to affect train traffic beyond the project area

3.1.9.3.3 Aviation

An impact will be considered significant if it could result in increased operations over a continuous extended period of time which warrant physical improvements or cause violations in air operations safety regulations.

3.1.9.3.4 Public Transit

An impact will be considered significant if it could result in an appreciable increase in the number of passengers over a continuous extended period of time which will warrant additional vehicles.

3.1.9.3.5 Pedestrian and Bicycle Facilities

An impact will be considered significant if it could result in an appreciable increase in accidents which will warrant physical or safety-related improvements.

3.1.9.4 Environmental Impacts of the Proposed Action and Project Alternatives

For the roads analysis, the methodology for characterizing road and traffic conditions for future baseline years and under the Proposed Action involved an assessment of travel demand, traffic engineering, and physical condition of roads and bridges. Key components of this methodology are summarized below.

In the Cheyenne area, estimations of baseline future travel demand reflect population forecasts and the associated allocation of new housing units to parts of the Cheyenne area where anticipated growth could logically occur. Based on discussions with city and state officials, probable roadway improvements that could occur in the Cheyenne area were incorporated into the roadway network model for the project's peak construction year in Cheyenne (1985) and operation year (1990). Trip generation procedures were then used to produce baseline future traffic conditions in the Cheyenne area for 1985 and 1990.

For project-related impacts on travel demand in the Cheyenne area, project manpower estimates formed the basis for determining housing needs and subsequently determining travel demand. Project-related traffic patterns were evaluated on the basis of projected work locations, work schedules, and vehicle occupancies. For this study, a "worst-case" analysis was developed. It was assumed that project-related employees will make work trips during the same peak hour, and that vehicle occupancies will be low. Based on the above assumptions, the peak-hour project-related traffic demand was determined. The number of additional vehicle trips made as a result of the project was then combined with future baseline traffic volume projections to determine impacts of the project on the road system.

Level of service, capacity, queuing, delay, and safety analysis were performed for traffic conditions for the roadway study network for the peak construction year and initial operating year.

For physical conditions of roads under baseline future conditions, it was assumed that Minuteman transporter-erector routes will continue to be used and the roadway condition will remain essentially unchanged.

To assess physical conditions of roads under the Proposed Action, it was assumed that the stage transporter vehicle will use existing transporter-erector routes. The analytic methods used to assess the ability of these transporter-erector routes to accommodate the extreme weight and size of the stage transporter vehicle consisted of comparing the physical characteristics of the transporter erector routes (as assembled during the road inventory) with the various design standards relating to the stage transporter vehicle. These standards specifically refer to roadway width, shoulder width, pavement structure, curve radii, superelevation, cross slope, longitudinal grades, vertical clearance, and cover for culverts. A basic assumption in this analysis is that the transporter-erector routes will be upgraded to meet the vehicle standards of the project.

Estimates were made of Deployment Area traffic on selected routes. During the construction phase, light vehicle traffic on these roads is expected to increase in the range of 10 to 100 vehicles per day. In a similar fashion, heavy truck traffic may increase in the range of 2 to 20 vehicles per day on selected routes. A worst-case approach was again taken, and the upper ranges for both vehicle types were employed in analyzing impacts on the rural roads.

To assess baseline future conditions for railroads, aviation, public transit, and pedestrian and bicycle facilities, the methodology employed in profiling existing conditions was extended to future baseline years, based on future traffic trends and information or probable improvements or changes in operational activities during these years.

To assess project-related impacts on these elements, project-related demands were added to future baseline conditions and the ability of each transportation mode's system to serve these demands were evaluated.

3.1.9.4.1 Roads

3.1.9.4.1.1 Urban Areas

Baseline Future - No Action Alternative. The peak construction period at F.E. Warren AFB is anticipated to be 1985 with normal operations resuming in 1990. Therefore, these future baseline years were employed in the analysis to provide a comparison of future baseline traffic conditions (without the project) with project-related traffic conditions as described in the next section.

Proposed Action. Under the Proposed Action for 1985, (the peak onbase construction year), the "worst-case" assignment of AM peak-hour traffic volumes indicates that several roadway sections, intersections, and interchanges may have traffic volume increases. Level of service reductions at impacted locations are shown in Table 3.1.9-2. Project-related operational traffic in 1990 will have a negligible and not significant impact.

Table 3.1.9-2

LEVEL OF SERVICE REDUCTION, LEVEL OF IMPACT, AND SIGNIFICANCE DETERMINATION FOR IMPACTED ROADWAY SECTIONS IN THE CHEYENNE AREA IN 1985

	Location	Level of Service Reductions	Level of Impact	Significance
1.	Central Avenue Interchange at I-25	A to A/B	Low	Not Significant
2.	College Drive at I-25	A to D/F	High	Significant
3.	Randall Gate at F.E. Warren AFB	Due to Queuing	Moderate	Significant
4.	Randall at Snyder			
	Randall - EB & WB	B to C	Low	Not Significant
	Snyder - EB	D to E	Moderate	Significant
5.	Central - at 18th			
	18th - WB	A to B	Low	Not Significant
6.	Central - at I-80 north ramp			
	Central - NB	A to B	Low	Not Significant
7.	Central - at Fox Farm			
	Fox Farm - EB WB	A to B	Low	Not Significant
8.	Central - at College			
	Central - WB	B to C	Low	Not Significant
9.	Warren - at 8th			
	8th - EB	A to B	Low	Not Significant
10.	19th - at Snyder			
	19 - EB	A to B	Low	Not Significant
11.	19th - at Logan			
	Logan - SB	D to E	Moderate	Significant
12.	Lincolnway at Logan			
	Logan - SB	D to E	Moderate	Significant

Table 3.1.9-2 Continued

LEVEL OF SERVICE REDUCTION, LEVEL OF IMPACT, AND SIGNIFICANCE DETERMINATION FOR IMPACTED ROADWAY SECTIONS IN THE CHEYENNE AREA IN 1985

13. Nationway at Logan			
Nationway - EB	A to B	Low	Not Significant
14. Dell Range at Prairie			
Dell Range - WB	A to B	Low	Not Significant
15. Dell Range at Converse			
Dell Range - EB	D to E	Moderate	Significant
16. Dell Range at Windmill			
Dell Range - EB	D to E	Moderate	Significant
17. Dell Range at Ridge			
Dell Range - EB	A to B	Low	Not Significant
18. Pershing at Randall			
Pershing - EB & WB	C to D	Moderate	Significant
19. Pershing at Snyder			
Pershing - WB	B to D	High	Significant
Pershing - NB	D to E	Moderate	Significant
20. Pershing at Warren			
Pershing - EB	E to F	Moderate	Significant
Pershing - WB	A to C	Moderate	Significant
21. Pershing at Evans			
Pershing - WB	D to F	High	Significant
Evans - SB	A to B	Low	Not Significant
22. Pershing at Logan			
Pershing - EB	B to D	High	Significant
Logan - NB	D to E	Moderate	Significant
23. Pershing at Windmill			
Pershing - EB	A to B	Low	Not Significant
24. Pershing at Ridge			
Ridge - SB	A to B	Low	Not Significant
25. Pershing at College			
College - SB	A to B	Low	Not Significant
26. Randall at I-25			
Weaving area on			
Randall - WB	A to D	High	Significant

Road traffic demand on the Cheyenne roadway system under the Proposed Action will have an overall moderate, short-term local impact that will be significant because they will reduce level of service below minimum desirable design standards. In particular, level of service decreases will occur at the interchange of Interstate 25 at Pershing Boulevard, and at College Drive, at various intersections on Pershing between Converse and Interstate 25, and on Logan Avenue between Lincolnway and Pershing. Level of service at the site level will receive a low not significant level of impact.

A moderate, short-term local level of impact that will be significant will occur due to the length of queues at the Randall gate entrance to F.E. Warren AFB. The impact will be significant since the queues may extend to the adjacent Randall Avenue at the Interstate 25 interchange. At the site level queues will have a low not significant level of impact. There will be a moderate, short-term level of impact in safety at the Randall interchange due to the potential for accidents involving property damage over $200 (an amount at which various states require an accident to be reported). This is significant because it will warrant geometric improvements of the interchange. However, at the overall local level, there will be a low, not significant impact in safety, in terms of the number of accidents resulting in property damage and minor injuries. There will be low impacts at various intersections in the amount of delay motorists will experience.

All road-related impacts will be low and not significant at the regional level.

Alternative internal road configurations (referred to as R1, R2, and R3) were specified for F.E. Warren AFB. These alternatives essentially offer varying means of access to the Stage Storage Area and the Weapons Storage Area. Alternatives R1 and R2 are similiar with the exception of the Round Top Road utilization in Alternative R2. Alternative R3 proposes construction of a new southern extension of Round Top Road and the construction of a new interchange with Interstate 80. A basic assumption is that the necessary roadway improvements will be made.

Alternatives R1 and R2 utilize existing or previously proposed facilities outside F.E. Warren AFB. Alternative R3 requires a new interchange with Interstate 80. Alternative R3 will have a low impact that will be not significant due to construction delays associated with physical improvements to Interstate 80 and Round Top Road. Alternatives R1 and R2 will have lesser impacts due to the lower magnitude of construction activities. All three alternatives include new roadway construction inside F.E. Warren AFB. Regardless of which alternative is selected, it appears that general traffic will continue to utilize gates 1 and 2 due to the proximity to Cheyenne population centers. The alternative Round Top Road entrances will be primarily used by the stage transporter vehicle and associated operations.

3.1.9.4.1.2 Rural Areas

Baseline Future - No Action Alternative. The peak years of construction in rural areas will depend upon phasing of Launch Facility-related construction. It was assumed that 1986 through 1989 would be the peak construction years for rural areas. It was further assumed that the operational phase would begin

in 1990. These years are evaluated for the project-baseline future analysis of traffic conditions under the No Action Alternative to form a comparison with project-related traffic conditions for these years under the Proposed Action.

Road traffic demand under baseline future conditions will have negligible impacts on the roadway network. Though traffic volumes will increase during these years, there will be no change in level of service category and motorists will perceive no significant change in traffic operations.

Assuming Minuteman transporter-erector routes will continue to be used during 1986 through 1990, their physical condition will remain essentially unchanged and adequate for Minuteman operational activities.

Proposed Action. The Proposed Action requires that existing-transporter erector routes be able to accommodate the specifications of the stage transporter vehicle. Projected roadway deficiences on transporter-erector routes were assessed through an evaluation of existing roadway conditions provided by the road inventory and applicable project design standards. Table 3.1.9-3 shows basic roadway and structural deficiencies identified during this evaluation. Bridges over 20 feet long will require individual structural engineering evaluations to determine the necessary improvements to accommodate the stage transporter vehicle. It should be noted that the potential road and structural deficiencies identified in this report will be verified through an evaluation process by the Military Traffic Management Command, the Federal Highway Administration, the Department of the Air Force, and the state and local transportation departments.

Transporter erector roadways must have adequate surface type and surface width. Based on current Air Force standards, roadway surfaces of E-1 or less will probably require an additional 6 inches of compacted gravel. Roadways with E-2 surfaces will probably require an additional 2 inches of compacted gravel. Narrow roadways will have to be widened to a 24-foot width of surface and shoulder.

Construction activities associated with upgrading sections of roads and certain bridges along transporter erector routes will have a short-term adverse impact on the level of service, queues and safety on these roads that will be low and not significant. However, construction will cause delays that will have low impacts that will be significant at the sites. The delays will be significant since motorists may be delayed for over 5 minutes or have to seek alternate travel routes. Delays at the local level will be low and not significant.

For other project-related rural roads, the physical condition of the roads may be impacted by construction vehicles and other project-related usage. Needed repairs to deteriorated roadways will result in a short-term adverse impact that will be moderate and significant at the site and local level due to the decrease in physical conditions over an extended period of time that will warrant physical improvements or increased maintenance. Physical condition impacts will also cause impacts on safety which will be low and not significant at the site level and low and significant at the local level. Overall, however, there will be a substantial long-term beneficial effect on the physical condition and safety of these roads and bridges, due to upgrading activities associated with the project.

Table 3.1.9-3

ALL COUNTIES
COMPARISON OF EXISTING CONDITIONS
WITH VARYING DESIGN STANDARDS

All Roads

Width	Mileage (Gravel Roadways)
< 18'	27.08
< 20'	40.12
< 24'	197.69
< 26'	237.73
< 28'	262.96
< 30'	281.48
TOTAL MILES OF ROAD:	969.75

Gravel Roadways

TOTAL MILES OF E-1 OR LESS:	203.15
TOTAL MILES OF E-2 OR LESS:	306.83

Geometric Conditions

Substandard Curves[1]	62

Culverts

Type	Total Number	Number with Deficient Cover
Box Culverts	158	No Standards
Reinforced Concrete Pipe	525	68
Corrugated Metal Pipe	1,067	350
Metal Pipe Arch	112	45
Other	0	No Standards
Reinforced Concrete Arch Culverts	23	10

Note 1 Substandard Curves-curves that would be unable to accommodate the required turning radius of the stage transporter vehicle.

Cable alternatives will have negligible impacts that will be not significant.

The forecast increases in transportation activities due to the staging areas are low. For the Proposed Action, which includes options for Kimball, Cheyenne, and F.E. Warren AFB, this will result in a low impact on roads and aviation that will be not significant. For the alternative which excludes Kimball, the effect is less due to higher baseline levels of transportation activity at Cheyenne and F.E. Warren AFB. Thus, the alternative has a negligible impact that will be not significant.

The Kimball railroad bridge over Nebraska State Highway 71 presently has a clearance of only 13 feet, 6 inches. Several alternate routes exist to preclude the necessity of substantial changes to the existing railroad overpass. These include:

- Use the existing county road in Banner County between Launch Facility B-5 and Route 71, adding about 12 miles of roads to the Defense Access Road system.

- Use the existing county road in Banner County between Launch Facilities B-6, D-2, and Route 71 which has an 80-foot bridge with three spans designed for H-20 loads. This adds about 16 miles of roads to the Defense Access Road system.

- Use the existing county road 2 miles west of Route 71 on Route 30 across an existing railroad at-grade and proceeding 1 mile north, then 2 miles east to Route 71 which will require improvement of the at-grade railroad crossing. This adds about 3 miles of roads to the Defense Access Road system.

In addition to the mileage added by each alternative to the Defense Access Road system, the first two alternatives involve a more circuitous travel route, thus generating more vehicle-miles of travel for stage transporter operations. The last alternative will require the least amount of upgrade and the least impact on the whole Defense Access Road system.

3.1.9.4.2 Railroads

3.1.9.4.2.1 Baseline Future - No Action Alternative

Based on recent trends and discussion with rail officials, it can be assumed that rail activity on the system as it presently exists will remain reasonably stable.

3.1.9.4.2.2 Proposed Action

The existing rail system is well under capacity and could handle added shipments related to the project. At the Cheyenne rail yard, any foreseeable effect on its operating capacity can be readily handled. This will constitute a negligible level of impact and be not significant.

3.1.9.4.3 Aviation

3.1.9.4.3.1 Baseline Future - No Action Alternative

Cheyenne Airport. Cheyenne Airport has seen large variations in air traffic over the years due to a number of factors such as military constructions, airline headquarters basing, the air controllers' strike, fuel shortage, high interest rates, and airline fare structures.

Air passenger traffic activity at Cheyenne has made a marked recovery during 1983, due to the changes in the fare structure and to the general economic recovery. Long-term trends will depend upon continued competitive fares, lower fuel prices, low interest rates, and improved national and regional economics.

Real personal income, which is the most significant factor in determining air passenger travel, is expected to increase in Cheyenne and its neighboring areas at about 6.67 percent per year between 1983 and 1990.

Anticipated schedules for Frontier Commuter and Rocky Mountain Airways formed the basis for 1984 turbo operations, and an annual growth rate of 5 percent is assumed thereafter. The difference in growth rates between passenger traffic (6.67%) and operations (5%) accounts for a gradual increasing load factor.

Analysis was performed for the Cheyenne Airport regarding runway capacity, terminal capacity, and parking capacity at the terminal. According to the 1979 Cheyenne Municipal Airport Master Plan, the hourly capacity of the existing runways is between 99 and 152 operations-per-hour. Airport traffic control personnel estimate from experience that 75 to 90 operations per hour will be a more realistic figure.

Based on Federal Aviation Administration (FAA) criterion, 24,200 square feet (sq ft) of terminal space should be provided per 100 typical peak hour passengers. For Cheyenne, the typical peak hour passenger is estimated to be 0.12 percent of the annual flows, or 62 typical peak hour passengers in 1990 (Ashford and Wright 1979). Thus, approximately 15,000 sq ft of terminal space will be required. Although this is still about 1,000 sq ft less than what is presently available, the present arrangement allows only 570 sq ft for the security area and no space for a secured waiting area. Airport management suggests that approximately 5,000 sq ft will be needed to add facilities necessary to efficiently serve the commercial passengers.

At present, an insufficient number of spaces are available to the public for long-term and short-term parking. This problem will become critical in the near future, as the airport continues its normal growth. Failure to resolve this problem could inhibit the airport's growth.

Area Airports. With the exception of General Brees Field in Laramie and Scotts Bluff County Airport, area airports are almost totally oriented to general aviation. These general aviation airports serve only a limited number of aircraft and are largely underused and will remain so during baseline years.

According to the 1979 Airport Master Plan for General Brees Field, this field has a peak hourly capacity of 82 operations and an annual capacity of 212,500 operations. The Master Plan recommends expansion to handle 737 aircraft and a doubling of terminal area from the existing 4,570 sq ft to 8,320 sq ft in 1990.

Capacity at Scotts Bluff Airport is well above the 1991 annual operations of 63,600 operations projected by a 6 percent area growth factor, and the 81,300 operations projected for 1990 by the Master Plan. The Master Plan states that passenger terminal area required will be 11,000 sq ft as compared to the existing 3,656 sq ft.

Denver's Stapleton International Airport continues to grow rapidly and future expansion is planned.

3.1.9.4.3.2 Proposed Action

Cheyenne Airport. Two major factors could result in project-related impacts to the Cheyenne Airport. One is the increased corporate and private traffic related to the project such as project-related manufacturers and contractors, government agencies, and high technology companies.

Another main factor affecting the airport will be the use of possible helicopter and small aircraft by the contractor. Because of the driving distances from the staging areas to the various sites, helicopters and small aircraft could possibly be used to shuttle personnel, supplies, and small equipment between F.E. Warren AFB and the sites. It is estimated that the project may add as much as 8,300 annual operations during construction. About 1,500 of these will involve jet traffic. Additional project-related traffic will be below theoretical runway capacity but may slightly increase the deterioration of runway pavement.

Peak project-related enplanements occur in 1986 and may require slight increases in land-side facilities over baseline needs. This will have a low impact and be not significant at the site and local level because it will not appreciably change demand for land-side facilities.

Area Airports. Because of their locations on the periphery of the project area, the general aviation airports will be negligibly impacted.

Kimball is a possible site as a staging area under the project, and the possibility of again having a fleet of aircraft based there is reasonable. The Kimball Airport is in a rural area located some distance from residential property. The airport has the capacity to handle a large number of helicopters, both for air operations and ground parking areas. Kimball could be added to the Scotts Bluff-Cheyenne-Denver route by one of the air carriers.

3.1.9.4.4 Public Transit

3.1.9.4.4.1 Baseline Future - No Action Alternative

Jitney, Inc., has been in operation in Cheyenne for only a short time, and offers

a minimum level of service to the community. Jitney, Inc., is considering expanding its routes to more areas of the city in the future. Taxi service is also currently operating at a low level in Cheyenne.

Transit demand in an auto-oriented community like Cheyenne is not readily measured. If demand does not exist in the area under consideration, it can only be determined by implementing service. Ridership levels then determine the extent of sevice that can be justified. Based on the current low level of service provided, it would appear that only slight increases in ridership will occur in the foreseeable future. Both Greyhound and Trailways project approximately 5 to 10 percent growth across their systems. No changes to the present area of service are foreseen.

3.1.9.4.4.2 Proposed Action

Project-related demand will result from increases in population and housing due to the project. It is doubtful if the current or anticipated service is adequate to attract project employee work trips. Routings are very limited, and the long headways offer a poor transportation alternative.

It appears that project-related employees will have occasion to use taxi service for convenience reasons, and may increase taxi demands. If additional demand occurs, the taxi operator could more readily add vehicles and drivers. In general, the impacts on the transit and taxi system in Cheyenne will appear to be negligible and not significant.

High income levels of project-related employees also will indicate a low demand for intercity bus service. The increased level of economic activity will probably result in limited demand increases.

3.1.9.4.5 Pedestrian and Bicycle Facilities

3.1.9.4.5.1 Baseline Future - No Action Alternative

Improvements to the major network will probably occur in association with major development projects. Through various land use policies, the City is encouraging developers to develop bikeways, pedestrian paths, and greenbelts as part of their individual undertakings.

3.1.9.4.5.2 Proposed Action

The relative population increases and distribution related to the project will cause a negligible impact on the Cheyenne bikeway network. The very nature and layout of the bikeway network system will meet much of the demand of the increased population. A relatively small number of households will constitute the permanent work force, and will have a negligible impact on the pedestrian and bicycle system.

3.1.9.5 Summary of Impacts

3.1.9.5.1 Explanation of Detailed Impact Matrix

The effects of the Proposed Action on the Transportation resource which have been described previously are summarized in Figure 3.1.9-1.

Overall, the transportation facilities will be substantially improved due to the upgrading of the existing transporter erector road network. Short-term adverse impacts will occur due to the construction activities associated with F.E. Warren AFB and the Launch Facilities. For example, traffic congestion may occur at various locations in Cheyenne, most noticeably at the Interstate 25 at Randall Avenue interchange. Also, construction activities associated with the Launch Facilities may have an adverse impact on non-transporter erector rural roadways. The long-term beneficial effects of the Proposed Action appear to outweigh the short-term adverse impacts.

It should be noted regarding alternatives R1, R2, and R3, that none of the alternatives change the overall effect of the road impact evaluation. However, alternative R3 would have more impact than alternatives R1 and R2, due to the construction delays on Round Top Road and Interstate 80. Cable alternatives will have negligible impacts that would not be significant.

The Proposed Action for the staging areas, which includes Kimball, has a low impact that is not significant. The alternatives exclude Kimball and have a negligible impact that is not significant.

Railroad capacity in the Region of Influence would be negligibly impacted and the impact would not be significant.

The capacity of land-side facilities at Cheyenne Airport would have a low impact that would be not significant since possible increased operations, over an extended period of time, would not warrant any appreciable physical improvements. Impacts on area airports are negligible and not significant.

Negligible impacts would occur on public transit systems and pedestrian and bicycle facilities in Cheyenne. The impact would not be significant.

3.1.9.5.2 Aggregation of Elements, Impacts, and Significance

Figure 3.0-1 presented the aggregation of impacts for Transportation as a whole. The aggregated rating for Transportation is: low and significant impacts at the site level in the short term, moderate and significant impacts at the local level for the short term, and low and not significant impacts at the regional level for the short term. Long-term effects to roads at the regional level are considered beneficial.

The overall rating for Transportation was based on a qualitative professional evaluation of subelements and then elements as given in Figure 3.1.9-1. The level of impact for the five subelements of roads at the site level were all low except for physical conditions which were rated moderate. There were significant impacts

FIGURE 3.1.9-1

TRANSPORTATION SUMMARY IMPACT MATRIX

LEGEND		ADVERSE IMPACTS	SIGNIFICANT ADVERSE IMPACTS
LEVEL OF IMPACT*	LOW	○	●
	MODERATE	◯	●
	HIGH	◯	●
POTENTIAL BENEFICIAL EFFECTS			▒

* MEASURE OF THE AMOUNT OF ENVIRONMENTAL CHANGE

	PROJECT IMPACTS					
	SHORT TERM			LONG TERM		
	SITE	LOCAL	REGIONAL	SITE	LOCAL	REGIONAL
TRANSPORTATION	●	●	○	▒	▒	▒
Roads	●	●	○	▒	▒	▒
Level of Service	○	●	○			
Queues	○	●	○			
Delay	●	○	○			
Safety	○	●	○	▒	▒	▒
Physical Condition	●	●	○	▒	▒	▒
Railroads						
Aviation	○	○				
Cheyenne	○	○				
Area Airports						
Public Transit						
Pedestrian and Bicycle Facilities						

for delay. Thus, the aggregated level of impacts at the site level for roads is low and significant. At the local level the moderate and significant level of impact for roads reflects the fact that three of the five subelement impacts are moderate and significant. The regional level of impacts were all low and not significant. The overall rating for Transportation, again based on qualitative professional evaluation, reflects the dominance of roads among the five elements.

The short-term site impacts are rated low and significant primarily due to construction activities on and near the roads in the Deployment Area. The short-term local impacts are due to the added volume of traffic which will cause a decrease in level of service at a number of intersections and an increase in queuing at the Randall Avenue gate to F.E. Warren AFB. The short-term regional impacts are low and not significant due to the relatively minor effect on the regional transportation system as a whole. The overall long-term impacts to transportation are beneficial due to the improvement of the physical condition of deployment area roads and the associated increase in safety.

The cable alternatives to the Proposed Action have a negligible and not significant impact. The Proposed Action for the staging areas has a low and not significant impact because the location of a staging area in Kimball may add some construction-related traffic to the road network. The other alternatives for the staging area have a negligible and not significant impact. The alternative R3 of the F.E. Warren AFB circulation routes has a low and not significant impact due to the amount of construction activities and their effect on Round Top Road and Interstate 80. The other road configurations have a negligible and not significant impact.

3.1.9.6 Mitigation Measures

Potential mitigation measures that will be considered are identified below. One, some, or all of the mitigation measures may ultimately be selected. Each measure identifies the party responsible to implement, but not necessarily to pay for, the measure.

Mitigation measures for roads using transportation systems management techniques are listed for consideration:

- Scheduling of work hours for project-related employees to avoid the normal current traffic peak hours (Air Force);
- Contractor should work with local jurisdictions to minimize problems (contractor); and
- Providing project-related employees incentives for using high-occupancy vehicles such as vanpools or car pools (Air Force).

Mitigation measures for roads using capital intensive projects are listed for consideration:

- Moving the Randall gate at F.E. Warren AFB to the west to accommodate the traffic queue (Air Force);

- o Modifications to the geometric design of Interstate 25 at Randall Avenue interchange and on Interstate 25 at College Drive interchange (State Highway Department);

- o Improved traffic signalization on Pershing Boulevard between Converse and Interstate 25 (City);

- o Improved traffic signalization on Logan Avenue between Lincolnway and Pershing Boulevard (City);

- o Improved traffic signalization at Randall Avenue at Snyder Avenue, and Dell Range Road at Windmill and Converse (City); and

- o General maintenance and site-specific rehabilitation of project-related roadways (State, County, and City).

No mitigation measures are required for railroads.

Increased flight operations at Cheyenne Airport may require slight increases in land-side facilities.

No mitigation measures are required for either public transit systems or pedestrian and bicycle facilities.

3.1.9.7 Unavoidable Adverse Impacts

It does not appear that there will be any residual or unavoidable adverse impacts resulting from the project.

3.1.10 Land Use

3.1.10.1 Introduction

This section describes the impacts of the Proposed Action on urban and rural land use. A description of the criteria used to classify impacts and determining their significance is contained in the following sections.

Since Cheyenne and Kimball are the only communities projected to experience a significant housing impact, and since new residential development is the primary indirect land use impact from the Proposed Action, these two communities comprise the urban land use Area of Concentrated Study. On the other hand, since all of the impacts associated with rural land use are directly related to the Proposed Action, the Area of Concentrated Study for rural land use includes the Launch Facilities and areas between them where cable system routes are proposed, the Quantity Distance zones, and the transporter erector roads.

3.1.10.2 Definitions of Levels of Impact

3.1.10.2.1 Urban Land Use and Planning

The levels of impact for urban land use and planning consider three factors: absorption of vacant land in incorporated areas, the potential for underutilization of developed land, and whether major land use controls (including zoning, subdivision ordinances, and land use plans) have been adopted. While infill is generally desirable, total depletion of vacant land could result in a need for annexation or encourage scattered development in unincorporated areas where costs for utilities and services would be high. An underutilization of developed land could result in reduced maintenance of properties and inefficient use of utilities and services, thereby creating a financial burden on local government and/or local taxpayers.

Levels of impact for urban land use are:

- Negligible Impact - Development controls have been adopted, there is an adequate amount of vacant land to absorb new development, and no underutilization of developed land will occur if demand was met.
- Low Impact - Development controls have been adopted, but one or both of the following could occur if demand was met: depletion of total available vacant land or underutilization of developed land.
- Moderate Impact - Development controls have not been adopted, and one of the following could occur if demand was met: depletion of total available vacant land or underutilization of developed land.
- High Impact - Development controls have not been adopted, and both of the following could occur if demand was met: depletion of total available vacant land and an underutilization of developed land.

3.1.10.2.2 Rural Land Use

The levels of impact for rural land use consider the amount, type, and duration of direct land use impacts projected for the proposed project in relation to the character of the area in which the impact occurs. The definition takes into account potential interruptions or changes in existing uses (as in the case of temporary interruption of agricultural land use from construction of the proposed cable routes) and restrictions on current and future land uses (as in the case of restrictions on residential uses within the Quantity Distance zones). The rating criteria are applied to the proposed cable routes, transporter erector road modifications, Launch Facility modifications, and Quantity Distance zones. The levels of impact associated with rural land use are:

- Negligible Impact - Little change in the land use and character of the area.
- Low Impact - An interruption or restriction of land use that will not change the character of the area.
- Moderate Impact - An interruption or restriction of land use that will change the character of the area on a temporary basis.
- High Impact - A permanent change in the land use and character of the area.

3.1.10.3 Determination of Significance Criteria

3.1.10.3.1 Urban and Rural Land Use

Significance is a function of the level of impact and its interaction with the context in which the impact occurs. For urban and rural land use, any one or a combination of the following could determine significance:

- Whether the impact affects public health or safety;
- Whether the impact is likely to be highly controversial;
- Whether the impact compels land development in ways not expressly intended and is therefore inconsistent with adopted plans and policies;
- Whether the impact threatens the violation of some federal, state, or local law or requirements imposed for the protection of the environment, or public health and safety; and
- Whether institutional responses to the impact will need to be extensive, or are beyond institutional capacity to respond.

3.1.10.4 Environmental Impacts of the Proposed Action and Project Alternatives

The urban land use methodology applied land use standards to baseline population and housing projections to determine the amount and type of demand for land development. Lot size requirements in local zoning ordinances were considered to determine housing densities. Per capita standards were used for all nonresidential land uses. Vacant land absorption (in acres) was estimated. The methodology for the Proposed Action is similar to the No Action Alternative with the following additions: the difference between peak land use and baseline demand was estimated to identify the potential for underutilization of developed land, and adopted plans and policies were assessed to identify potential conflicts.

For urban land use, it was assumed that if existing developed land met or exceeded generally used standards, new population growth will require additional development according to those same standards. Vacant land absorption was analyzed with the assumption that the supply of vacant land in the city will stay constant. There are no assumed mitigations for urban land use.

For rural land use, cable routes and Quantity Distance zones were analyzed through aerial photography and satellite imagery previously described. The amounts and types of land uses potentially affected by extension of the cable routes were determined, together with a consideration of the temporal nature of the impact. The Quantity Distance zones were looked at in terms of how restrictions might affect existing and future residential land uses. A "worst-case" analysis was done for the cable routes to identify the five routes that could affect the most agricultural land.

It was assumed that the cable rights-of-way for routes along existing roads and project-related road modifications will accommodate upgrading activities with no impact on existing agricultural land uses. Activities at all Launch Facilities were assumed to occur within publicly owned land and would not affect agricultural land use. In addition, the analysis assumed certain mitigations for agricultural land use impacts, including livestock protection, minimization of crop damage and farming practice delays, restoration of topsoil, and provision of adequate drainage and irrigation facilities through temporary replacement or restoration as appropriate.

3.1.10.4.1 Baseline Future - No Action Alternative

3.1.10.4.1.1 Urban Land Use and Planning

Cheyenne, Wyoming. Under baseline conditions, Cheyenne's population is projected to grow by approximately 870 persons per year through the 1980s. This would result in an annual demand for approximately 56 acres of residential land use (46 acres of single family, 6 acres of multifamily, and 4 acres of mobile home uses) and 43 acres of nonresidential land use (2 acres of commercial, 10 acres of industrial, 4 acres of parks and open space, 9 acres of public and semipublic, and 18 acres of streets). This assumes that current local housing preferences and lot size requirements will continue and that existing developed urban land

is generally fully utilized. Adequate amounts of vacant land should be available to absorb this new demand, either in vacant lots in existing subdivisions or in appropriately zoned vacant parcels.

Kimball, Nebraska. Kimball's population is projected to decline slightly through the 1980s, creating no additional demand for land.

3.1.10.4.1.2 Rural Land Use

The percentage mix of agricultural land uses within the Deployment Area is expected to remain relatively stable under baseline conditions. The national trend toward larger farms, fewer owners, and less farm acreage is expected to be represented in the region.

3.1.10.4.2 Proposed Action

3.1.10.4.2.1 Urban Land Use

Cheyenne, Wyoming. Based on population influx and housing demand, there is a projected demand for 320 acres of vacant urban land in Cheyenne, in addition to baseline. Increased housing demand may have a potential beneficial effect by creating infill of vacant lots. Between 1985 and 1987, the peak demand years, the requirement will be 164 acres of nonresidential uses, 79 acres of single-family residential, 1 acre of multifamily residential, and 76 acres of mobile home residential.

If peak demand is met through new development, an underutilization of developed land could be created during the decline phase. The underutilization of nonresidential uses could last at least 4 years, from 1988 to 1991, and be absorbed by 1992. The underutilization of single-family residential use could occur in 1988 and 1989 and be absorbed by 1990. The underutilization of mobile home uses could last past 1990, since baseline mobile home absorption is projected at only 4 acres per year.

Availability of vacant land in Cheyenne should not be a constraint on new development since there were almost 1,500 acres of vacant land in the city in 1982. Substantial amounts of additional vacant land have been designated for future annexation. Underutilization potential results in a low, not significant impact in both the short and long term.

Kimball, Nebraska. Project-related demand for vacant urban land is estimated at 11 acres. Six acres will be for mobile home sites with the remainder for nonresidential uses. Sufficient vacant land is available for mobile home park development in Kimball. Because Kimball's population is projected to decline slightly through the 1980s, baseline demand will not be expected to absorb new development following 1989 unless current housing preferences change. An underutilization of developed land could thus occur for an indefinite period. Therefore, impacts will be low but not significant in both the short and long term.

3.1.10.4.2.2 Rural Land Use

Direct impacts upon agricultural land uses relate to potential interference with the cultivation and harvesting of irrigated and dry farmed cropland, as well as a potential reduction in the amount of natural and/or cultivated forage available for grazing animals. In addition, potential changes in subsurface soil moisture retention capacities and drainage characteristics (critical to dry farming and irrigation practices) are possible due to cable-trenching operations. Indirect project-related impacts upon ranching activities and upon access to farming operations may occur due to construction noise and vehicular movement; however, they will be localized and temporary.

Launch Facility site and transporter-erector road modifications have no impacts on rural land use. Cable route and PA2 and the portions of RB1, PB1, PD1, PA3, SC2, and PA4 which follow existing roads all have no direct impacts on agricultural land uses. Table 2.1.10-1 shows existing land use conditions and potential impacts for cable corridors. The Proposed Action cable routes (RB1, PD1, PA4, PA1, and SB1) could potentially affect approximately 127 acres of irrigated, dry farm, and rangeland uses. Once cable placement and construction mitigation requirements are completed, landowners will have full access to the cable easement for normal ranching and farming operations. There will be an interruption of agricultural land uses during cable construction in the short term, but the character of the area will not be changed since cable-trenching will be limited to a few areas and agricultural use will continue once the cable is in place. Therefore, the level of impact for the five preferred cable routes will be low in the short term and negligible in the long term, and will not be significant.

For planning purposes, Quantity Distance requirements for the proposed project are 1,050 feet to public traffic routes and 1,750 feet to inhabited buildings. It is assumed that exemptions will be granted for public roads as is the case for the current Minuteman system. The Air Force will acquire a restrictive easement over the area from 1,200 feet (current easement) to 1,750 feet to preclude encroachment of inhabited buildings; however, other uses, such as agriculture, will not be affected.

While future construction of inhabitable buildings will be absolutely prohibited under the easements, there are nine existing inhabited structures that require specialized consideration. These are residences associated with farm complexes which include additional uninhabited farm support buildings. These nine homeowners will be informed in detail of the risks associated with their location. To assist them, they will be offered three choices:

1) Sell the residence and the associated farm improvements to the Air Force, while keeping 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. These values would be determined by professional appraisers from the local area if available, otherwise those familiar with the local realty market, and be subject to negotiations with the owners. Relocation benefits would also be paid as authorized by law. The Air Force will commission and pay for the appraisals.

2) Sell only the house to the Air Force at its fair market value and use the proceeds to build a new residence outside the Quantity Distance area. The owner will be given the opportunity to move his present house outside the Quantity Distance area if he wishes.

3) For those families who would like to remain undisturbed, the Air Force would process a request to the Secretary of the Air Force for an exemption. Each exemption request will be considered on a case-by-case basis. Each homeowner who wants to remain will be required to acknowledge in writing the nature of the circumstances for the establishment of the safety zone, that the Air Force is willing to acquire the structures and provide relocation assistance as provided by law, and a clear statement of his desire to remain nonetheless.

Although there will be a restriction on future residential use, agriculture could continue within the Quantity Distance zones. Since the character of the area will not change, there will be a low impact in both the short and long term at the site level. Impacts will not be significant.

3.1.10.4.3 Consideration of Alternatives

There are three staging area proposals. The first includes three staging area sites, one each at F.E. Warren AFB, Cheyenne, and Kimball. Another proposal provides no staging areas, and a third alternative drops the staging area at Kimball. The staging areas will each contain a small portable building and an open area for equipment and materials storage. If designed as a temporary use and located in an industrial area, the staging areas should have a negligible and not significant impact in both the short and long term, since vacant land is available in Cheyenne and Kimball, underutilization will not occur, and development controls are in place at the local level.

The five preferred action cable routes could potentially affect approximately 127 acres of agricultural land, a majority of it rangeland (see Table 2.1.10-1 for acreages affected by individual cable routes). Impacts at the site will be low in the short term and negligible in the long term because the temporary interruption in land use will not change the character of the area.

The five corridors whose cumulative impacts represent a worst-case scenario (PA3, PB1, SB1, SC2, and SB2) could potentially affect approximately 425 acres of irrigated, dry farm, and rangeland. The impact ratings will generally be the same as for the preferred action (low in the short term, negligible in the long term, not significant) since there will be temporary interruptions of use but no change in the character of the area. The worst case could, however, affect more agricultural land.

Implementation of the R1 and R2 proposed road alternatives to achieve better and safer access to F.E. Warren AFB will involve raising either one or two bridges, lowering a roadbed, or realigning a minor portion of Happy Jack Road. Applying the level of impact definitions for urban land use, the impacts for R1 and R2 will be negligible in the short and long term and not significant at the local level since vacant land will not be depleted, underutilization will not occur, and development controls have been adopted.

Alternative R3 will require approximately 8 acres of land for a new interchange at Round Top Road and Interstate 80. An interchange in this location could open up access to land west of F.E. Warren AFB. If the interchange was built and used largely by traffic generated by F.E. Warren AFB, it might be underutilized much of the time. The impact at the local level is low in the short and long term due to potential underutilization, and not significant.

3.1.10.5 Summary of Impacts

3.1.10.5.1 Explanation of Detailed Impact Matrix

Project-related land use impacts within the cable routes are low in the short term, negligible in the long term, and not significant due to a short-term interruption of agricultural land use that will not change the character of the area, and the continuation in the long term of agricultural uses after cable-trenching.

Land use impacts involving Launch Facility sites and transporter erector road modifications are both negligible and not significant in the short and long term.

Quantity Distance zone impacts are low in the short and long term, and not significant since restrictions on residential land use will not change the overall agricultural character of the area.

Urban land use impacts in Cheyenne and Kimball are low in the short and long term due to the potential for an underutilization of developed land following peak demand. They are not significant in either the short or long term.

3.1.10.5.2 Aggregation of Elements, Impacts, and Significance

Figure 3.0-1 presents the aggregation of impacts for Land Use as a whole. The aggregated rating for Land Use overall is low at the local level in both the short and long term. Impacts are not significant in the short or long term. At the site level, impacts are low for the cable routes and Quantity Distance zones, and negligible for the Launch Facilities and transporter erector road modifications. They drop to negligible in the long term for all aspects except the Quantity Distance zones, where they remain low due to restriction of residential uses. No impacts are significant at the site level.

This overall rating has been reached through a qualitative averaging of the element and subelement ratings given in Figure 3.1.10-1. The potential for underutilization of developed land, which usually creates a fiscal burden on local government and on the local taxpayer, creates a low, not significant impact. Increased housing demand may have a potential long-term beneficial effect by creating infill of vacant lots.

3.1.10.5.3 Alternatives Matrix

The preferred cable routes will all have low impacts due to the temporary interruption of agricultural land use. Approximately 127 acres of agricultural land will be temporarily affected, not enough to change the character of the area.

FIGURE 3.1.10-1

LAND USE SUMMARY IMPACT MATRIX

LEGEND		ADVERSE IMPACTS	SIGNIFICANT ADVERSE IMPACTS
LEVEL OF IMPACT*	LOW	o	●
	MODERATE	○	●
	HIGH	◯	●
POTENTIAL BENEFICIAL EFFECTS		▒	

* MEASURE OF THE AMOUNT OF ENVIRONMENTAL CHANGE

	PROJECT IMPACTS					
	SHORT TERM			LONG TERM		
	SITE	LOCAL	REGIONAL	SITE	LOCAL	REGIONAL
LAND USE	o	o		o	▒ o ▒	
URBAN LAND USE						
Cheyenne, Wyoming		o			o	
Kimball, Nebraska		o			o	
RURAL LAND USE						
Cable Routes	o					
Launch Facility Sites						
Transporter Erector Road Modification						
Quantity Distance Zones	o			o		

The five alternative cable routes will have the same overall ratings as the preferred action, but could potentially affect more agricultural land - approximately 375 acres - but still not enough to affect the character of the area. Route PA2 will have a negligible impact since it follows an existing road right-of-way.

Impacts resulting from the R1 and R2 alternative road configurations will be negligible, short term, and not significant since they will involve roadway realignment or bridge-lowering only. Alternative R3 will have a low short and long-term impact due to the requirement for a new interchange which could be underutilized. The impact is not significant.

The staging area alternatives will have a negligible and not significant impact if designed for temporary use and located in industrially zoned areas.

3.1.10.6 Mitigation Measures

3.1.10.6.1 Urban Land Use and Planning

Mitigation measures in addition to standard assumed Air Force mitigations are listed for consideration below. Each measure identifies the party responsible to implement, but not necessarily to pay for, the measure.

- A temporary project worker facility should be considered in order to alleviate the high demand for mobile homes by the inmigrant and weekly commuting construction workers. Consideration should also be given to the reuse of such a facility, thereby deriving a longer economic life than usually expected. This would also prevent a long-term overbuilt condition for mobile homes.

- Development of a program to monitor land use and demographic change (local officials and Air Force).

- implementation of local annexation, infill, and development policies would encourage orderly land development and could reduce the oversupply of vacant lots in single-family subdivisions (local authorities).

- Cooperative community planning and communication by project representatives, government agencies, and community groups (Air Force and local authorities).

- Approval of mobile home park development plans designed as temporary facilities to house project employees should be contingent upon a commitment by the builder to reclaim the park for an alternative use within 6 months following the end of project construction (local authorities).

3.1.10.6.2 Rural Land Use

The mitigation measures for rural land use could be implemented by USAF and its contractors and include the following:

- o Schedule cable laying through sensitive cropland after harvest and before planting periods whenever possible to minimize crop damage.

- o Minimize the placement of cables through irrigated cropland, especially center pivot systems.

- o Preserve the integrity of the strip-cropping dry farming technique by laying cables parallel to and not across active/fallow strip-cropping systems whenever possible.

- o Locate cable routes away from watering holes, mineral blocks, and other locations on grazing lands where livestock tend to concentrate.

- o Minimize obstructed access to adjacent farms, ranches, and fields during project construction activities.

3.1.10.7 Unavoidable Adverse Impacts

There are no unavoidable adverse impacts on urban or rural land use. There are no irreversible or irretrievable commitments of resources in either the short or long term.

3.1.11 Recreation

3.1.11.1 Introduction

This section describes the impacts of the Proposed Action on both regional and local recreation. A description of the criteria used to classify impacts and determine their significance is contained in the following sections.

The Area of Concentrated Study for the regional recreation analysis was determined from conversations with federal and state recreation planners, as well as from available visitation data pertaining to visitor origins. It was concluded from these sources that the majority of recreational participation originating in Cheyenne occurs within the Wyoming counties of Laramie, Albany, Platte, Goshen, and Carbon. It was also ascertained that Wyoming residents generally do not travel to Colorado or Nebraska recreational areas for most activities.

The Area of Concentrated Study for local recreation, which includes the Cheyenne Urban Area and the city of Kimball, accounts for those areas which are anticipated to experience the highest levels of population influx.

3.1.11.2 Definitions of Levels of Impact

3.1.11.2.1 Regional Recreation

Levels of impact definitions for regional recreational areas are based on changes in the perceived quality of the recreational experience at those areas. The changes in perceived quality are, in turn, directly associated with project-related increases in population (i.e., recreational participation demand) and the relative ability of recreational areas to absorb these increases. Problems such as overcrowding, activity conflicts, traffic congestion, littering, loss of serenity, etc., are all directly linked to increases in visitation and can result in declines in perceived quality of the recreational experience.

The levels of impact associated with regional recreation are:

- Negligible Impact - Will result in immeasurable, minimal, or no effects on the perceived quality of the recreational experience.
- Low Impact - Will result in increased visitation pressure but without a noticeable decline in perceived quality of the recreational experience.
- Moderate Impact - Will result in an occasional noticeable decline in perceived quality of the recreational experience.
- High Impact - Will result in a frequent noticeable decline in perceived quality of the recreational experience.

3.1.11.2.2 Local Recreation

Local recreation impacts are defined in terms of the additional incremental load on parkland, recreational facilities, and staffing over projected baseline conditions.

The level of impact definitions for local recreation are:

- o Negligible Impact - Will result in minor impacts not requiring any new parkland, facilities, or staffing above projected baseline values. No capital expenditures or increases in operations or maintenance costs will be required.

- o Low Impact - Will result in impacts not requiring any additional parkland, facilities, or staff. No capital expenditures will be required, but there will be increased operations and maintenance costs.

- o Moderate Impact - Will result in impacts requiring redesign of existing parkland, additional part-time staff, or upgrading of existing facilities. Capital expenditures will be required for upgrading parks and/or facilities, as well as increased operations and maintenance costs.

- o High Impact - Will result in impacts requiring the construction or purchase of new facilities, additional full-time staff, or the purchase of additional parkland. Capital expenditures will be required for acquisition or development of parkland and/or facilities, in addition to increased operations and maintenance costs.

3.1.11.3 Determination of Significance Criteria

Significance is a function of the level of impact and its interaction within the context in which the impact occurs. For recreation, any one or a combination of the following could determine significance:

- o Whether the impact affects public health or safety;

- o Whether the impact is likely to be highly controversial;

- o Whether the action and its impact may establish a precedent for future actions with significant effects or represent a decision in principle about a future consideration or policy;

- o Whether the action or its impact challenges or threatens the violation of some federal, state, or local law or requirements imposed for the protection of the environment; and

- o Whether institutional response to the impact will need to be extensive.

3.1.11.3.1 Regional Recreation

For regional recreation, an impact is significant if public health or safety is affected. Safety is related to the potential for injury to oneself or others in overcrowded

situations which may create unsafe conditions. These conditions occur when space is limited for an activity and there is too much demand for that space, or when the same space is used for conflicting activities.

3.1.11.3.2 Local Recreation

The determination of whether an impact within the overall local parks and recreation system will be considered significant is based on the ability of the system to provide recreational opportunities at levels that do not fall below existing conditions and/or threshold standards. An impact which will have little or no effect on the ability of institutions to provide services at an existing or standard level will be considered not significant. It would be significant if major agency responses such as raising taxes or floating a bond issue were required to respond to identified need.

3.1.11.4 Environmental Impacts of the Proposed Action and Project Alternatives

For the regional recreation analysis, existing levels of use at recreational areas within the Area of Concentrated Study and Region of Influence are assumed to continue under the No Action scenario. However, due to data unit inconsistencies (e.g., activity-days vs. visitor-days) that exist between various sets of data, statistical manipulation was required to present all estimates in comparable terms. Activity-day units were selected for defining baseline visitation values.

It was assumed for the Proposed Action analysis that the inmigrant population will participate in various recreational activities at the existing per capita rates calculated from the Wyoming State Comprehensive Outdoor Recreation Plan. On that basis, it was possible to estimate total recreation demand, by activity, that will be generated by project-induced population in Cheyenne. A computerized gravity model was used to allocate total induced participation pressure, by activity, to the individual recreational areas within the Region of Influence.

For the local recreation analysis, adopted state and national standards, and existing ratios were applied to baseline and projected impact population figures for Cheyenne and Kimball to determine whether improvements or additions to existing recreation systems were necessary. It was assumed that recreation participation is, for the most part, directly proportional to growth in population, and that the inmigrant population will recreate at the same level as current urban residents.

3.1.11.4.1 Regional Recreation

3.1.11.4.1.1 Baseline Future - No Action Alternative

In terms of activity days, Medicine Bow National Forest will exceed all other recreational areas in the Area of Concentrated Study by a ratio of 2.5 to 1.0 under assumed baseline conditions. The Medicine Bow Unit of the Forest will remain the most utilized area for all activities. Wyoming state parks, especially Glendo, will continue to have a relatively high level of utilization, while activity-days

of use at most Wyoming game and fish areas will continue to be low (with the exception of Lake Hattie, Twin Buttes Reservoir, and Wheatland Reservoir No. 3). Sloans Lake will also continue to be popular at a local level.

3.1.11.4.1.2 Proposed Action

Since the forecast increase over baseline in the project peak year is approximately four times larger than in the settlement year, only the impacts occurring during the peak year are described. Long-term impacts are generally low and not significant.

Within the Area of Concentrated Study, the greatest absolute increase in recreational pressure attributable to project-induced population in Cheyenne will occur at Medicine Bow National Forest. More than half of this increase is expected to occur at the Pole Mountain Unit due to its proximity to Cheyenne, while most of the remaining increase occurs at the Medicine Bow Unit. Hunting experiences the greatest increase in pressure at both Forest units with increases of 11.1 and 3.2 percent over baseline at Pole Mountain and Medicine Bow, respectively. Percentages are intended to indicate order of magnitude.

Other activities anticipated to experience increases over baseline use at the Pole Mountain Unit are snowmobiling/cross-country skiing (4.9 percent), fishing (4.6 percent), hiking/horseback riding (4 percent), picnicking (3.2 percent), and camping (2.4 percent). The percentage increases in pressure for these same activities at the Medicine Bow Unit are considerably lower, ranging from less than 1 percent to 1.4 percent. These increases will have a low, not significant impact on the quality of the recreational experience during the short term since many of the developed areas within the Forest are below capacity much of the year.

Of the three state parks within the Area of Concentrated Study, Curt Gowdy is expected to receive the greatest increase in visitation, since it is closest to Cheyenne. The percentage increases in participation pressure over baseline use are relatively high for all activities: fishing (8.8 percent), hiking/horseback riding (7.5 percent), boating (7.4 percent), picnicking (6.0 percent), and camping (4.5 percent). These increases are considerably lower at Glendo and Guernsey with the greatest increases occurring in swimming (2.8 percent and 2.9 percent, respectively). Since all three areas are virtually at capacity during peak holiday weekends, increases are likely to result in additional demand during the project peak year, creating a moderate and significant impact, because there would occasionally be noticeable declines in the perceived quality of the recreational experience.

Only five of the game and fish areas within the Area of Concentrated Study are expected to receive recreation pressure increases of greater than 200 activity-days during the peak year. These include Lake Hattie, Twin Buttes Reservoir, Springer Wildlife Unit, Wheatland Reservoir No. 3, and Meeboer Lake. With the exception of Springer Wildlife Unit, the largest absolute increase in activity pressure at each area occurs in fishing. The low increases at most of these areas result in a negligible to not significant impact.

Of the other areas within the Area of Concentrated Study, the one expected to receive the most increased recreation pressure from projectrelated population settlement in Cheyenne is Sloans Lake. Most of that pressure is related to swimming, since this resource provides the city with its closest outdoor swimming opportunity. The 7.7-percent increase projected for that activity during the peak year is likely to magnify already crowded conditions at the beach, thereby causing a moderate and significant impact. Impacts are considered significant because they aggravate a situation already identified as a problem. Areas that are currently overcrowded cannot accommodate additional recreational use without causing competition for space for conflicting activities or overuse for the same activity, thereby creating a potential hazard to public safety.

3.1.11.4.2 Local Recreation

3.1.11.4.2.1 Baseline Future - No Action Alternative

Both participation rates and usage patterns are expected to continue at their present rates for the foreseeable future. Baseline forecasts for the Cheyenne Urban Area show population increases of 6,063 people or slightly less than 10 percent from 1983 to 1990. The largest increase is 868 people, which occurs between 1985 and 1986. Cheyenne will have sufficient parkland to see it through this period, although the City will need some additional facilities and staff. Based on national standards, Cheyenne will need to increase its recreation staff by approximately 10 percent and construct additional softball, baseball, tennis, and volleyball facilities. Kimball, on the other hand, should feel no pressures on its existing system since its population is expected to decline during this period.

3.1.11.4.2.2 Proposed Action

Cheyenne's project-related population forecast for the peak year (1987) is 3,781. This number decreases to less than 950 by the settlement year (1990). For this reason the majority of the Proposed Action discussion concerns itself with peak-year conditions. Since project-related population increases are concentrated in approximately 8 years, long-term impacts are expected to be low and not significant.

The majority of local recreation impacts in Cheyenne occur because certain facility undersupplies currently exist in the system. The City will have sufficient parkland throughout the construction period. Total parkland demand is 340 acres during the peak year and Cheyenne has an existing base of 345.5 acres. It is expected, however, that up to 60 percent of the inmigrant population might settle in South Cheyenne, creating a demand for 11.3 acres of parkland within that community. In the short term, this is a high and significant impact because it will require extensive institutional response. Extensive is defined to mean that funding outside of normal budgetary processes that would be required to respond to the need and would include such measures as raising taxes, floating a bond issue, or creating special assessment districts.

Peak year staffing demand will require an additional 5.2 persons beyond baseline need. Impact demand will decrease to 2.6 additional staff persons in 1988 and 1.3 in 1990. These staff shortages could be dealt with by creating additional part-time positions during periods of high demand. This short-term impact will be moderate and not significant.

Cheyenne's recreation facilities will receive increased pressure from inmigrant population. During the peak year there will be a temporary demand for additional baseball (one field), softball (one field), volleyball (one court), and tennis (two courts) facilities. As with staffing, this demand will decrease by 50 percent the following year and will decline to 25 percent of peak-year demand by 1990. This short-term impact will be moderate and significant because it will require an extensive fiscal response of the same nature as that required for parkland.

Kimball's population is not expected to change dramatically from its current level over the course of the next 8 years. Project development will produce modest population increases (119) over the 3-year peak period (1987-1989). This temporary and slight increase will most likely be considered an asset to Kimball, due to its declining tax base. The population increase associated with the project will not create demand for services beyond those already provided within the community. Both short and long-term impacts would be negligible and not significant.

3.1.11.4.3 Consideration of Alternatives

Since alternative staging areas, roads, and cable system routes do not affect parkland or recreational facilities, no impacts on recreation are anticipated due to the alternatives.

3.1.11.5 Summary of Impacts

3.1.11.5.1 Explanation of Detailed Impact Matrix

The impact level and significance matrix for Recreation (Figure 3.1.11-1) shows that there will be a moderate and significant impact on both local and regional recreation systems during the short term. The impact on both systems is low and not significant over the long term.

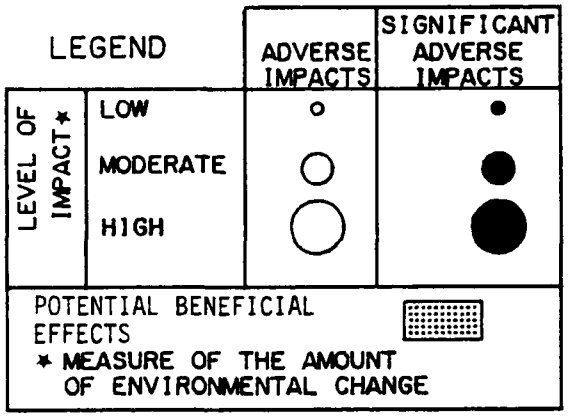
3.1.11.5.2 Aggregation of Elements, Impacts, and Significance

Figure 3.0-1 presents the aggregation of impacts for Recreation as a whole. The aggregated rating for the overall resource is moderate and significant at both the local and regional levels in the short term, and low and not significant in the long term. The site level is not relevant to recreation.

This overall rating has been reached through a professionally judged, qualitative averaging of the two subelements comprising the Recreation resource. The subelement ratings are found in Figure 3.1.11-1.

FIGURE 3.1.11-1

RECREATION SUMMARY IMPACT MATRIX



	PROJECT IMPACTS					
	SHORT TERM			LONG TERM		
	SITE	LOCAL	REGIONAL	SITE	LOCAL	REGIONAL
RECREATION		●	●		o	o
Regional Recreation		●	●		o	o
Quality of Recreational Experience		●	●		o	o
Local Recreation		●			o	
Parkland		⬤			o	
Staffing		○			o	
Facilities		●			o	

Under the regional heading of the matrix, the level and significance of impacts are based entirely on the regional recreation analysis. However, under the local column, the determination depends on the results of both the regional and local analysis since Sloans Lake is both a local facility and a regional resource-based facility.

Impacts at the regional level are moderate because there are already facilities that virtually reach peak capacity on certain seasonal and holiday weekends and any additional use exacerbates an existing overcrowded situation thereby contributing to a noticeable decline in the perceived quality of the recreational experience. Moderate impacts are significant because additional recreational demand contributes to a competition for space among conflicting activities or overuse for the same activity, thus creating a potential hazard to public safety.

Local recreation comprises three components: parkland, facilities, and staff. Impacts to parkland are judged high and significant, to recreation facilities moderate and significant, and to staff moderate and not significant. The high determination is localized to the need for additional parkland in certain Cheyenne neighborhoods only and not to the city as a whole. Therefore, an overall rating of moderate is more representative of the potential impacts. The significance determination is related to the need for an extensive fiscal response on the part of local government to provide additional parkland or recreation facilities. The need for additional staff is not deemed to require a major financial outlay and is, therefore, not significant.

3.1.11.6 Mitigation Measures

3.1.11.6.1 *Regional Recreation*

Mitigation measures are designed to eliminate or minimize the problems associated with increased visitation at regional recreation areas. In addition to standard assumed Air Force mitigations, other mitigation measures are listed for consideration below. Each measure identifies the party responsible to implement, but not necessarily to pay for, the measure.

- Implement an environmental awareness program to educate the population about problems associated with poaching, illegal fishing, vandalism, violations of park regulations, off-road vehicle abuse, etc. (Air Force contractor).

- Work with the Wyoming Recreation Commission to develop techniques to protect against long-term camping at nearby recreational areas (Air Force contractor).

- Implement a monitoring program to continue throughout the project construction period to assess changes in conditions at major recreational areas in the region (state and federal agencies).

- Develop management techniques to control the numbers of people entering already overcrowded facilities (state and federal agencies).

3.1.11.6.2 Local Recreation

- Adopt an incremental fee structure for programs and classes (Cheyenne Parks and Recreation Department);
- Analyze facility utilization to determine whether rescheduling or minor upgrading (e.g., lighting ballfields) might ease impacts (Cheyenne Parks and Recreation Department);
- Develop group of volunteers to assist paid staff and institute training programs (Cheyenne Parks and Recreation Department);
- Develop short-term recreational programs for the inmigrant population (USAF contractor and Greater Cheyenne Recreation Commission); and
- Consider use of special recreation districts for county areas developed for inmigrant population (Laramie County Recreation Planning Advisory Committee and Greater Cheyenne Recreation Commission).

3.1.11.7 Unavoidable Adverse Impacts

There are no unavoidable adverse impacts on recreational resources.

3.1.12 Cultural and Paleontological Resources

3.1.12.1 Introduction

This section describes the impacts of the Proposed Action on prehistoric, historic, American Indian, and paleontological resources. A description of the criteria used to classify impacts and to determine their significance is presented with a general discussion of the procedures employed in their estimation. Following this introductory section, the level, significance, duration, and scope of major anticipated impacts are provided for each resource element. Both the No Action and Proposed Action alternatives are considered. Information obtained from such detailed impact analyses is summarized and aggregated to the element level preparatory to the proposing of mitigation measures that would minimize expected adverse impacts while maximizing potential benefits. The section concludes with a consideration of unavoidable adverse impacts.

As noted in Section 2.1.12.1.1, two separate geographic areas are distinguished for the purpose of identifying and categorizing impacts to cultural and paleontological resources: 1) an Area of Concentrated Study within which measurable effects may accrue directly from project-related actions; and 2) a Region of Influence, a larger area that is exclusive of the Area of Concentrated Study in which measurable effects may accrue indirectly from project-related activities. The recognition of a separate Area of Concentrated Study and Region of Influence is tied to the kinds and locations of impacts expected as a consequence of project implementation. Specification of an Area of Concentrated Study and the effects that will occur within it are totally dependent upon facilities siting decisions associated with the Proposed Action. Maintenance of a division between Region of Influence and Area of Concentrated Study is justified because the nature and importance of impacts expected within each area are appreciably different, as will be potential mitigation measures.

3.1.12.2 Definition of Levels of Impact

The level of impact to Cultural and Paleontological Resources is a measure of the degree to which changes in existing resource conditions can be anticipated from proposed project actions. Given that specification of impact level in any absolute sense requires far greater knowledge of resources than is currently available, treatment of this topic must be restricted to its qualitative implications.

Viewing cultural and paleontological resources within the affected areas as a whole, four criteria are specified that address potential levels of impact. These are framed as a series of questions:

1) Does that portion of the Area of Concentrated Study/Region of Influence affected by a particular proposed action contain, or is it expected to contain, cultural or paleontological resources?

2) Will baseline conditions identified for existing or expected resources be affected by the Proposed Action?

3) Have these resources been determined to have important scientific or humanistic qualities?

4) Is the loss or gain of information or value, if any, resulting from project-related activities expected to be: a) minimal, b) limited, or c) extensive?

Answers to the above questions may be derived from currently available information or reasoned extrapolation from baseline data. In addition, these criteria are in accord with those promulgated in existing statutory guidelines (e.g., 36 CFR 800 and 36 CFR 60).

The level of impact associated with any element of Cultural or Paleontological Resources is established according to the following qualitative rankings:

- Negligible Impact:
  - Where the response to questions 1, 2, 3, and 4 is no;
  - Where the response to question 1 is yes and the response to questions 2, 3, and 4 is no; or
  - Where the response to questions 1 and 2 is yes and the response to questions 3 and 4 is no.
- Low Impact - Where the response to questions 1, 2, 3, and 4(a) is yes;
- Moderate Impact - Where the response to questions 1, 2, 3, and 4(b) is yes; and
- High Impact - Where the response to questions 1, 2, 3, and 4(c) is yes.

It should be apparent from the material presented above that the determination of level of impact as defined here entails a linked evaluative process. The key elements in the proposed procedure for level of impact determinations are the specification of criteria 3 and 4. Depending upon characterizations of the degree of loss or gain of scientific and humanistic values to particular resources, level of impact will be ranked negligible, low, moderate, or high.

Due to the current lack of a comprehensive resource inventory within the Region of Influence and Area of Concentrated Study, it is not possible at this time to identify all properties that will be affected by project-related activities. Similarly, it is impossible to determine in advance the exact nature and spatial extent of such anticipated impacts. Consequently, estimation of the degree of expected loss or gain of important scientific or humanistic qualities at a given resource

locality must be based almost exclusively on professional judgment. As further data to predict the precise numbers, kinds, and conditions of resources subject to direct or indirect project effects become available, level of impact determinations will become increasingly more objective and resultant assessments will be incorporated into the resource management process.

In addition to considering level of impact, predictions of project-related impacts on cultural and paleontological resources involve evaluating the type, duration, and scope of impacts to each major resource element and subelement. For both cultural and paleontological resources, impacts might be either direct or indirect. Direct impacts result from disturbances occurring during project planning, design, construction, and operation that result in modifications to the landscape. Indirect impacts are those induced by, but not directly the product of, project planning, construction, and operation. For example, induced development and increased usage of public recreation facilities will likely result in impacts to resources through related increases in vandalism, looting, and artifact collecting. The magnitude of indirect impacts generally is dependent upon the rate of population increase and the demographics of the resultant population.

Impacts may be classified as beneficial or adverse. Beneficial effects result in enhancement of the qualities of a resource that give it significance. These could include restoration of historic buildings for appropriate reuse or recovery of scientific data from archaeological sites that otherwise will be lost. Adverse impacts result in the loss or alteration of the qualities of a resource that give it scientific or humanistic value (cf., 36 CFR 800.3.)

Duration of impacts can be classified as short term or long term. Short-term impacts are direct or indirect effects occurring during the period of project construction when ground disturbance and population levels will be at their maximum. Long-term impacts consist of those direct or indirect effects occurring as a consequence of project operations.

Scope of impacts refers to the geographic area within which project-related effects are perceived or predicted. For purposes of the current analysis, three areal scales are recognized: 1) site, referring to the Area of Concentrated Study; 2) local, encompassing historic districts, parks, and cultural conservancies proximal to the project area; and 3) regional, constituting the remaining area included in the Region of Influence.

3.1.12.3 Determination of Significance Criteria

The significance of impacts to cultural and paleontological resources is a measure of the relative importance of the impact in terms of the quality of human existence. In this context and in accordance with 36 CFR 800.3 and 40 CRF 1508.27, significant impacts are those that have beneficial or adverse effects on those qualities that make a cultural resource eligible for the National Register of Historic Places. Similarly, significant impacts to paleontological resources are those that have beneficial or adverse effects on the scientific significance of the resource. Conversely, impacts that are not significant are those that have no effect on a Register-eligible property. Although any loss of humanistic or scientific values/integrity is inherently

detrimental to the resource base, the Air Force is required to assess adverse effects only for cultural resources that have been determined to be eligible to the National Register of Historic Places (36 CFR 60.6).

Air Force management policy for cultural resources stresses avoidance of adverse impacts. Nevertheless, it is assumed that, regardless of the best efforts during project planning and design, unavoidable adverse impacts to cultural and paleontological resources will result from its implementation. The degree to which this holds true is wholly dependent on the siting of specific project elements.

3.1.12.4 Environmental Impacts of the Proposed Action and Project Alternatives

Certain fundamental assumptions are incorporated into the analysis of direct and indirect impacts expected to result from project-related actions. These may be listed as follows:

- It is assumed that existing resource inventory data, which probably represent less than 1 percent areal coverage of the Region of Influence, provide a reasonable approximation of the kinds of resources occurring throughout the area.

- It is assumed that currently unrecorded or unevaluated resources exist within the Region of Influence that possess important scientific and/or humanistic values.

- It is assumed that ongoing natural and human factors affecting current baseline conditions (e.g., wind and water-prompted erosion or common agricultural practices) will remain relatively unchanged for the foreseeable future.

- It is assumed that the Air Force will establish a program for resource management that complies with applicable federal and state laws and regulations. Such a comprehensive resource management plan will establish:

  - Methods for inventory of all cultural and paleontological resources potentially directly affected by proposed actions;

  - Procedures for evaluating cultural resources for National Register of Historic Places eligibility in accordance with the criteria established in 36 CFR 60.6;

  - Measures for mitigation of adverse impacts to Register-eligible resources;

  - Procedures for monitoring and managing Register-eligible resources; and

- Procedures for implementing and coordinating the measures listed above.

The analysis and specification of potential impacts to cultural and paleontological resources involved projecting known and anticipated project-induced landscape-altering processes onto existing baseline conditions and applying the criteria outlined in Sections 3.1.12.2 and 3.1.12.3 to establish level and significance of impacts. All recorded sites were plotted onto standard topographic sheets to provide a common basis from which to characterize resource dispersions. Information regarding the content, age, and environmental setting of all sites/localities for a given resource element were used to generate qualitative estimates of potential site densities for areas that currently lack direct resource inventory data. Both known and projected resource density estimates were then compared against the individual aspects of the Proposed Action (e.g., facilities construction at F.E. Warren AFB) to estimate the numbers and kinds of sites/localities potentially subject to direct or indirect project effects.

In the sections that follow, the results of these analyses are presented for both the No Action and Proposed Action and its alternatives. These analyses lead to the conclusion that the Proposed Action should have no significant adverse impacts to cultural and paleontological resources. In the case of American Indian and paleontological resources, this determination is based on an absence of any known sites or localities in areas subject to direct project impacts and the low likelihood of encountering such resources. Consequently, in accordance with 40 CFR 1501.7(a)(3), detailed consideration of impact analyses and results for these two resource elements is not included in this document; however, such an account is provided in the environmental planning technical report for the project. In the case of prehistoric and historic cultural resources, the determination of no significant adverse impacts is predicated on the assumption that a comprehensive resource management plan will be developed and implemented and that mitigation measures will be adopted to avoid or ameliorate potential adverse impacts to Register-eligible resources, which should allow the Air Force to seek and obtain a determination of "no adverse effect" from the Advisory Council on Historic Preservation in accordance with 36 CFR 800.

3.1.12.4.1 Prehistoric Cultural Resources

3.1.12.4.1.1 Baseline Future - No Action Alternative

Impacts to prehistoric cultural resources within the Region of Influence and Area of Concentrated Study occur from a variety of natural and manmade causes. Although most trends mentioned here will result in an overall loss of resource values, certain actions may have beneficial effects. At the same time, currently available information does not permit identification of specific resource sites subject to such impacts, and much of this narrative is necessarily generic in scope and content.

Perhaps the single most important impact to the existing resource base is ongoing natural erosion/decay that affects all physical properties exposed to the environment. This process is expected to continue into the future at a fairly uniform rate, and over the long term, will significantly diminish the scientific and/or humanistic value of the resource.

Both short and long-term degradation of the resource also will result from current and projected regional land use patterns. Housing construction, industrial and urban development, recreational use, agricultural practices, and the like all may contribute to the loss of heritage values. Population projections indicate that significant increases can be expected in the number of people inhabiting the region, and therefore, resource sites likely will be altered or destroyed at an increasing rate during the next few decades.

Ongoing and proposed construction of new facilities and modifications to existing structures at F.E. Warren AFB could cause adverse impacts to both known and unknown prehistoric resources. A recently completed archaeological inventory of selected portions of the base recorded eight prehistoric sites within a relatively small area; therefore, it is concluded that virtually any ground-disturbing activity has the potential for encountering additional prehistoric remains.

It is anticipated that existing federal, state, and local statutes affording protection to significant prehistoric resources will continue to be in force for the foreseeable future and even may be expanded in scope and authority. These protective measures may be viewed as a beneficial effect in that they serve to avert adverse impacts that would otherwise occur if no such measures existed. In this same respect, negotiations are currently underway to develop a Memorandum of Agreement between the Air Force, the Advisory Council on Historic Preservation, and the Wyoming State Historic Preservation Office that will provide for comprehensive management of all cultural resources at F.E. Warren AFB. The establishment of such an agreement, which is not contingent upon the Proposed Action, would require that heritage concerns are addressed in base planning efforts and this, in turn, would reduce the level of impact associated with future facilities siting and construction.

3.1.12.4.1.2 Proposed Action

Direct project-induced impacts potentially affecting important prehistoric cultural resources will occur as a result of several ground-disturbing activities required by the assembly, deployment, and operation of the Peacekeeper missile system. In the paragraphs that follow, these impacts are described for each major component of the Proposed Action.

Construction of support facilities at F.E. Warren AFB will result in low to moderate, short and long-term impacts to resources located in the immediate vicinity of proposed construction sites. Proposed onbase facilities construction will involve above-ground modifications to existing structures or new construction in areas that have witnessed prior disturbance, and negligible impacts are expected from these activities. On the other hand, construction of a new Stage Storage Area and proposed additions to the Weapons Storage Area will involve substantial

new ground disturbance in areas that may contain buried prehistoric sites. Nevertheless, an overall low level of impact has been assigned to this aspect of the Proposed Action because prior resource inventory did not identify any surface-evident remains and there is a relatively low potential for finding extant buried cultural deposits in these particular areas. Long-term impacts could occur in areas away from building sites due to artifact collection by base personnel, but these are given an overall low level of impact rating.

Construction activities associated with modifying existing Minuteman Launch Facilities will result in negligible, short-term impacts at the silos and in adjacent areas. The negligible impact rating at the level of site is based on the results of onsite reconnaissance of all proposed Launch Facilities. This inventory program recorded the presence of only a single archaeological site at the silos. This site appears to have been largely destroyed as a result of construction activities associated with Minuteman deployment at this Launch Facility. At the same time, areas adjacent to silos may contain important resources that could incur adverse impacts if construction crews (short term) and security patrols (long term) engage in artifact collecting or other actions that alter cultural associations. The level of impact attributed to these actions is rated as negligible, however, because it is anticipated that most personnel will confine their activities to those areas within the existing fence at each silo.

Preliminary reconnaissance inventory of Defense Access Roads requiring upgrading indicates that several links along these existing rights-of-way are within archaeologically sensitive areas and may well intersect prehistoric sites. Therefore, construction-related disturbances could result in moderate, short-term and low, long-term impacts at the site level. Onsite inventory will be necessary to locate and evaluate resources potentially subject to such impacts.

The proposed alternatives (R_1, R_2, and R_3) for stage transporter routes that would service F.E. Warren AFB are characterized by moderate short-term and low long-term impacts at the site level. Previous inventory at the base identified at least two loci of prehistoric activity that might be affected by construction or long-term artifact predation. Although one of the alternatives (R_3) will affect fewer known resources and another (R_2) traverses more areas that are archaeologically sensitive, no alternative has been surveyed in its entirety, and thus each has the potential for containing Register-eligible cultural properties.

Anticipated impacts associated with any of the proposed construction staging alternatives will be low to negligible, depending upon the number and sizes of areas involved, and of short-term duration. Given that these facilities will be temporary structures used only during the period of deployment, impacts mainly will be of short-term duration at each staging facility site. The F.E. Warren AFB - Cheyenne - Kimball staging option has a slightly higher potential level of impact than the F.E. Warren AFB - Cheyenne alternative; however, the difference is not great enough to warrant different level of impact rankings. The No Staging Area alternative will have negligible impact on the resource.

Ten alternative paths have been proposed for the cable system that will cross-link the system's missile Launch Facilities. Five of these rights-of-way ultimately will be selected for construction. Six of the ten alternatives consist, in part, of 1-mile wide corridors within which a particular easement will be chosen. Two alignments have existing cable. All ten alternatives pass close to known sites or through archaeologically sensitive areas (e.g., floodplains and terraces). Given that construction will involve digging a trench along a proscribed right-of-way, severe localized disturbance will occur at any intersected site. In view of these baseline conditions, the level of impact for all proposed alternatives is rated as moderate to high in the short term and low in the long term at the site level.

Moderate short-term impacts at the regional level are anticipated in areas outside the Area of Concentrated Study as a consequence of project-induced population increases and altered land use. In addition, low long-term impacts are expected at the site and regional levels. The kinds of effects resulting from these indirect changes will parallel those already described in Section 3.1.12.4.1.1.

3.1.12.4.2 Historic Cultural Resources

3.1.12.4.2.1 Baseline Future - No Action Alternative

Future impacts to historic cultural resources will occur as a consequence of various natural and cultural agencies. Most of these anticipated long-term impacts will have adverse impacts on cultural values, yet certain actions also may be beneficial. Although available information in a majority of cases does not allow identification of specific resource sites subject to baseline future trends, specific impacts are discussed where they are known.

Long-term loss of humanistic and scientific values can be expected to occur throughout the Region of Influence as a consequence of natural agencies such as erosion and decay, depending upon resource location (e.g., proximity to active erosion areas along water courses) and current condition. Unattended and abandoned structures/areas will suffer greater impacts than those that are occupied and/or managed.

Long and short-term changes attributable to human agency are likely to be greater than those due to natural causes. Current rural and urban land use practices and anticipated future changes in regional demographics will exert a variety of effects on baseline conditions.

Rural areas contain historic resources that are more subtle in nature and may reflect different cultural themes than those in urban areas. Structures tend to represent developmental trends in agricultural and ranching architecture or use patterns. Most are situated on private lands that are subject to county ordinances and tend to lack the emotional appeal of urban structures. Funding for preservation programs is difficult to obtain, as is protection from vandals and collectors. The general decline in farming within the region has and will continue to result in increased abandonment of farm houses and outbuildings that may have historic significance.

Historic resources located within the region's cities and towns generally are standing structures. Although vulnerable to modification and/or destruction as a result of urban renewal programs, fire, vandalism, pollution, and urban blight, these resources also tend to have high visibility and often have been accorded some measure of protection through any of a variety of management programs ranging from tax incentives and block grants for restoration to municipal zoning variances. Several communities in the region (e.g., Torrington, Greeley, and Fort Collins) have taken active measures to identify and/or protect historic properties within their jurisdictions, and this trend is expected to gain further momentum in the future.

The F.E. Warren Historic District/National Historic Landmark, encompassing nearly 100 individual historic structures, will continue to be used as a military installation and will be subject to potential direct and indirect impacts from new construction and adaptive reuse of existing structures. While these impacts could have important short and long-term consequences for the District's integrity, steps currently are being taken to provide for future comprehensive base planning that will emphasize preservation and enhancement of architectural and archaeological values. While some loss of scientific and humanistic values is inevitable, adherence to existing and proposed preservation policies should ensure the continued existence of this unique cultural property.

3.1.12.4.2.2 Proposed Action

Direct project-induced impacts potentially affecting important historic cultural resources will occur as a result of several of the activities involved in assembly, deployment, and operation. Given that anticipated impacts to historic resources to a large degree parallel those noted in discussions of the prehistoric resource element, treatment is briefer and emphasizes those aspects of the Proposed Action that would have measurable net effects to the existing baseline.

Construction of support facilities at F.E. Warren AFB and activities associated with modifying Minuteman Launch Facilities for project operations are expected to result in moderate to high, short-term impacts to resources located within areas of proposed construction. At F.E. Warren AFB, project-related modifications to historic structures necessary to provide support facilities for project operations will affect interior and exterior characteristics of buildings currently listed on the National Register of Historic Places. In addition, there is a high likelihood of encountering buried historic archaeological remains along proposed utilities corridors that would service project-related facilities. Consequently, high short-term and low long-term impacts are expected at the site level. Although Launch Facilities modifications will not directly affect historic properties, several silos are known to have buildings in the vicinity that may require relocation or abandonment for safety considerations. Given that some of these structures may have important historic values that will be affected by their physical modification, short-term impacts are rated moderate at the site level and long-term impacts are rated low.

Anticipated modifications to Defense Access Roads used to transport missile components between the Operating Base and the Launch Facilities could potentially affect approximately 20 structures along existing rights-of-way. Although none of these structures has been evaluated in terms of National Register of Historic Places eligibility criteria, they must be considered potentially eligible pending definitive study. At the same time, it is anticipated that proposed roadway modifications will not require removal or alteration of the overwhelming majority of such structures and impact potential is accordingly rated low at the site level over both the short and long terms.

The proposed alternatives (R_1, R_2, and R_3) for stage transporter routes servicing F.E. Warren AFB are characterized by moderate short-term and low long-term impacts at the site level. Although none of the alternatives will directly impact any existing structures, the proposed routes could potentially intersect historic archaeological remains.

Anticipated effects associated with any of the proposed construction staging alternatives will have a low or negligible level of impact. It is anticipated that such areas will not require removal or alteration of any standing structures, and impacts to any historic archaeological remains at any of the proposed staging sites, including F.E. Warren AFB, will be minimal.

High short-term and low long-term impacts at the site level could occur along all of the proposed communication cable paths. These estimations are based both on the presence of recorded historic structures (e.g., the Campbell Ranch) in the immediate vicinity and the lack of systematic inventory in these areas to identify existing resources. Among the alternatives, the highest levels of impact are expected to be associated with routes SB2, SC2, PB1, and PD1, where recorded sites are most numerous. Current data are not adequate to accurately distinguish differences among the alternatives and all are accordingly assigned moderate to high rankings.

Low indirect, population-induced impacts of short and long-term duration are anticipated at the regional level. These impacts are likely to result from modifications to existing historic structures that could effect resource integrity. Increased population levels are likely to be accompanied by increased predation on archaeological remains and abandoned structures. Low long-term impacts are also expected at the site level.

3.1.12.5 Summary of Impacts

Impacts to prehistoric and historic cultural resources are summarized in two sets of matrices, detailed and aggregated, wherein the overall effects of the Proposed Action are presented. The criteria for determining level of impact and significance have been defined previously (Sections 3.1.12.2 and 3.1.12.3). These have been applied to each of the project-related actions and evaluated according to both geographic scope and duration.

3.1.12.5.1 Explanation of Detailed Impact Matrix

3.1.12.5.1.1 Prehistoric Cultural Resources

The rankings for impacts to prehistoric cultural resources expected to occur as a consequence of the Proposed Action are shown in Figure 3.1.12-1. Separate consideration is given to the effects of actions on the base and in the Deployment Area, which are treated within site-level rankings. Consequently, most impacts do not have a "local" effect. Local-level impact categorizations are reserved for effects occurring on a district-wide or municipality-wide basis.

Matrix data indicate that site-level, moderate to high short-term and low long term impacts will result from facility construction, widening of Defense Access Roads and excavation of communication cable trenches. Low long-term and moderate short-term adverse impacts will be generated regionally by population-induced and recreation-oriented activities. Low to negligible, short-term impacts will occur as a consequence of project staging activities.

3.1.12.5.1.2 Historic Cultural Resources

The rankings for impacts to historic cultural resources expected to occur as a consequence of the Proposed Action are shown in Figure 3.1.12-1. Moderate to high, localized (site) short-term and low long-term impacts are expected to result from facility construction/modification and placement of communication cable lines. Moderate short-term and low long-term impacts are also anticipated from roadway improvements and population-induced causes. In addition, negligible to low impacts will occur as a consequence of project staging.

Although most of the proposed cable options have high levels of impact, the preferred set of alternatives will have less overall impact because proposed easements PA1 and RB1 exhibit low to moderate level of impact ratings. There is a clear preference for adopting the "No Staging Areas" option because each of the other proposed alternatives involves increased use of F.E. Warren AFB and consequent risk of indirect impacts to historic structures.

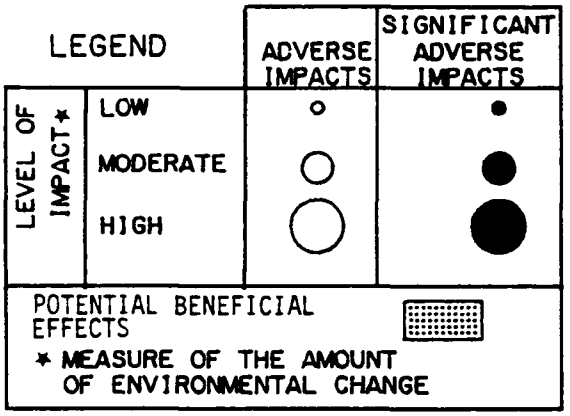
3.1.12.5.2 Aggregation of Elements, Impacts, and Significance

Aggregate impacts to cultural resources are expected to be moderate in the short term and low in the long term at the site level and negligible otherwise (Figure 3.0-1). As noted in Section 3.1.12.4, these impacts have been rated as not significant because it is assumed that the Air Force will develop and implement a comprehensive resource management plan that will provide for mitigation of impacts to Register-eligible cultural sites in accordance with current regulatory statutes and guidelines.

The aggregation of levels of impact and significance ratings from individual resource elements to the resource itself is accomplished according to a two-step process. The following paragraphs explain the methods used in developing aggregate impact ratings as well as the results of applying such aggregation methods to the current assessment effort.

FIGURE 3.1.12-1

CULTURAL RESOURCES SUMMARY IMPACT MATRIX



	PROJECT IMPACTS					
	SHORT TERM			LONG TERM		
	SITE	LOCAL	REGIONAL	SITE	LOCAL	REGIONAL
CULTURAL RESOURCES	○			◦		
PREHISTORIC AGGREGATE IMPACT	○			◦		
Facility Construction						
F.E. Warren AFB	◦			◦		
Launch Facilities						
Stage Transporter Routes						
Defense Access Roads	○			◦		
F.E. Warren AFB						
Alternative R1	○			◦		
Alternative R2	○			◦		
Alternative R3	○			◦		
Construction Staging Areas						
Proposed	◦					
Alternative	◦					
No Staging Areas						
Cable Paths						
Preferred	○			◦		
Alternatives	◯			◦		
Population/Land Use Change (Indirect)			○	◦		◦

FIGURE 3.1.12-1 CONTINUED

CULTURAL RESOURCES SUMMARY IMPACT MATRIX

LEGEND		ADVERSE IMPACTS	SIGNIFICANT ADVERSE IMPACTS
LEVEL OF IMPACT*	LOW	○	●
	MODERATE	◯	●
	HIGH	◯	●
POTENTIAL BENEFICIAL EFFECTS			

* MEASURE OF THE AMOUNT OF ENVIRONMENTAL CHANGE

	PROJECT IMPACTS					
	SHORT TERM			LONG TERM		
	SITE	LOCAL	REGIONAL	SITE	LOCAL	REGIONAL
HISTORIC AGGREGATE IMPACT	○			○		
Facility Construction						
F.E. Warren AFB	◯			○		
Launch Facilities	○			○		
Stage Transporter Routes						
Defence Access Roads	○			○		
F.E. Warren AFB						
Alternative R1	○			○		
Alternative R2	○			○		
Alternative R3	○			○		
Construction Staging Areas						
Proposed	○					
Alternative	○					
No Staging Areas						
Cable Paths						
Preferred	◯			○		
Alternatives	◯			○		
Population/Land Use Change (Indirect)			○	○		○

The first step involves combining impact ratings assigned to individual aspects of the Proposed Action (e.g., facilities construction at F.E. Warren AFB) to arrive at aggregate ratings for a resource element as a whole. Specification of element-level aggregate ratings involves assigning a summary measure that best reflects the overall level of impact for the Proposed Action. This attribution is based on both professional experience and a judgmental qualitative weighting of level of impact ratings for the several individual components of Proposed Action: the various aspects of the project will have quite different kinds of effects on any resources that may be subject to direct or indirect alteration. For example, laying of proposed intersilo communications cables will result in intense, narrow, linear ground disturbances, which will alter but probably not wholly destroy resource sites intersected by an alignment. On the other hand, proposed facilities construction will affect broader areas, which could include entire sites. Consequently, the level of impact ratings for facilities construction carries more weight than those for cable paths. Insofar as the current analysis is concerned, both prehistoric and historic cultural resources have the same element-level aggregate ratings (Figure 3.1.12-1): 1) moderate in the short term at the site-level, 2) low in the long term at the site-level, and 3) negligible otherwise.

Once summary ratings have been established for a resource element, the second step in the process involves assigning aggregate level of impact ratings to the resource as a whole. Given that no basis exists for differential weighting of prehistoric and historic cultural resource elements, aggregate impact determinations make use of equal-weighted averaging of the individual element-level ratings. For example, if high, short-term, site-level impacts are attributed to prehistoric cultural resources and low impacts are specified for the historic cultural resource element, the overall short-term, site-level impacts to cultural resources will be rated moderate. In the current analysis, the element-level aggregate ratings for both prehistoric and historic cultural resources were identical (Figure 3.1.12-1), and, consequently, resource-level ratings were the same as the element-level ratings.

3.1.12.6 Mitigation Measures

Potential mitigation measures that will be considered are identified below. One, some, or all of the mitigation measures may ultimately be selected. In all cases, the Air Force will be responsible for implementation, but not necessarily for funding selected measures.

Avoidance of sensitive areas often provides the most effective means of mitigating direct adverse impacts to cultural resources. Prior to any possible redesigning of facilities plans, however, the locations, contents, significance (qualities), and conditions of the affected resources must be determined. At the present time, insufficient sample data are available with which to implement a program of resource avoidance. Accordingly, other mitigation measures will be desired once the Air Force has established and delineated specific corridors for various project easements and rights-of-way. Specifically, these measures should:

- Require a complete survey (inventory and subsurface testing) of all project-related areas within the Area of Concentrated Study in order to:
  - Identify all cultural resources potentially affected by the project and determine their status, whether previously recorded or not;
  - Develop site-specific plans, as appropriate, to recover, analyze, and curate data from resources for which significant adverse impacts cannot be mitigated by avoidance or other means (e.g., relocation); and
  - Recommend practical measures for mitigation of indirect adverse impacts to cultural properties located within or adjacent to the Area of Concentrated Study including encouraging private landowners to stabilize and conserve Register-eligible properties under their control.
- Establish qualified, trained cultural resource specialists onbase to oversee mitigation measures, to evaluate newly discovered resources, to implement appropriate cultural resource management procedures, and to develop educational and interpretive programs for Air Force and construction crew personnel.
- Stabilize sensitive areas within the Area of Concentrated Study that are being eroded.
- Formalize mechanisms for federal, state, and local agencies and organizations having land use planning responsibility to be involved in the mitigation decision-making process as required by existing statutes and regulations.
- Develop and implement a program for monitoring project-related ground-disturbing activities that could affect potentially significant cultural resources. Such a program would involve:
  - Conducting systematic resource inventory both prior to and during construction activities;
  - Directing construction traffic away from known sensitive areas;
  - Directing crews to avoid cultural remains uncovered within construction areas; and
  - Conducting on-the-spot evaluations of any resources discovered during ongoing inventory.
- Require that all supervisory construction personnel be made aware of areas containing sensitive cultural materials and of any access restrictions.

- o Restrict outdoor recreational vehicle use of easements by using patrols, physical barriers, or other protective measures where practical.

3.1.12.7 Unavoidable Adverse Impacts

Once specific locations for planned, project-related facilities have been determined, implementation of the mitigation measures listed above should result in the reduction or prevention of impacts to resources that could cause a significant loss of scientific and humanistic qualities. At the same time, adequate measures cannot be developed to totally eliminate cumulative adverse impacts to resources within the Region of Influence as a whole. Although the project-related causes of these effects will be most pronounced during peak construction years and will not continue past 1990, the resultant impacts would cause some irreversible and irretrievable commitment of resources.

3.1.13 Visual Resources

3.1.13.1 Introduction

This section describes the impacts of the Proposed Action on visual resources. It includes a description of the criteria used to classify impacts, and determine their significance.

The Area of Concentrated Study is the six-county region because direct impacts will be concentrated at F.E. Warren AFB and the Deployment Areas. Indirect population-induced impacts are projected in Cheyenne and Kimball where the majority of inmigrants are expected to settle.

3.1.13.2 Definitions of Levels of Impact

The methodology used to determine the magnitude of impacts is based on the Bureau of Land Management (BLM) Contrast Rating System. Landscape elements are segmented and rated, assigned a weight according to the BLM system, and combined and averaged to obtain a total feature rating. This results in the following levels of impact:

- Negligible Impact - Assigned to a feature in which three of the four elements have no degree of contrast (0-4 points).
- Low Impact - Assigned to a feature whose four elements have a weak degree of contrast (5-10 points).
- Moderate Impact - Assigned to a feature whose four elements have a medium degree of contrast (11-20 points).
- High Impact - Assigned to a feature in which at least one element has an overall strong degree of contrast and whose total point range is greater than 21, exceeding BLM objectives for total contrast ratings (21-30 points).

3.1.13.3 Determination of Significance Criteria

Landscape features which have a high visual impact (i.e., features which depict a strong degree of contrast and exceed BLM contrast rating objectives by greater than 21 points) are significant because of the spatial extent to which they are noticeable.

3.1.13.4 Environmental Impacts of the Proposed Action and Project Alternatives

The method for predicting impacts of the proposed project on visual resources measured the degree of visual contrast between proposed project activities and the existing landscape. A modified version of the BLM Contrast Rating System was used; it reveals the elements and features that will cause the highest visual impact.

Contrasts were measured by separating and examining the major features of the landscape (land/water surface, vegetation, and structures) and predicting the change in each of the basic elements (form, line, color, and texture) within the landscape feature.

Contrast in the basic elements of the landscape is measured on a weighted scale ranging from 4 (form) to 1 (texture). An indication of the strength of contrast is determined by assigning a different weight to the degree of contrast (3 for strong, 0 for none) and multiplying it by the weight of each element. When these are totaled, the visual impact for each landscape feature is attained. This process is repeated for each feature separately.

The following are assumed mitigations:

- Reestablishment of landform to original character (Air Force contractor);
- Placement of plant material to screen or blend proposed buildings with the landscape (Air Force contractor);
- Revegetation with appropriate plant species (Air Force contractor);
- Implementation of erosion and dust control measures (Air Force contractor); and
- Design of new base facilities to conform to existing architecture, and painting to blend with landscape (Air Force contractor).

3.1.13.4.1 Baseline Future - No Action Alternative

To analyze future trends, known projects or major proposed activities were considered with respect to landscape modification or the introduction of visual intrusions that will alter existing conditions or impact visual resources. None were found to be applicable.

3.1.13.4.2 Proposed Action

Direct and indirect impacts will occur with implementation of the proposed project. It will alter the surface, vegetative, and structural characteristics of the landscape over the short-term construction phase. Long-term impacts for all aspects of the Proposed Action will be negligible (0-4 points) and not significant after regrading and revegetation are completed.

3.1.13.4.2.1 Operating Base Facility Development

Construction activities at the Operating Base will create a moderate visual impact during the short-term construction phase (averaged contrast rating score of 12.6 points, i.e., not significant). Short-term impacts result from clearing vegetation for building sites, clearing for road systems and railway development, and earth movement associated with construction of the various support and deployment facilities. Impacts will be limited to the viewshed or that segment of the landscape that is seen from the travel route adjacent to the proposed facilities.

3.1.13.4.2.2 Cable System

Cable installation will create a negligible impact during the short-term construction phase (averaged contrast rating score of 4.6 points, i.e., not significant). All ten siting alternatives will create the same negligible impact; therefore, no "worst-case" example has been cited. Short-term impacts include clearing and stripping of vegetation followed by soil excavation and stockpiling while cable installation occurs.

3.1.13.4.2.3 Transportation Network

The missile will be transported between the Operating Base at F.E. Warren AFB and silos in the Deployment Area on the existing road network wherever possible. Construction activity to widen and upgrade the road system will create a low visual impact for the immediate area adjacent to the affected roadways (averaged contrast rating score of 6, i.e., not significant). Short-term impacts will include vegetative clearing and regrading to accommodate the additional width.

In addition to upgrading the Defense Access Road system, construction activities are needed to connect F.E. Warren AFB with Interstate 80. All of the three alternatives will have a low (averaged contrast rating score of 8.6 points, i.e. not significant) and temporary visual impact.

3.1.13.4.2.4 Staging Areas

In addition to the construction staging area at F.E. Warren AFB, two other staging areas are proposed as options for the contractor. One will be in Cheyenne; the other in Kimball. All three will be on a site with a small portable building and an open area for equipment and materials storage.

Short-term impacts could include vehicular exhaust; dust from excavation, and other construction-related airborne matter which may reduce visibility; and possible clearing of vegetation. Short-term visual impacts will be negligible (averaged contrast rating score of 4.3, i.e., not significant).

3.1.13.5 Summary of Impacts

3.1.13.5.1 Explanation of Detailed Impact Matrix

To summarize impacts of the Proposed Action on visual resources, results of the BLM Contrast Rating System were combined and averaged. The contrast rating scores for Operating Base construction (moderate 12.6 points), Defense Access Road network (low 6 points), base access roads (low 8.6 points), cable routes (negligible 4.6 points), and staging areas (negligible 4.3 points) produce an overall low visual impact (7.2 points) for site-specific, short-term activities. Local and regional short-term impacts, and site-specific, local, and regional long-term impacts are negligible and not significant.

3.1.13.5.2 Aggregation of Elements, Impacts, and Significance

Since Visual Resources contains one element, no aggregation was performed.

3.1.13.5.3 Alternatives Within the Proposed Action Alternative

The impacts of various development options within the Proposed Action on visual resources are summarized in the overall matrix (Figure 3.0-1). All the options for siting the cables and the staging areas would create a negligible visual impact (Figure 3.0-2). All three of the options for road construction would create a moderate visual impact. All impacts are temporary in nature and are not significant.

3.1.13.6 Mitigation Measures

No mitigation measures are recommended beyond the assumed mitigations discussed in Section 3.1.13.4.

3.1.13.7 Unavoidable Adverse Impacts

There are no unavoidable adverse impacts on visual resources.

3.2 Natural Resources

3.2.1 Water Resources

3.2.1.1 Introduction

Water will be required for project construction, operation, and to satisfy demands induced in the Region of Influence by inmigrating workers, dependents, and related induced activities. Construction of facilities may alter natural drainageways and impact storm runoff with resulting erosion and sedimentation. Increased water use will result in increased wastewater flow which can impact the natural water resource system as it returns to the environment.

The analysis focuses on the Crow Creek watershed Area of Concentrated Study since direct and indirect project water use and demand are expected to be great only in this Area of Concentrated Study, and the effects of meeting the demand and of project-induced construction could affect other water resource elements. In the other Area of Concentrated Study watershed areas, analysis centers on direct effects of project construction since impacts will be restricted to the watersheds. Indirect or induced water demands for municipalities outside the Crow Creek watershed and supplying those demands will not represent a large change from existing conditions.

3.2.1.2 Definition of Levels of Impact

Level of impact definitions for Water Resources and for each Water Resource element used in the analyses are shown in Table 3.2.1-1 and further described below.

3.2.1.2.1 Water Demand and Water Use

The project will require water for its construction. It will also cause an induced water demand due to inmigrating population drawn to the area because of the project or related construction.

The increase in amount of water used, capacity of existing systems, and present cost of service are relatively easy to measure attributes of this Water Resource element. Level of impact is determined by changes to the existing system that will be needed to match water supply and water demand.

3.2.1.2.2 Constraints on Water Use

The cost of, or difficulty in, meeting constraints relative to the acquisition and development of water resources or their protection will depend upon the area in which the project is located. Changes in requirements and constraints are difficult to quantify, requiring more qualitative evaluations. Some general criteria for assessing the level of impact the project will have on existing individual water rights can be formulated (where right to use water is controlled).

Table 3.2.1-1

DEFINITION OF LEVEL OF IMPACT FOR WATER RESOURCES

Resource Element	Negligible	Low	Moderate	High
Water Resources	Will result in no easily measurable change in the projected baseline water resource system.	Will result in a measurable change in the projected baseline water resource system that could require minor modification in operations.	Will result in a measurable change in the projected baseline water resource system that will require minor modification in operations or facilities.	Will result in a measurable change in the projected baseline water resource system that will require major changes in operations or facilities.
Water Demand and Water Use	Will permit the increase in the amount of water required to meet project direct and induced demands to remain within the projected baseline available capacity of existing delivery systems and will require no change in system operation. No cost impacts on existing users will occur.	Will permit the increase in the amount of water required to meet project direct and induced demands to remain within the projected baseline available capacity of existing delivery systems but will require minor increases in system operation to satisfy demands. No cost increases will be required to deliver the required amounts of water to existing water users.	Will increase the amount of water needed to meet project direct and induced demands so as to exceed the projected baseline available capacity of the existing delivery system. Capacity could be increased by construction of minor new facilities or by increases in system operation. The cost of the facilities to deliver the required amount of water could require a minor cost change for existing water users.	Will increase the amount of water required to meet project direct and induced demands so as to exceed the projected baseline available capacity of existing delivery systems. Capacity could be increased by construction of major new facilities or major increases in system operation. Major water cost changes will result for existing users.
Constraints on Water Use	Will require no acquisition of existing water rights.	Will require some acquisition of projected baseline existing water rights. Water rights will be relatively easy to acquire, and acquisition will not affect the livelihoods of the former owners.	Will require acquisition of many projected baseline existing water rights. Water rights will be difficult to acquire and will affect the livelihoods of the previous owners. Minor facilities may be needed in order to transport the water where it is needed.	Will require more extensive acquisitions of projected baseline existing water rights than could be acquired in the area and major physical facilities will be needed to import water.

Table 3.2.1-1 Continued

DEFINITION OF LEVEL OF IMPACT FOR WATER RESOURCES

Resource Element	Negligible	Low	Moderate	High
Surface Water Hydrology and Quality	Will result in no easily measurable projected baseline changes in water erosion, sedimentation potential, or associated water quality degradation, flood flows, wastewater discharge to streams, or changed surface water flow (whether increase or decrease).	Will result in small but measurable projected baseline changes in water erosion, sedimentation potential, and associated water quality degradation, flood flows, wastewater discharge to streams, or surface water flow that will require slight modifications in operations.	Will result in measurable projected baseline changes in water erosion, sedimentation potential, and associated water quality degradation, flood flows, wastewater discharge to streams, or surface water flow that will require modifications in operations or construction of minor new facilities.	Will result in measurable projected baseline changes in water erosion, sedimentation potential, and associated water quality degradation, flood flows, wastewater discharge to streams, or surface water flow that will require major changes in operations or construction of major new facilities.
Groundwater Hydrology and Quality	Will result in no easily measurable projected baseline reductions in water levels in existing wells or spring flow, and no easily measurable degradation of groundwater quality from increased wastewater discharges.	Will result in small but measurable projected baseline reductions in water levels in existing wells or spring flow, or a small but measurable degradation of groundwater quality from increased wastewater discharges that will require slight modification in operations.	Will result in measurable projected baseline reductions in water levels in existing wells or in spring flow, or a measurable degradation of groundwater quality from increased wastewater discharges that will require modifications in operations or construction of minor new facilities.	Will result in measurable projected baseline reductions in water levels in existing wells or in spring flow, or a substantial measurable degradation of groundwater quality from increased wastewater discharges that will require construction of major new facilities.

Project-induced changes in the water resource system may require construction of new facilities or changes in operation of existing ones to comply with laws adopted to protect or manage the water resource system.

3.2.1.2.3 Surface Water Hydrology and Quality

The project could exert a number of possible impacts on surface water hydrology and quality, including an increase in the erosion potential and associated water quality degradation, an increase in flood flows (such as annual and 100-year events), an increase in wastewater discharge to streams, or an increase or decrease in surface water flow. Because of these varied possible impacts, defining the level of impact requires multiple criteria. The level of impact assigned is the highest category for which any of these defined criteria are satisfied.

The change in each attribute of surface water hydrology and quality can be calculated using various analytical techniques to assign level of impact.

3.2.1.2.4 Groundwater Hydrology and Quality

As with surface water hydrology and quality, there are several possible effects that the project could have on the groundwater hydrology and quality. These include reductions in water levels in existing wells or in spring flow, and degradation of groundwater quality from increased wastewater discharges. Geologically related impacts, such as subsidence, that could be due to groundwater withdrawal are addressed in the Geologic Resources section. Once again, the level of impact assigned will be the highest category for which any of the criteria are satisfied.

As in surface water hydrology and quality the changes in each attribute of groundwater hydrology and quality can be calculated using various analytical techniques to assign level of impact.

3.2.1.3 Determination of Significance Criteria

For water resources, an impact is significant if:

- It will violate laws or regulations adopted to project or manage the water resource system;
- It will endanger public health or safety by creating or worsening an adverse safety condition or a health hazard;
- It will reduce water availability to, or interfere with, existing users creating a situation the user is unable to respond to;
- It will threaten or damage unique hydrologic characteristics of the area; or
- It will change preproject hydrologic baseline conditions over an extensive area or period of time, so that resultant conditions are highly controversial, highly uncertain, or involve unique or unknown risks.

The determination of significance of impacts is applied on site-specific, local, and regional levels. For the purposes of the Water Resource assessment, site-specific is the location where direct construction activities are occurring and includes F.E. Warren AFB in the Crow Creek watershed, and areas within 1,000 feet of Launch Facilities, Launch Control Facilities, cables, potential project wells or Defense Access Roads in other Areas of Concentrated Study. Local is the city jurisdiction or district surrounding an impacted area and includes the Cheyenne Urban Area in the Crow Creek watershed, and an area within 2 miles of Launch Facilities, Launch Control Facilities, cables, potential project wells, or Defense Access Roads. Regional includes the entire watershed area in the Areas of Concentrated Study in the Region of Influence. If the anticipated water resource impacts do not meet any of these criteria for the defined area, then they will be considered not significant for that area.

3.2.1.4 Environmental Impacts of the Proposed Action and Project Alternatives

This section assesses effects on water resources from the Proposed Action and project alternatives. The level of impact resulting from these effects is estimated, as is the potential significance of those impacts using the above procedures.

Methods of mitigation of potentially significant impacts are also presented. Certain mitigations are part of standard Air Force construction practices or policy. For potential water resource impacts these include:

- Compensation to current water users who may be directly impacted during project construction in compliance with state and federal water laws;
- Minimization of site disturbance and employment of proper revegetation techniques to reduce erosion potential;
- Construction of stormwater detention and erosion control facilities to control increased surface runoff impacts; and
- Development of water supply and waste disposal facilities for project facilities consistent with legal requirements.

The implementation of these standard mitigation measures was assumed in evaluating the level and significance of impacts on the water resource system.

Procedures used to forecast future conditions with and without the project were as follows. For water use and demand, use rates were assumed to remain as determined in the existing conditions plus an allowance for industrial growth in Cheyenne. This is 180 gallons per capita per day (gpcd) plus existing industrial use plus 100 acre-ft/yr industrial growth in Cheyenne and 250 gpcd for other areas. These per capita values are assumed for induced population. Project construction water requirements are developed separately.

Legal requirements and constraints are assumed to remain as they now are.

Procedures used to describe existing conditions for storm runoff and drainage, erosion potential, and wastewater discharges are repeated for the population and land use changes that will occur with or without the project. The disturbed area subject to erosion for analysis purposes was assumed as 0.5 acre per Launch Facility or Launch Control Facility, 2.0 acres per mile of road, 1.0 acres per mile of cable, 40 acres at F.E. Warren AFB, and 200 acres per 1,000 population growth in Cheyenne. For groundwater hydrology and quality it was assumed that construction wells, if any, will have maximum capacities of 100 gallons per minute (gpm). Single well hydraulic equations (U.S. Bureau of Reclamation 1977) were applied to typical aquifer characteristics to forecast likely drawdown. More sophisticated modeling is being done in the Crow Creek watershed (Ertec 1983). Additional specific assumptions and analysis procedures are discussed under individual Water Resource elements.

3.2.1.4.1 Water Demand and Water Use

Projection of water demand through the year 1991 will encompass the time period required for project construction and stabilization of the population to operational levels.

3.2.1.4.1.1 Baseline Future - No Action Alternative

Crow Creek Watershed. The Cheyenne Urban Area is the only area in the Crow Creek watershed where the Proposed Action will induce a measurable change. Table 3.2.1-2 shows a year by year projection of water demand and water supply for the Cheyenne Board of Public Utilities service area through the year 1991. Values for supply represent the net amount of water that is delivered through the raw water delivery system in the Crow Creek watershed and thus exclude evaporation and spillage losses. Water supply is being reduced temporarily by Stage II construction and the Cheyenne Board of Public Utilities plans to use wells at higher rates than desired and withdraw water from storage in reservoirs to meet near-term demands. Other water demands in the watershed are projected to increase water use in the watershed to 37,100 acre-ft/yr by 1991.

Other Areas. Water use in the 6-county area described in Section 2.2.1.2.1.2 is expected to increase to 866,000 acre-ft/yr in 1990 with most of the increase due to increased agricultural irrigation. Baseline projections for potentially impacted communities in 1990 indicate a demand of 560 acre-ft for Pine Bluffs, 2,110 acre-ft for Wheatland, 5,030 acre-ft for Torrington, 970 acre-ft for Kimball, 4,500 acre-ft for Scottsbluff, and 3,760 acre-ft for Gering.

3.2.1.4.1.2 Proposed Action

Impacts are evaluated for construction water requirements and for project-induced population demands. The project water requirements of the Proposed Action for these purposes is shown in Table 3.2.1-3. None of the project alternatives will change the induced demand values. Water requirements for the F.E. Warren AFB road alternatives are all about 8 acre-ft. Revegetation requirements for the Proposed Action cables are 13 acre-ft. Project alternatives range from 12 to 19 acre-ft. Water requirements for staging areas are about 2 acre-ft. The Proposed Action will use 6 acre-ft where alternatives are 2 and 4 acre-ft.

Table 3.2.1-2

CHEYENNE BASELINE MUNICIPAL WATER DEMANDS

Water Demand (Acre-Ft)	1983	1984	1985	1986	1987	1988	1989	1990	1991
Industrial	2,500	2,600	2,700	2,800	2,900	3,000	3,100	3,200	3,300
Nonindustrial	12,080	12,240	12,400	12,560	12,730	12,890	13,050	13,210	13,370
TOTAL:	14,580	14,840	15,100	15,360	15,630	15,890	16,150	16,410	16,670
Water Supply (Acre-Ft)									
Net Import From Douglas Creek[1]	1,510	4,120	8,850	10,430	10,430	10,430	10,430	10,430	10,430
Crow Creek Watershed[2]	4,150	4,520	4,790	4,840	4,840	4,840	4,840	4,840	4,840
Municipal Wells[3]	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000
TOTAL:	7,660	10,640	15,640	17,270	17,270	17,270	17,270	17,270	17,270
Supply-Demand	-6,920	-4,200	540	1,910	1,640	1,380	1,120	860	600

Note: 1 Net import downstream of reservoirs. Net inflow to reservoirs is 2,100 acre-ft in 1983, 5,080 acre-ft in 1984, 10,080 acre-ft in 1985, and 11,710 acre-ft in later years. Water diversion from Douglas Creek will be 2,400 acre-ft in 1983, 5,500 acre-ft in 1984; 10,700 acre-ft in 1985; and up to 12,400 acre-ft in 1986 and later years.

2 Crow Creek watershed supply equals 1,220 acre-ft/yr from North Crow and inflow to the Middle Crow reservoirs, less a share of existing evaporation and spillage losses which are apportioned based on the percent of total flow to the reservoirs from import water and watershed inflow.

3 Assumes total pumpage is reduced to 2,500 acre-ft/yr, and irrigation use remains at 500 acre-ft/yr.

Table 3.2.1-3

PROJECT WATER REQUIREMENTS

	1984	1985	1986	1987	1988	1989	TOTAL
Construction Water Demands (Acre-Ft)							
F. E. Warren AFB	13	49	5	-	-	-	67
Deployment Area	8	160	179	94	8	-	449
Nebraska Section	-	-	56	88	5	-	149
Wyoming Section	8	160	123	6	3	-	300
TOTAL:	21	209	184	94	8	-	516[b]
Induced Water Demands[a] (Acre-Ft)							
Cheyenne	-	684	773	808	410	382	3,057
Deployment Area	-	-	121	147	57	59	384
Nebraska Section	-	-	106	67	16	40	229
Wyoming Section	-	-	15	80	41	19	155
TOTAL:	-	684	894	955	467	441	3,441

Note: a A continuing operating demand in Cheyenne of 209 acre-feet/yr is expected in 1990 and later years. The Launch Control Facilities will continue to use 12 acre-feet/yr in the Deployment Area.

b Includes 100 percent for contingencies.

Crow Creek Watershed. It is assumed that construction water demands at F.E. Warren AFB and induced water demands will be supplied by the Cheyenne Board of Public Utilities. The impact of construction water demands in the Cheyenne Urban Area is negligible since little or no project construction will occur there. The impact of the project on the Cheyenne area is shown in Figure 3.2.1-1. The ability of Cheyenne's water system to supply the water necessary to satisfy the demands is somewhat limited in the initial project years. In 1985, the project will result in a water shortage of 190 acre-ft, rather than a surplus of 540 acre-ft, as projected under baseline conditions. After 1985 the effect of the project is to reduce the amount of surplus water available for increasing storage in Crow Creek reservoirs. The long-term operating demand will create a water shortage 1 year earlier with the project than without it. Several alternatives (i.e., increased pumpage of wells, modifications to raw water delivery system, wastewater reuse at F.E. Warren AFB, purchase of existing water rights) are being examined to increase water supply or reduce water demand for the Cheyenne Urban Area in water supply planning for the project (Ertec 1983). The induced water demands will result in a short-term, moderate, significant impact for the Cheyenne Urban Area since minor new facilities may be required and reduction in water availability to existing users could occur. Short-term impacts are rated low and not significant for F.E. Warren AFB since demands will only require increased operation of facilities and will not interfere with existing users. Negligible impacts will occur in the Crow Creek watershed in the short and long term. Low, long-term not significant impacts will occur in the Cheyenne Urban Area due to the 1-year earlier required development of a new water supply.

Other Areas. Water supply for construction and induced demand in the Deployment Area is assumed to come from wells. Construction water is to be supplied by development of new groundwater supplies or purchase or temporary use of existing water rights following procedures of the states. Because of the short-term limited use, no long-term effects are anticipated. Existing water supplies in all potentially impacted communities are adequate to meet increased demands of the induced population but increased operations may cause a low not significant short term impact. Water development may require construction of minor new facilities so impacts are rated moderate for the site and local levels, but since facilities would not interfere with existing users the impacts are not significant.

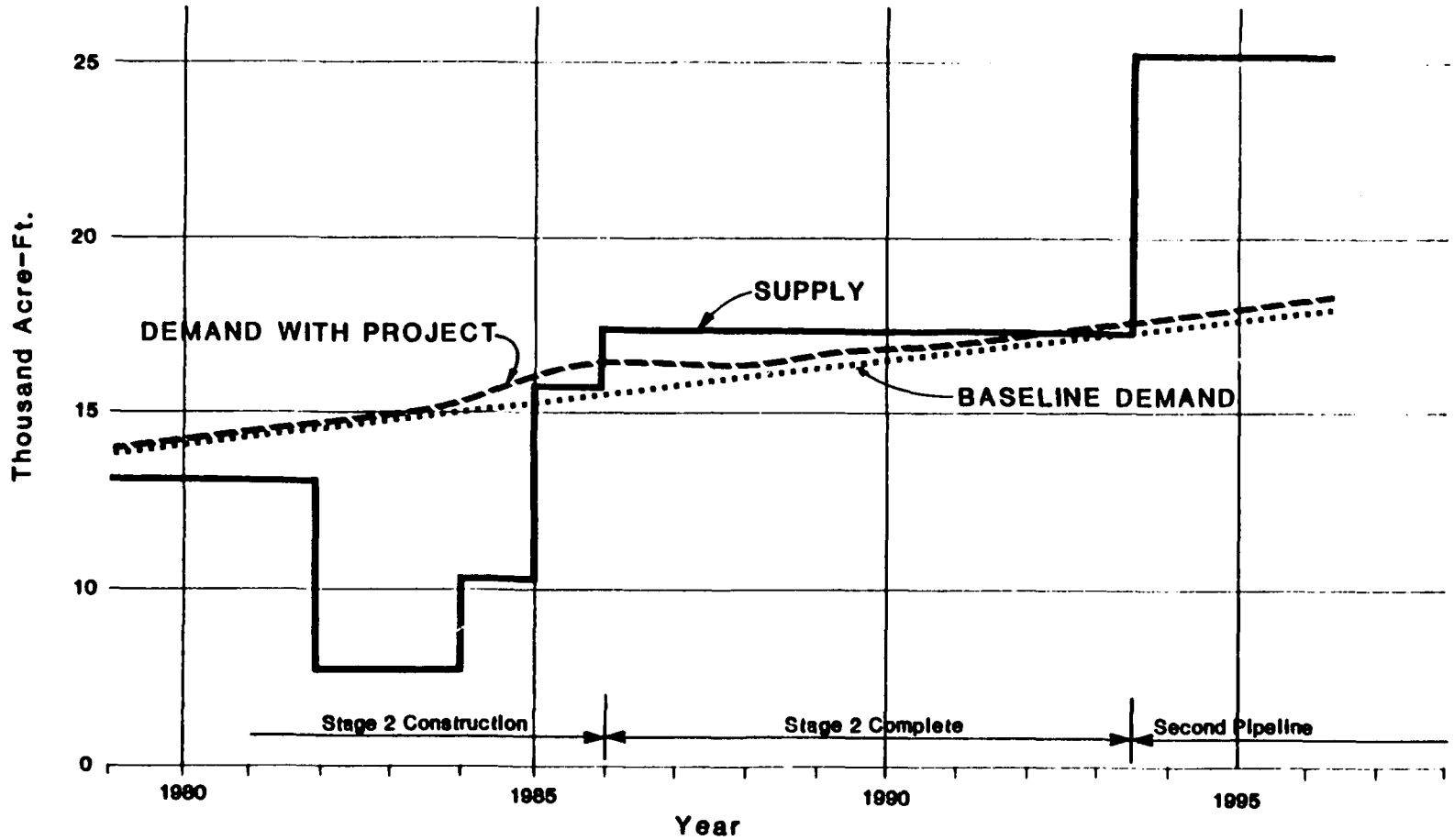
3.2.1.4.2 Constraints on Water Use

3.2.1.4.2.1 Baseline Future - No Action Alternative

No change in controls on water use or water quality protection are forecast. Additional water rights may be required to meet forecast demands and increased use could impact existing water rights.

3.2.1.4.2.2 Proposed Action

No change in controls on water use or water quality protection are forecast as a result of the Proposed Action or project alternatives so negligible not significant impacts are expected.



PROJECT IMPACT ON CHEYENNE URBAN WATER SUPPLY

(04-7)

FIGURE NO. 3.2.1-1

Crow Creek Watershed. No water rights will be needed at F.E. Warren AFB. One alternative for increasing water supply in Cheyenne is to lease or purchase existing rights. This will cause a low not significant impact.

Other Areas. Development of water for project construction could impact some existing water rights. It is expected that water needed in Wyoming will be obtained from Wyoming sources and water needed in Nebraska will be obtained from Nebraska sources to avoid potential interstate problems. The impact of obtaining water will be low and not significant since legal requirements of the states are followed.

3.2.1.4.3 Surface Water Hydrology and Quality

This section evaluates future conditions with and without the project for stormwater runoff and drainage, erosion and sedimentation, wastewater discharge, and surface water flow.

3.2.1.4.3.1 Baseline Future - No Action Alternative

Crow Creek Watershed.

Stormwater Runoff and Drainage. Increasing urban development will increase stormwater runoff from a 50-year, 6-hour storm in the Dry Creek basin by 82 cubic feet per second (cfs) by 1987 if stormwater management policies of the City of Cheyenne are not followed. No increase in flows is expected as a result of limited future development in South Cheyenne without the project.

Erosion and Sedimentation. Continuing construction in Cheyenne will contribute about 13,000 tons per year (T/yr) of erosion over existing conditions if construction produces 75 tons per acre (T/acre) (EPA 1982) and erosion control practices are not followed.

Wastewater Discharge. Wastewater will total 8,750 acre-ft in 1987 without the project and represent 92 percent of base flow in Crow Creek downstream of Cheyenne.

Surface Water Flow. Crow Creek may show some increased flow due to wastewater discharges and decreased pumpage in the Cheyenne well fields. Implementation of wastewater reuse will reduce the increase in flows downstream of Cheyenne.

Other Areas.

Stormwater Runoff and Drainage. No major changes in watershed characteristics are expected so no change in runoff is expected.

Erosion and Sedimentation. Erosion and sediment delivery are assumed to remain at present levels in the future.

Wastewater Discharge. Some increase in wastewater flows will occur as municipalities grow, but will not appreciably change present sur face water hydrology or quality.

Surface Water Flow. All streams can expect some decreases in surface water flow where groundwater pumpage for irrigation reduces groundwater inflow to streams, or the streams are increasingly used for irrigation.

3.2.1.4.3.2 Proposed Action

Crow Creek Watershed.

Stormwater Runoff and Drainage. The Proposed Action is expected to produce a small but measurable change in storm runoff from F.E. Warren AFB so the impact is rated low for both the short and long term. Increased flow due to development from population-induced housing will increase flow from a 50-year, 6-hour storm by 67 cfs over 1987 baseline conditions in Dry Creek and 60 cfs in South Cheyenne. This level of increase will require construction of minor flood control facilities and is rated moderate in the short and long term and significant due to danger to public safety due to flooding. Only slight changes to flows in Crow Creek will occur during flood conditions as a result of these increases so the impact is rated low and not significant in the short term.

Erosion and Siltation. Erosion from construction for all project alternatives at F.E. Warren AFB is estimated at 3,000 T/yr if uncontrolled. Application of assumed mitigations reduces the impact to low and not significant. Erosion from construction, related to induced population is estimated at 31,800 T in 1985, the peak year of land development, without controls. Control of this erosion will require construction of minor facilities so the impact is rated moderate and significant in the short term since without controls water quality regulations could be violated. The influence of changes in the Cheyenne Urban Area will have a low but significant impact in Crow Creek downstream of Cheyenne since without controls in the urban area water quality regulations could be violated. Long-term impacts are rated negligible and not significant.

Wastewater Discharges. Wastewater discharges to Crow Creek are expected to total 9,240 acre-ft in 1987 with the project and wastewater will represent 92.4 percent of base flow in Crow Creek downstream of Cheyenne. The impact is rated as moderate in the short term since minor changes to existing facilities may be required to maintain treatment levels (Banner Assoc. 1982), but not significant since no public health risks would occur. The increase in wastewater flow could cause a low not significant impact in the Crow Creek watershed in both the short and long term.

Surface Water Flow. No change in stream flow other than increasing wastewater discharges are expected with the project. Implementation of wastewater reuse as a water demand reduction alternative for the project will reduce projected increases in this discharge. The change in flow will be negligible.

Other Areas.

Stormwater Runoff and Drainage. A potential increase at the site level is calculated to be 2.8 percent over existing conditions, resulting in a low level of impact that is not significant because the increase will not endanger public safety. No significant changes will occur at the local or regional level.

Erosion and Sedimentation. Erosion increases at the site level for Launch Facility, Launch Control Facility, and Defense Access Roads will be 16 to 19 percent and 0.15 to 0.2 percent at the local level. All construction related to the project could cause increases of 0 to 1 percent at the regional level if erosion is not controlled. Application of assumed mitigations will result in negligible impacts for the proposed project and project alternatives.

Wastewater Discharges. Low short-term impacts will occur due to increased operation of existing facilities to treat wastewater from inmigrating people. Since public health will not be endangered the impacts are rated not significant.

Surface Water Flow. No change in surface water flow is expected as a result of the project so impacts are rated negligible and not significant.

3.2.1.4.4 Groundwater Hydrology and Quality

This section evaluates future conditions with and without the project for groundwater hydrology and quality.

3.2.1.4.4.1 Baseline Future - No Action Alternative

Crow Creek Watershed. Increasing pumpage from Cheyenne well fields could cause reduced flow in springs and in Crow Creek, as well as lower water levels in existing wells. The City of Cheyenne has determined that groundwater withdrawal rates of 2,000 acre-ft/yr for municipal use will not result in further water level declines (Cheyenne Board of Public Utilities 1983-a). However, groundwater declines of 3 to 5 feet per year could result if groundwater pumpage increases to approximately 4,000 to 5,000 acre-ft/yr to meet shortages in water supply in 1983 and 1984 based on past groundwater modeling in the area (Crist 1980). Completion of current Stage II facilities will allow recovery of the groundwater system after 1985. Continued discharges of wastewater to Crow Creek will continue to increase total dissolved solids and nitrate levels in groundwater downstream of Cheyenne.

Other Areas. Generalized localized patterns of water level declines are expected to continue with increasing pumpage of groundwater.

3.2.1.4.4.2 Proposed Action

Crow Creek Watershed. Use of the Cheyenne well field to meet shortages caused by the project (a pumpage rate of 2,200 acre-ft/yr for municipal use in 1985) could cause a slight decrease in water levels and a slight decrease in flow in Crow Creek.

These amounts of water level lowering which will only occur in the short term are rated as low and not significant since the lowering will not likely interfere with existing users. Use of the wells will not alter regional groundwater quality. Increases in wastewater discharges will have a low and not significant impact on groundwater quality at the local and regional level. The Proposed Action or project alternatives at F.E. Warren AFB are not expected to influence groundwater hydrology or quality.

Other Areas. The potential water level lowering 1,000 and 5,000 feet away from a construction well following 1 year of continuous pumping at 100 gpm was evaluated using equations of groundwater flow for typical aquifer parameters for the Ogallala and Arikaree aquifers with results given below:

	1,000 ft	(Feet of Lowering)	5,000 ft
Ogallala	1.5		0.02
Arikaree	3.0		0.01

These levels will only cause low and not significant impacts since the lowerings will not interfere with the existing users.

No changes to regional groundwater quality are expected as a result of project activities in the Deployment Area.

Low, not significant impacts could occur as the result of increasing wastewater discharges in the short term at the site and local level.

The impact of wells developed to supply Deployment Area construction demands will depend on site-specific hydraulic characteristics, well construction and efficiency, and proximity to existing wells, springs, and streams. Determining precise impacts will require monitoring during construction.

3.2.1.5 Summary of Impacts

This section presents a summary of impacts expected under the Proposed Action and project alternatives based on the analysis of Section 3.2.1.4 and the level of impact definitions and significance determination criteria presented in Sections 3.2.1.2 and 3.2.1.3.

3.2.1.5.1 Explanation of Detailed Impact Matrix

Figure 3.2.1-2 provides a summary assessment of the level and significance of impacts to the Water Resource elements and subelements. The project will only cause significant impacts in the Crow Creek watershed with no significant impacts expected in the Deployment Area. Significant, short-term, moderate impacts are expected for the induced demand subelement of the water use and demand element in the local area of the Crow Creek watershed since project changes could interfere with existing uses in the Cheyenne Urban Area. Significant, short and long-term moderate impacts are expected for the erosion and sedimentation subelement of the surface water hydrology and quality element. Significant, short

and long-term impacts are expected for the stormwater runoff and drainage subelement of the surface water hydrology and quality element since the project without mitigation changes could endanger public safety.

All other project impacts in the Crow Creek watershed and in other Areas of Concentrated Study are rated not significant because with assumed mitigations they will not violate laws or regulations adopted to protect or manage the water resource system, endanger public health or safety, reduce water available to or interfere with existing users, or change preproject hydrologic baseline conditions over an extensive area or period of time.

Figure 3.0-2 shows the level and significance of impacts for each component of the Proposed Action for which alternatives have been identified including those contained in the Proposed Action. None of the project alternatives will alter impact assessments made for the Proposed Action.

3.2.1.5.2 Aggregation of Elements, Impacts, and Significance

Figure 3.0-1 presented the aggregation of impacts for Water Resources as a whole. The only overall significant impact on water resources will occur in the short term in the Cheyenne Urban Area where moderate level of impact is expected. All impacts on overall water resources in the Deployment Area are considered not significant and represent an overall low level of impact. Aggregation of the four Water Resource elements to an overall level of impact and significance rating for water resources involved weighing each aggregated element (equally) to calculate level of impact and making an overall professional judgment on the significance of water resource changes due to the project.

Aggregation of the various Water Resource subelements to the element level generally involved assigning the highest level of significant impact for each subelement to the element level due to potential controversy in any water development program or water resource change.

The overall water use and demand element is rated as moderate and significant due to the potential interference with water supply to Cheyenne and the need for new minor facilities to avoid this interference. The overall surface water hydrology and quality element is also rated as moderate and significant due to potential water quality and flooding problems that also require new minor facilities to avoid violations of water quality regulations and to protect public safety.

Project alternatives do not change aggregated levels of impact or significance ratings.

3.2.1.6 Mitigation Measures

Potential mitigation measures that will be considered are identified below. One, some, or all of the mitigation measures may ultimately be selected. Each measure identifies the party responsible to implement, but not necessarily to pay for, the measure.

Figure 3.2.1-2

WATER RESOURCES
SUMMARY IMPACT MATRIX

LEGEND		ADVERSE IMPACTS	SIGNIFICANT ADVERSE IMPACTS
LEVEL OF IMPACT*	LOW	∘	•
	MODERATE	○	●
	HIGH	◯	⬤
POTENTIAL BENEFICIAL EFFECTS		▦	

* MEASURE OF THE AMOUNT OF ENVIRONMENTAL CHANGE

	Crow Creek Watershed						Other Areas					
	Short Term			Long Term			Short Term			Long Term		
	SITE	LOCAL	REGIONAL	SITE	LOCAL	REGIONAL	SITE	LOCAL	REGIONAL	SITE	LOCAL	REGIONAL
Water Resources	∘	●	∘	∘	∘		∘	∘				
Water Use and Demand	∘	●			∘		○	○				
Construction Water Demand	∘						○	○				
Induced Water Demand	∘	●			∘			∘				
Constraints on Water Use		∘					∘	∘				
Changes in Constraints												
Changes to Individual Water Rights		∘					∘	•				
Surface Water Hydrology and Quality	∘	●	•	∘	●		∘	∘				
Storm Runoff and Drainage	∘	●	∘	∘	●		∘					
Erosion and Siltation	∘	●	•									
Wastewater Discharges		○	∘		∘	∘	∘	∘				
Surface Water Flow												
Ground Water Hydrology and Quality		∘	∘		∘		∘	∘				
Interference with Springs, Wells, and Surface Flow		∘					∘	∘				
Regional Groundwater Quality												
Wastewater Discharge Effects on Water Quality		∘	∘		∘	∘	∘	∘				

- Implementation of water conservation measures or wastewater reuse projects in the Cheyenne Urban Area or on F.E. Warren AFB to reduce raw water demand (Cheyenne Board of Public Utilities and/or Air Force).

- Operation and/or modification to raw water collection systems in the Crow Creek watershed to increase use of the available supply (Cheyenne Board of Public Utilities).

- Lease or purchase of water rights in the Crow Creek watershed to provide additional water to the Cheyenne Urban Area (Cheyenne Board of Public Utilities).

- Use of stormwater detention facilities and/or erosion control including revegetation for all construction projects in the Cheyenne Urban Area (Cheyenne and Laramie County Public Works Departments and Air Force).

- Early implementation of plans for upgrading of wastewater treatment facilities in the Cheyenne Urban Area to reduce discharge impacts (Cheyenne Board of Public Utilities).

- Siting of new wells, if any, in the Deployment Area at least 2,000 feet from existing streams and springs to minimize impacts to spring or streamflow (Air Force).

- Increase monitoring and modeling of the Cheyenne well field operations and raw water supply in the Crow Creek watershed to better define production capacity (Air Force in conjunction with the Cheyenne Board of Public Utilities).

- More refined modeling of stormwater drainage in the Cheyenne Urban Area to better define flood control opportunities. (Cheyenne and Laramie County Public Works Departments and Air Force).

3.2.1.7 Unavoidable Adverse Impacts

Implementation of the Proposed Action will result in consumptive use of about 4,000 acre-ft of water during the 1983 through 1989 time period in the Areas of Concentrated Study. The water resource system response to this use will generally impact the water delivery system to, and wastewater discharge from, the Cheyenne Urban Area, where approximately 86 percent of the use will occur. Construction will permanently alter drainage characteristics in several drainage areas. Implementation of the Proposed Action will increase long-term water demands by about 210 acre-ft/yr in the Cheyenne Urban Area. There will be no other long-term increase in water use as a result of the project.

3.2.2 Biological Resources

3.2.2.1 Introduction

This section describes the impacts of the Proposed Action on vegetation, wildlife, fisheries, unique and sensitive habitats, and threatened and endangered species. A description of the criteria used to classify impacts, the criteria used to determine the significance of these impacts, and a description of the procedures used to estimate impacts are contained in the following subsections. The analysis of the environmental consequences includes an evaluation of effects in the Region of Influence and in the Area of Concentrated Study. The Area of Concentrated Study, incorporating the Flights and the site-specific locations within them, is based on those areas where direct effects due to road modifications, silo upgrading, and buried cable path construction will take place. The F.E. Warren AFB portion of the Area of Concentrated Study includes those portions of the base and adjacent areas where direct impacts due to modification, upgrade, and construction of facilities for the project will take place.

A variety of direct and indirect impacts due to facility modification, upgrade, and construction for the project are expected to affect the biological resources within the Area of Concentrated Study. Indirect impacts may also affect some biological resources in the Region of Influence. The direct impact levels differ between the Flights and F.E. Warren AFB within the Area of Concentrated Study, however, the direct and indirect impacts are similar within the broader Region of Influence. Direct impacts may affect some sensitive species or habitats at potential ancillary facilities in the Region of Influence. Direct impacts are a result of those project-related activities that remove areas of habitat or segments of native plant and animal populations, or create noise and movement which may cause disturbance to wildlife. Direct impacts are usually related to construction but may also occur during operation and maintenance activities. Indirect impacts are those associated with increased human population and activities not directly related to project construction, operation, and maintenance.

3.2.2.2 Definition of Level of Impact

Impact levels were developed to classify potential direct and indirect impacts generated by the project. The impact levels were derived from an impact evaluation model containing these characteristics:

- Sensitivity - Susceptibility to and degree of response to, change.
- Habitat Quality - Value of the habitat for support of plant and animal populations, based on relative disturbance levels.
- Quantity - Amount of a natural system potentially disrupted due to project activities.
- Duration - Time necessary for recovery of a resource from a disturbance.

The impact levels include an evaluation of appropriate committed mitigations.

Impact level definitions summarized from the impact model are:

- Negligible Impact - Will result if impacts occur, but the sensitivity, quantity, duration, or habitat quality will be very low.

- Low Impact - Will affect widespread habitats with low diversity, areas that are highly modified or degraded, usually by human activities. Impacts can be short or long term, depending on the quality and quantity of the disturbed habitat.

- Moderate Impact - Will affect diverse habitats or habitats supporting state-protected species. This includes impacts to special wildlife use areas or to vegetation/habitat types of regionally limited areal extent. Impacts are usually long term but can be short term, depending on the quality and quantity of habitat affected.

- High Impact - Will result in disruption or loss of highly unique vegetation/habitat types or habitats of federally listed threatened or endangered species. Impacts are usually long term but can be short term, depending on the quality and quantity of habitat affected.

3.2.2.3 Determination of Significance Criteria

The determination of significance for biological resources involves the evaluation of the context in which the impact may occur, and the intensity and extent of the impact effect. Potential impacts are assessed as to significance in a *site-specific, local,* and regional context. Evaluations determining an impact to be significant or not significant also include an assessment of intensity (severity criteria) and extent (in time and space).

Intensity is based on relative changes:

- To the unique characteristics of the area (wetland, ecologically critical areas);

- Likely to be controversial;

- In cumulative impact;

- That may cause potential adverse impacts to threatened, endangered, or otherwise unique species; and

- In resources considered to be important or valuable from the perspective of scientific opinion and management agency concerns.

Extent is related to:

- Area/quantity of a resource affected relative to the area/quantity of a resource available in a defined area of influence;

- o Potential for change in reproductive success and maintenance of a population at preproject levels; and

- o Duration of time over which an impact will occur.

A finding of significance for a particular impact can be based on one or more of the intensity (severity) and extent criteria as well as the context in which it occurs.

3.2.2.4 Environmental Impacts of the Proposed Action and Project Alternatives

The evaluation of impacts on biological resources included the use of several assumptions. Some representative assumptions are:

- o Increased pumping of the Cheyenne water well field could affect the riparian vegetation along Crow Creek; and

- o Work force inmigrants will increase fishing and hunting pressures within the Region of Influence.

In addition, it was assumed that in conformance with normal construction practices, certain mitigation measures will be carried out. These measures include provisions to:

- o Minimize surface disturbances;

- o Revegetate with quick growing native species as appropriate for short-term soil stabilization;

- o Revegetate with native plants for long-term recovery;

- o Minimize removal of trees (raptor roosts/nests);

- o Inform construction and operational staff of the need to minimize disturbance within and adjacent to the Area of Concentrated Study;

- o Inform project workers of wildlife and fishing regulations, the detrimental effects of illegal hunting and fishing, and the legally protected status of raptors;

- o Control dust during construction;

- o Minimize disturbance to rare plant populations;

- o Restrict vehicle maintenance activities to areas away from stream banks;

- o Minimize erosion and utilize erosion controls during construction activities;

- o Restrict use of firearms in construction areas;

- Minimize the spread of noxious weeds as appropriate;

- Conduct a site-specific biological inventory and survey of cable paths providing the necessary data base to plan appropriate avoidance or minimization of installation impacts on the sensitive vegetation types (riparian, meadow, shrubland and woodland) along these paths. The results will be used to position the centerline of the cable right-of-way in the most environmentally compatible location within mission and design criteria;

- Have a qualified biologist/botanist provide direct onsite input to, and monitor the construction contractor's compliance with, mitigation stipulations in biologically sensistive areas;

- Conduct a site-specific biological inventory and survey of culvert upgrade and other road modification locations wherever these potential actions intersect or parallel the sensitive vegetation zones on F.E. Warren AFB;

- Install the cables so as to restore the top soil and associated seed sources when back filling;

- Maintain a separation distance of at least one-half mile between cable right-of-way and identified raptor nest sites within mission and design requirements;

- Avoid disturbance to identified black-footed ferret habitat (Air Force);

- Minimize disturbance to rare wildlife populations (Air Force);

- Consider institution of a conservation area on Air Force fee title land for riparian/wetland habitats (Air Force);

- Develop a management plan for protection of rare plant species and sensitive habitats (Air Force):

- Restrict off-road vehicle use by project personnel and construction work force in the project vicinity (Air Force); and

- Increase productivity of selected areas of wildlife habitat through promotion of range improvement programs (Air Force, Wyoming Game and Fish Department, and Nebraska Game and Parks Commission).

These assumed mitigations, the potential disturbances, suggested mitigations, and the existing conditions were analyzed in an impact evaluation model and an impact assessment and mitigation planning chart to determine impact levels and residual adverse/beneficial impacts.

3.2.2.4.1 Vegetation

3.2.2.4.1.1 Baseline Future - No Action Alternative

The No Action Alternative will cause no project-related impact to vegetation within the Region of Influence, or the two portions of the Area of Concentrated Study. Current trends in human population-related impacts on the resource will be expected to continue. Any changes in the existing conditions will reflect future changes in agricultural and wildlife management philosophies related to long-term increased population pressures not project-related.

3.2.2.4.1.2 Proposed Action

Direct project-related disturbances will be restricted to the Area of Concentrated Study and closely adjacent areas. Therefore, no significant impacts on vegetation are anticipated within the broader Region of Influence. Road modifications in the Flights would disturb short-grass prairie, shrubland, meadow, rock outcrop, woodland, and riparian vegetation. Short-term impacts to short-grass prairie and meadow vegetation types will be associated with increased dust from vehicle movement, increased localized erosion, and unauthorized offsite, off-road vehicle activity. Long-term impacts will result from permanent removal or burial of any of these types of vegetation and from off-road vehicle use in shrubland, woodland, and riparian types. The long-term impacts to shortgrass prairie will be negligible and not significant since it is regionally abundant and in most areas subjected to grazing pressure. Short and long-term impacts to rock outcrop vegetation will be low, but significant because the vegetation type is very limited in distribution regionally. With application of the appropriate assumed mitigations, short and long-term direct impacts to shrubland, woodland, and meadow vegetation will be significant and low, while impacts on riparian vegetation will be moderate and significant. The quantity of these vegetation types impacted by the project will be low but important because these vegetation types provide important habitat for wildlife and due to the infrequency of suitable edaphic factors they are less abundant than short-grass prairie within both the Region of Influence and Area of Concentrated Study.

Impacts associated with road corridors outside the Flight portion of the Area of Concentrated Study, but closely adjacent to them, would be the same as those occurring along road corridors within Flights as discussed earlier.

Direct project-related disturbance to short-grass prairie may occur at the 58 silo sites where native vegetation is present. These impacts would be negligible and not significant due to the low acreages affected and regional abundance of short-grass prairie.

Disturbance to vegetation adjacent to the cable paths will occur primarily where easements across private land are necessary. The types of impacts occurring in these areas will be similar to those described for road corridors with the addition of trenching activities and increased potential for erosion-related impacts. Impact levels for vegetation types potentially disturbed within the cable paths will be the same as those identified for the road corridors. The overall vegetation impact levels for the five Proposed Action paths (Figure 3.0-2) are estimated

to be negligible and not significant to moderate and significant, depending on the vegetation types present, and may be short or long term. The other five alternate cable paths also range from negligible to moderate and significant and may be short or long term. These estimated impact levels reflect the quantity, recovery rate, and vegetation types potentially affected.

New construction and modification of proposed Peacekeeper facilities on F.E. Warren AFB will result in short and long-term impacts to mixed-grass prairie vegetation. Short-term low impacts will result from increased dust levels, potential erosion and vehicle turning movements during construction, while moderate impacts will result from the permanent removal and burial of mixed-grass vegetation. The impacts on mixed-grass prairie on F.E. Warren AFB will be significant because this vegetation type occurs infrequently within the Region of Influence and Area of Concentrated Study. In addition, mixed-grass prairie vegetation on F.E. Warren AFB is unique since it has not been grazed for over 25 years.

Impacts on the meadow vegetation within the F.E. Warren AFB portion of the Area of Concentrated Study, due to construction, modifications, and upgrading of roads and utilities will be moderate and significant because it is a limited resource. These impacts may be short term if disturbed areas are revegetated using the appropriate assumed mitigations. However, long-term impacts can be expected in those areas where habitat is eliminated by road expansions.

Impacts related to project activities will have a significant high impact on riparian vegetation along Crow and Diamond creeks. These impacts will be short and long term, primarily due to the length of time necessary for recovery of shrubs and trees following disturbances. The riparian vegetation also provides known areas of habitat for the U.S. Fish and Wildlife Service Category One species, the Colorado butterfly plant, as well as potential habitat for expansion of the species population. High, short and long-term impacts which will be significant could also affect riparian vegetation in an unnamed drainage near Cheyenne and Parade avenues on F.E. Warren AFB.

The three alternative new road configurations, including the offbase circulation corridors, will have high, short and long-term, significant, site-specific impacts on riparian habitat, and will affect known populations of the Colorado butterfly plant. These impacts will be significant because of the unique character of the riparian vegetation. The offbase impacts are negligible and not significant at the Interstate 25 interchanges and along Round Top Road south of the F.E. Warren boundary and at Interstate 80. However, the proposed new north/south road and its design option alternatives (R2 and R3) will have high and potentially short and long-term impacts which are significant on riparian vegetation supporting known populations of Colorado butterfly plant. The area where these two road alternatives cross Diamond Creek supports currently undisturbed vegetation. Alternatives R1 and R2 will also have high, short and long-term, significant impacts on Colorado butterfly plant habitat along the new southern east/west road. The southern design option follows existing road alignments and will have moderate, short and long-term, significant impacts on riparian vegetation at the Crow Creek crossing. Colorado butterfly plant is not currently known to occur in the vicinity of the Plant Road bridge.

The staging area alternatives are expected to have similar biological impact levels. The impacts are expected to be negligible.

3.2.2.4.2 Wildlife

3.2.2.4.2.1 Big Game

Baseline Future - No Action Alternative. No project-related impacts to big game will occur in the Region of Influence, Area of Concentrated Study, F.E. Warren AFB, or other disturbed areas due to the No Action Alternative. Current trends in human population-related impacts on the resource will be expected to continue. Nonproject-related changes in wildlife management philosophies may impact existing conditions at a future date as a result of agency responses to perceived changes in population structures of the resources.

Proposed Action. The determination of significance for impacts to big game is generally based on management agency concerns and the potential for cumulative impacts. These management concerns include the quality of the hunting experience and hunter success. Cumulative impacts may occur in association with any new but currently unknown projects which may bring about added human population/increases in the region within the Peacekeeper time frame. However, the determination of significance for construction-related disturbances as discussed in this section is based on potential management agency concerns only.

The majority of project impacts within the Region of Influence are considered indirect and are due to human population increases. Increased hunting pressure may accompany this population growth. Hunting licenses are issued on a limited basis for most big game species, therefore big game legal harvests would not be affected. Short-term, low, and significant impacts may be expected to occur within the Wyoming Region of Influence to deer, elk, and black bear populations where general licensing occurs. Impacts to these species are considered low level because the project is expected to increase Wyoming hunting days by 1.1 percent (Wyoming Game and Fish Department 1982-c).

Poaching, dog kills, vehicle collisions, and general recreation pressures may also increase with human population growth and may result in short-term impacts to big game within the Region of Influence. Low level impacts which will be significant regionally are anticipated for each of these effects, except in those areas of concentrated recreation pressures where significant, moderate impacts may occur.

Long-term permanent and short term temporary habitat loss due to upgrading of access roads and cable installations will occur in the Area of Concentrated Study. However, due to the minimal amounts of big game habitat, including critical-winter-year long habitat, that will be affected, impacts will be negligible. Construction disturbances such as noise and vehicle movement, increases in poaching, and vehicle collisions within the Area of Concentrated Study are expected to be short-term, significant, and low level impacts in regard to pronghorn, mule deer, and white-tailed deer at silo sites. The impacts would be greatest in areas of relatively sensitive habitat. No project-related impacts are expected on elk, black bear, and mountain lion in the Area of Concentrated Study. Short and

long-term habitat (winter year long and year long), loss and short-term construction disturbance may cause significant, low level impacts to big game species using F.E. Warren AFB.

If aggregate quarries are located within critical pronghorn or mule deer habitat, low and significant impacts may occur due to habitat loss and construction disturbances. Impacts to big game associated with base circulation road alternatives will be low and significant, while impacts associated with cable paths and staging area alternatives will be negligible.

Overall impact levels for big game will be short and long term, low and significant in the flight portion of the Area of Concentrated Study and at F.E. Warren AFB. Short-term impacts in the Region of Influence will be significant and moderate. Long-term regional impacts will be negligible.

3.2.2.4.2.2 Furbearers, Upland Game, and Waterfowl

Baseline Future - No Action Alternative. No project-related impacts to furbearers, upland game, and waterfowl will occur from the No Action Alternative in the Region of Influence, Area of Concentrated Study (including F.E. Warren AFB), or other project-related disturbance areas, such as the cable paths or staging areas. Current trends in human population-related impacts on the resource will be expected to continue. Nonproject-related changes in wildlife management philosophies may impact existing conditions at a future date as a result of agency responses to perceived changes in the population structures of the resources.

Proposed Action. No direct impacts will affect furbearers, upland game, and waterfowl within the Region of Influence. However, indirect impacts such as increased hunting and trapping may occur. The increase in hunting and trapping pressures for most species will be short term and low level but not significant. Poaching may increase, but will result in low, and short-term, not significant impacts. No hunting or public trapping is permitted on F.E. Warren AFB. However, the Air Force does allow a restricted trapping program within the base.

The direct impacts on furbearers, upland game, and waterfowl due to loss and disturbance of aquatic and riparian habitats within the Area of Concentrated Study (including the cable paths and F.E. Warren AFB circulation road alternatives) or use of existing aggregate quarry sites will be long term, low level, but not significant. Reduction of other habitats will not adversely affect these species groups. Habitat modification or loss associated with the staging area alternatives will be negligible.

Overall impacts on furbearers, upland game, and waterfowl will be short and long term, low and not significant thoughout the Area of Concentrated Study. The impacts will be low and not significant in the Region of Influence for the short term and negligible in the long term.

3.2.2.4.2.3 Nongame Mammals, Other Birds, Reptiles, and Amphibians

Baseline Future - No Action Alternative. No project-related impacts to nongame

mammals, other birds, reptiles, and amphibians will directly result from the No Action Alternative in the Region of Influence, Area of Concentrated Study, F.E. Warren AFB, or other project-related disturbed areas. Current trends in human population-related impacts on the resource will be expected to continue. Nonproject-related changes in wildlife management philosophies could impact existing conditions at a future date as a result of agency responses to perceived changes in population structures of the resources.

Proposed Action. The proposed project will have negligible impacts on populations of nongame mammals, other birds, reptiles, and amphibians in the Region of Influence. Construction within the Area of Concentrated of Study, including F.E. Warren AFB, and activities associated with aggregate quarries and staging areas could cause the direct loss of individuals unable to move away from construction impacted areas. Permanent and temporary habitat loss for these wildlife groups is expected to be a negligible impact, due to the relatively broad distributions of each group. In addition, they generally have high reproduction rates and may reinvade disturbed areas as revegetation occurs. Therefore, no long-term impacts are anticipated for these wildlife groups. However, these predicted negligible impact levels may be moderate and significant if unique/rare species, such as the pale milk snake and meadow jumping mouse, occur within the construction areas. Impacts assoicated with cable paths, F.E. Warren AFB circulation road, and staging area alternatives on these four wildlife groups will be negligible.

3.2.2.4.2.4 Raptors

Baseline Future - No Action Alternative. No project-related impacts to raptors will occur from the No Action Alternative. Current trends in human population-related impacts on the resource will be expected to continue. Nonproject-related changes in wildlife management philosophies may impact existing conditions at a future date as result of agency responses to perceived changes in population structures of the resources.

Proposed Action. The determination of significance for impacts to raptors as discussed in this section is generally based on management agency concerns and the potential for cumulative impacts. Management agencies indicate concern that some raptor species, such as Swainson's and Ferruginous hawks, are declining. Cumulative impacts may occur in association with any new but currently unknown prospects which may bring about added human population increases in the region with the project time frame.

Random (indiscriminant) shooting is a major mortality factor affecting raptors (Newton 1979), and may increase within the Region of Influence. The impact will be short and long term, significant, and low level, depending upon the magnitude of the increase in shooting and the species involved. Moderate impacts may occur in the short term during peak population years.

Direct impacts to raptors may occur within the Area of Concentrated Study, F.E. Warren AFB, and other disturbed areas. These impacts include disturbance to nesting raptors and important habitat components such as trees and small mammal burrows. Nineteen known raptor nests are located within 1 mile of an access road or silo. Disturbances such as noise and movement near active

nests may cause moderate, significant, and short-term impacts. Implementation of appropriate assumed mitigations will reduce the impacts caused by the removal of trees in riparian and woodland habitats to a significant, short and long-term, low impact level. Due to the rare status of the burrowing owl, loss of small mammal burrows could remove potential habitat causing a short-term, low, significant level of impact on this species within the Area of Concentrated Study.

Construction activity during the raptor breeding season may cause significant, short-term, moderate impacts to the Swainson's hawk nest located adjacent to the southern east-west road alternatives (R1 and R2) on F.E. Warren AFB. However, impacts associated with loss of trees due to construction of the north-south road (Alternative R2 and R3) across Diamond and Crow creeks may be significant, short and long term, and low level.

The level of impact to raptors caused by disturbances near nesting locations could be dependent upon the amount of alternate habitat near the silo sites and access roads. Impacts may be short term, moderate, and significant. Impacts associated with the cable path alternatives may also be short term, moderate, and significant. Impacts associated with staging areas will be negligible.

Overall impacts on raptors will be moderate and significant for the short term in all areas. Impacts will be low and significant in all areas for the long term.

3.2.2.4.3 Fisheries Resources

3.2.2.4.3.1 Baseline Future - No Action Alternative

No project-related impacts to fisheries resources will directly result from the No Action Alternative. Current trends in human population-related impacts on the resource will be expected to continue. Nonproject-related changes in fisheries management philosphies may impact existing conditions at a future date as a result of agency responses to perceived changes in the population structures of the resources.

3.2.2.4.3.2 Proposed Action

The determination of significance for fisheries is generally based on management agency concerns. The significance determination for increased fishing pressure is also based on the potential for cumulative impacts. These management concerns include the quality of the fishing experience and fisherman success. Cumulative impacts may occur in association with any new but currently unknown projects which may bring about added human population increases in the region within the project time frame.

Aquatic resources in the Region of Influence will not be impacted by direct construction activities. Fishing opportunities in the Region of Influence may decline due to the estimated increase in the fishing population projected for the period of project construction. A significant, short-term, low impact may occur on waters that are currently overfished or at fishing capacity. Long-term impacts due to increased fishing pressure in the Region of Influence are expected to be negligible.

Construction activities within the Area of Concentrated Study may potentially cause significant, low, short-term impacts on streams within these areas. Aquatic resources that may be impacted by expansion and improvement of access roads include Chugwater, Horse, Bear, and Lodgepole creeks. Increased siltation and possible petroleum product and chemical spills will be the main impacts during the construction of access roads and the cable paths at perennial stream crossings. The impact level of increased turbidity on aquatic organisms from these construction-related disturbances is expected to be significant, short term, and low. Water quality changes, due to oil and chemical spills, may cause significant, low level impacts on these streams on a short-term basis, however, long--term impacts are expected to be negligible. Impacts from habitat loss due to stream bed construction activities are expected to be significant, low level, and short-term.

Horse, Little Horse, and Bushnell creeks could be impacted by installation of the cable path alternatives RB1 and PB1. The remaining eight cable path alternatives will cross intermittent drainages and are expected to have negligible impacts.

Increased fishing pressure on perennial streams in the Area of Concentrated Study such as Horse, Richeau, Chugwater, and Lodgepole creeks may result from localized population increases. Depending on the current availability and quality of fishing experiences in these areas, expected impacts will be significant, short term, and low level.

Construction activities associated with the access roads at stream crossings on Diamond and Crow creeks may impact these streams. Increased turbidity levels and potential oil and chemical spills are expected to have significant short-term, low level impacts on aquatic organisms in Diamond and Crow creeks. Short-term, significant, low level impacts may also occur due to habitat loss from the slope adjustment on Diamond Creek.

Sand and gravel removal from perennial stream beds may impact aquatic resources in and adjacent to the aggregate quarries. Short-term impacts such as increased turbidity levels and water quality changes may occur as a result of the sand and gravel removal. Impacts due to habitat loss are expected to be significant, short-term, and low. Borrow pits created by sand and gravel removal may provide improved fish habitat and fishing opportunities for the public if properly designed and managed.

The alternative staging sites are not expected to be placed in or adjacent to any stream drainages. Consequently, no direct construction-related activities from the staging sites are expected to impact aquatic resources in the study area.

Impacts on the fisheries will be low, and significant in the short term and negligible in the long term for all areas.

3.2.2.4.4 Unique and Sensitive Habitats

3.2.2.4.4.1 Vegetation

Baseline Future - No Action Alternative. Unique and sensitive habitats for vegetation will not be adversely affected with the No Action Alternative. Current trends in human population-related impacts on the resource will be expected to continue.

Proposed Action. Riparian areas in the Area of Concentrated Study may be adversely affected due to construction-related disturbances. Disturbance to riparian and associated wetland areas will constitute significant, moderate, short and long-term impacts within the Flights and significant, high, short and long-term impacts on F.E. Warren AFB. Impacts to riparian and wetland areas are significant due to specific concerns, related to unique characteristics of an area, addressed in the Council on Environmental Quality regulations. Short-term impacts on riparian areas associated with road and cable installation activities include loss of vegetation and increased erosion potential. Long-term impacts reflect the length of time required for revegetation and recovery of riparian and wetland habitats after disturbance. Impacts on the riparian areas along the Crow and Diamond Creek drainages within the boundaries of F.E. Warren AFB are of particular concern because of the occurrence of populations and habitat of the Colorado butterfly plant and due to the undisturbed nature of the vegetation of the proposed Diamond Creek crossing. Disturbance impacts to riparian vegetation will be short and long-term, significant, and high. Impacts to these riparian areas are discussed in more detail in Sections 3.2.2.4.1.2 and 3.2.2.4.5.1. If riparian vegetation occurs near potential staging areas, impacts may occur. However, due to the small acreages involved this will be a negligible impact.

3.2.2.4.4.2 Wildlife

Baseline Future - No Action Alternative. No project-related impacts to unique or sensitive wildlife habitat will directly result in the Region of Influence, Area of Concentrated Study, or F.E. Warren AFB from the No Action Alternative. Current trends in human population-related impacts on the resource will be expected to continue. Nonproject-related changes in wildlife management philosophies could impact existing conditions at a future date as a result of agency responses to perceived changes in the population structures of the resources.

Proposed Action. No significant impacts are expected to occur to unique or sensitive wildlife habitat within the Region of Influence from the Proposed Action. Pronghorn migration route and/or mule deer critical-winter-yearlong habitat loss associated with project activity within the Area of Concentrated Study will result in negligible impacts, due to the minimal quantity of habitat that may be affected along access roads and at silo sites.

If aggregate quarries are situated in pronghorn or mule deer critical-winter-yearlong habitat, construction disturbances and potential habitat loss may cause significant, short and long-term, low level impacts. These impacts would be significant because they may affect ecologically critical habitat.

3.2.2.4.4.3 Fisheries Resources

Baseline Future - No Action Alternative. There are no unique or sensitive aquatic habitats known to occur within the Area of Concentrated Study; therefore, no significant impacts are anticipated as a result of the No Action Alternative.

Proposed Action. There are no unique or sensitive aquatic habitats known to occur within the Area of Concentrated Study or other adjacent potential disturbed areas; therefore, no impacts are anticipated as a result of the Proposed Action.

3.2.2.4.5 Threatened and Endangered Species

Potential impacts on threatened and endangered species are considered significant because of their special legal status. Impacts to other species listed as rare, threatened, endangered or status undetermined by state agencies are also considered to be significant.

3.2.2.4.5.1 Vegetation

Baseline Future - No Action Alternative. Plant taxa listed by the U.S. Fish and Wildlife Service and various state agencies will not be adversely affected with the No Action Alternative. Current trends in human population-related impacts on the resource will be expected to continue.

Proposed Action. The rare (Wyoming) woolly milkvetch may be impacted at silo P2 during construction activities. This species was identified within a few meters of the security fence at silo P2 during a July 1983 field reconnaissance. Impacts to the woolly milkvetch at this silo may be short and long term, significant, and high.

The federally listed Category One Colorado butterfly plant and its critical habitat may be impacted at F.E. Warren AFB primarily due to transportation and utility corridors crossing riparian vegetation associated with Crow and Diamond creeks, in addition to the unnamed drainage near the intersection of Cheyenne Road and Parade Avenue. The crossing of Diamond Creek by the base access road alternatives, R2 and R3, will affect undisturbed habitat. Any short or long-term impacts to populations or habitat of the Colorado butterfly plant will be significant and high.

No threatened or endangered plant species presently are known to occur within the cable paths or staging area alternatives. Therefore, impacts will be expected to be negligible. All road alternatives within F.E. Warren AFB will impact the Colorado butterfly plant on a short and long-term, high, and significant level.

3.2.2.4.5.2 Wildlife

Baseline Future - No Action Alternative. No project-related impacts to threatened and endangered wildlife will directly result from the No Action Alternative. Current trends in human population-related impacts on the resource will be expected

to continue. Nonproject-related changes in wildlife management philosophies could impact existing conditions at a future date or as a result of agency responses to perceived changes in the population structures of the resources.

Proposed Action. The bald eagle may potentially experience short-term, significant, low impacts from increased random shooting throughout the Region of Influence and Area of Concentrated Study. The impact will be highest during peak construction activity and decrease in the years following.

Direct impacts occurring within the Area of Concentrated Study, including F.E. Warren AFB, and other disturbed areas will be associated with habitat loss. The bald eagle, peregrine falcon, and whooping crane will not be significantly impacted. With implementation of appropriate assumed mitigations, impacts to the black-footed ferret will be negligible if this species is currently using any of the prairie dog towns that may occur in the Flight portion of the Area of Concentrated Study. Construction activity may impact several species of special state concern in the Flight portion of the Area of Concentrated Study and on F.E. Warren AFB, such as the swift fox, burrowing owl, pale milk snake, and meadow jumping mouse. These impacts will be low, short term, and significant.

If habitat of threatened or endangered species occurs in the areas where aggregate quarries are to be expanded the impact will be short term, significant, and moderate, however if such habitat is not present the impacts would be negligible. With implementation of appropriate mitigations, during planning and installation of communication cables, impacts on the black-footed ferret would be negligible. Impacts on other species of state concern will be low, short term, and significant if they are present in the cable paths. Impacts associated with road alternatives on F.E. Warren AFB and with the staging area alternatives are expected to be negligible.

3.2.2.4.5.3 Fisheries Resources

Baseline Future - No Action Alternative. No project-related impacts to threatened and endangered fish will directly result from the No Action Alternative. Current trends in human population-related impacts on the resource will be expected to continue. Nonproject-related changes in fisheries management philosophies could impact existing conditions at a future date or as a result of agency responses to perceived changes in the population structures of the resources.

Proposed Action. No direct impacts to threatened and endangered fish in the Region of Influence will result from the Proposed Action. Potential impacts from increased regional fishing pressure may have a low, significant, short-term impact on the federally endangered greenback cutthroat trout.

Construction-related impacts on the orangethroat darter (undetermined status, Wyoming) such as increased turbidity levels and potential petroleum spills at stream crossings on Lodgepole Creek may be significant, short term, and moderate, if the species has become reestablished from downstream populations.

Construction of proposed access roads on F.E. Warren AFB may cause increased turbidities, potential petroleum spills and flow alterations in Diamond and Crow Creeks. These construction activities are expected to have significant, short-term, and low impacts on the common shiner, state listed as rare in Wyoming, because agency management concern is low (WGFD personal communication, 1983) and populations appear to be stable. There are general similarities for biological resource impacts among the road and staging area alternatives (Figure 3.0-2).

No indirect impacts will occur on fishes in the Area of Concentrated Study.

3.2.2.5 Summary of Impacts

3.2.2.5.1 Explanation of Detailed Impact Matrix

Using the input developed from the impact evaluation model impacts to Biological Resource components (i.e. species, vegetation types, or habitat types) have been summarized (Figure 3.2.2-1) to present impact levels and significance for the Proposed Action. Site-specific biological impacts occur in two distinct areas within the Area of Concentrated Study, the Flight area and F.E. Warren AFB. Site-specific areas are the locations within, or adjacent to, the Area of Concentrated Study where impacts due to project activities will take place. Regional impacts indicated in the matrix tables are based on direct or indirect impacts on biological resources that may occur within the broader Region of Influence. Biological resources include the potentially affected vegetation, wildlife, and aquatic species. Threatened and endangered species are included but because of their special legal status are discussed separately.

Site-specific impact levels differ between the Flight and F.E. Warren AFB portions of the Area of Concentrated Study, with impacts on vegetation generally being higher on F.E. Warren AFB. The impacts in the regional context tend to be lower than site-specific impacts. The alternative cable paths, roads, and staging areas exhibit some differences in impact level between Biological Resource elements, and between different alternatives (Figure 3.0-2). Seven of the ten cable paths have low to moderate impact levels which are all significant, and three of the corridors have negligible impacts which are not significant based on general biological criteria. Consideration of threatened and endangered species indicates that with implementation of appropriate assumed mitigations impacts on black-footed ferret habitat would be negligible. However impacts on other species of state concern will be low, short term and significant if they are present in the cable paths. There are general similarities for biological resource impacts among the road and staging area alternatives.

The overall impact level for biological resources, excluding threatened and endangered species, is moderate and significant in the flight portion of the Area of Concentrated Study in the short and long term. The overall impacts at F.E. Warren AFB are high and significant for the short and long term. Within the broader Region of Influence the impacts are moderate and significant for the short term and low and significant over the long term.

Figure 3.2.2-1

BIOLOGICAL RESOURCES
SUMMARY IMPACT MATRIX

LEGEND		ADVERSE IMPACTS	SIGNIFICANT ADVERSE IMPACTS
LEVEL OF IMPACT*	LOW	∘	•
	MODERATE	○	●
	HIGH	◯	⬤
POTENTIAL BENEFICIAL EFFECTS		▒	

* MEASURE OF THE AMOUNT OF ENVIRONMENTAL CHANGE

PROJECT IMPACTS

	SHORT TERM				LONG TERM			
	SITE		LOCAL	REGIONAL	SITE		LOCAL	REGIONAL
	FLIGHTS	F.E. WARREN			FLIGHTS	F.E. WARREN		
BIOLOGICAL RESOURCES	●	⬤		●	●	⬤		•
Vegetation	●	⬤			●	⬤		
Loss of Vegetation								
Prairie								
Short-grass								
Mixed-grass		●				●		
Shrubland	•				•			
Riparian	●	⬤			●	⬤		
Meadow	•	●			•	●		
Woodland	•				•			
Rock Outcrop	•				•			
Wildlife	●	●		●	●	●		•
Big Game	•	•		●	•	•		
Hunting Pressures	•			•				
Loss of Critical-Winter-Year Long Habitat								
Loss of Winter-Year Long-Habitat		•				•		
Loss of Yearlong Habitat		•				•		
Poaching Increases	•			•				
Road Kills	•			•				
Recreation Pressures				●				
Construction Activity Disturbances	•							
Feral/Domestic Dog Kills				•				

Figure 3.2.2-1 Continued

BIOLOGICAL RESOURCES SUMMARY IMPACT MATRIX

LEGEND		ADVERSE IMPACTS	SIGNIFICANT ADVERSE IMPACTS
LEVEL OF IMPACT*	LOW	○	●
	MODERATE	○	●
	HIGH	○	●

POTENTIAL BENEFICIAL EFFECTS

* MEASURE OF THE AMOUNT OF ENVIRONMENTAL CHANGE

	PROJECT IMPACTS							
	SHORT TERM				LONG TERM			
	SITE		LOCAL	REGIONAL	SITE		LOCAL	REGIONAL
	FLIGHTS	F.E. WARREN			FLIGHTS	F.E. WARREN		
Fur Bearers, Upland Game & Waterfowl	○	○		○	○	○		
Loss of Furbearers Habitat	○	○			○	○		
Hunting/Trapping Pressure	○			○				
Poaching	○			○				
Loss of Upland Game Habitat	○	○			○	○		
Hunting Pressure	○			○				
Poaching	○			○				
Loss of Waterfowl Habitat	○	○			○			
Hunting Pressure	○			○				
Poaching	○			○				
Nongame Mammals, Other Birds, Reptiles and Amphibians								
Loss of Nongame Mammal Habitat								
Loss of Other Bird Habitat								
Loss of Reptile and Amphibian Habitat								
Raptors	●	●		●	•	•		•
Loss of Raptor Habitat	•	•			•	•		
Random Raptor Shooting	●			●	•			•
Disruption of nesting activity	●	●						

Figure 3.2.2-1 Continued

BIOLOGICAL RESOURCES SUMMARY IMPACT MATRIX

LEGEND		ADVERSE IMPACTS	SIGNIFICANT ADVERSE IMPACTS
LEVEL OF IMPACT*	LOW	∘	•
	MODERATE	○	●
	HIGH	◯	⬤

POTENTIAL BENEFICIAL EFFECTS

* MEASURE OF THE AMOUNT OF ENVIRONMENTAL CHANGE

PROJECT IMPACTS

	SHORT TERM				LONG TERM			
	SITE		LOCAL	REGIONAL	SITE		LOCAL	REGIONAL
	FLIGHTS	F.E. WARREN			FLIGHTS	F.E. WARREN		
Fisheries Resources	•	•		•				
Loss of Habitat	•	•						
Increase in Turbidity	•	•						
Oil or Chemical Spills	•	•						
Increase in Fishing Pressure	•			•				
Unique and Sensitive Habitats	●	⬤			●	⬤		
Loss of Vegetation Habitat	●	⬤			●	⬤		
Loss of Wildlife Habitat	•				•			
Loss of Aquatic Habitat								
Threatened and Endangered Species	⬤	⬤		•	⬤	⬤		•
Impact on T & E plants	⬤	⬤			⬤	⬤		
Impact on T & E wildlife	•	•		•	•			•
Impact on T & E fish	●	•		•				

Threatened and endangered species were not combined into the overall biological summary because of their legal status. The site-specific differences in impact levels within the Area of Concentrated Study (Flights and F.E. Warren AFB) are due to the assumed implementation of mitigation for the Black-footed ferret and to the presence of potential habitat for the species of state concern within the Flight portion of the Area of Concentrated Study and known populations of the Colorado butterfly plant at F.E. Warren AFB.

The summarized impact level for the threatened and endangered species element will be significant and high for the Area of Concentrated Study including the flight portion and the F.E. Warren AFB area over the short and long term. The impacts will be low and significant in the broader Region of Influence for the short and long term.

3.2.2.5.2 Aggregation of Elements, Impacts, and Significance

The aggregated impact levels for Biological Resources indicate short-term impacts are expected to be high and significant on F.E. Warren AFB, moderate and significant in other portions (Flights) of the Area of Concentrated Study, and moderate and significant regionally. Long-term impacts would be high and significant on F.E. Warren AFB, moderate in the Flight portion of the Area of Concentrated Study, and low on a regional basis.

For the Proposed Action (Figure 3.0-1) and the alternatives (Figure 3.0-2), there are two separate aggregated levels of impact for Biological Resources. One composite rating aggregates the level of impact ratings for four of the Biological Resource elements: vegetation, wildlife, fisheries, and unique and sensitive habitats. A separate composite rating is aggregated for threatened and endangered species, due to the unique legal status of these resources.

3.2.2.5.2.1 Biological Resources

Aggregation of impacts took place in two steps. First, levels of impact for the Biological Resources subelements were aggregated into composite levels of impact for each element. This first level of aggregations was based on an evaluation of the levels of impacts on the subelements and, when appropriate, use of the highest impact level and representative of the impact level for that subelement and for the element. Second, the determination of the overall impact rating for Biological Resources involved aggregation of the impact ratings for the elements of the resource. The four biological elements were aggregated to the resource level following an evaluation of the potential project effects on these resource elements (vegetation, wildlife, fisheries, and unique and sensitive habitats). The impact evaluations were based on data available for each resource element and its subelements. Within two of the Biological Resource elements (vegetation and unique and sensitive habitats) high, significant impacts on riparian vegetation on F.E. Warren AFB are overriding considerations in aggregating impact levels. These impacts will affect the known and potential habitat of, the Colorado butterfly plant; therefore, these impacts are weighted higher than the low to moderate level impacts attributed to vegetation, wildlife, fisheries, and unique and sensitive habitats elsewhere in the Area of Concentrated Study.

3.2.2.5.2.2 Threatened and Endangered Species

Determination of the overall impact rating for Threatened and Endangered Species involved aggregation of the impact ratings for the elements of the resource. Threatened and endangered species were left at the resource level and not combined into the biological category for summarization due to their legal status. The aggregated impact levels within threatened and endangered species are based on a similar approach to that described above. In this case the residual high, significant impacts are related to potential impacts on the Colorado butterfly plant populations at F.E. Warren AFB. The potential for impacts on prairie dog towns (possible black footed-ferret habitat) in other areas of the Area of Concentrated Study will be negligible with the implementation of appropriate assumed mitigation measures.

3.2.2.6 Mitigation Measures

Potential mitigation measures that will be considered are identified below. One, some, or all of the mitigation measures may ultimately be selected. Each measure identifies the party responsible to implement, but not necessarily to pay for, the measure.

- Schedule construction activity to minimize disturbance during the raptor nesting periods (Air Force);
- Schedule construction activity to minimize disturbance during pronghorn migration periods (Air Force);
- Design and construct roads and stream crossings to minimize encroachment into stream channels and riparian vegetation (Air Force);
- Conduct site-specific biological inventory and survey of culvert upgrade and other road modification locations wherever these potential actions intersect or parallel sensitive vegetation type zones within the Area of Concentrated Study;
- Increase productivity of selected areas of wildlife habitat through promotion of range improvement programs (Air Force, Wyoming Game and Fish Department, and Nebraska Game and Parks Commission); and
- In coordination with the Water Resource monitoring studies, monitor effects of the cone of depression, associated with increased groundwater use, specifically as it relates to riparian vegetation and the Colorado butterfly plant, a sensitive species of concern (Air Force).

3.2.2.7 Unavoidable Adverse Impacts

Unavoidable adverse impacts due to the proposed project would include:

- Indiscriminate shooting of raptors;
- Permanent loss of riparian habitat;

- Temporary and permanent disturbance to shrubland;
- Potential disturbance to riparian habitat along Crow Creek as a result of widening the cone of depression around the Cheyenne well field; and
- Permanent and temporary disturbance and loss of Colorado butterfly plant habitat along Diamond and Crow creeks.

Irreversible and irretrievable commitment of resources include:

- Potential loss of critical habitat for the Colorado butterfly plant;
- Potential loss of riparian and meadow vegetation;
- Loss of native grassland; and
- Loss of big game habitat.

Short-term uses of the biological components of man's environment include direct construction-related disturbances and direct impacts associated with an increase in population which occurs over a period of less than 5 years. Long-term uses of man's environment include those impacts occurring over a period of time more than 5 years, including permanent habitat loss.

3.2.3 Geologic Resources

3.2.3.1 Introduction

The Region of Influence for Geologic Resources was presented and justified in Section 2.2.3.1. Following detailed data analysis, the only specific Areas of Concentrated Study were for faulting and soil resources. The Area of Concentrated Study for faulting is the area around the potentially active Wheatland-Whalen Fault Zone. This Area of Concentrated Study was adopted because of the potential for ground rupture within the fault zone. Fault rupture represents an impact on the project by the resource and not an impact on the resource produced by the project, and therefore will be discussed in Section 1.6.10.2. Only one subelement of energy and mineral resources, aggregate resources, was impacted by the project and was therefore the only subelement for which Levels of Impact and Significance Criteria were developed. The Areas of Concentrated Study for soil resources were adopted primarily because construction sites and buried cable locations have already been established and any project effect on soil resources will be limited to site-specific locations (Areas of Concentrated Study) directly disturbed by the Peacekeeper in Minuteman Silos project.

3.2.3.2 Definition of Levels of Impact

3.2.3.2.1 Energy and Mineral Resources

The level of impact definitions are:

- Negligible Impact - The project will produce no measurable change in the capacity utilization rate of aggregate resources but will affect regional suppliers' inventory.

- Low Impact - The project will be associated with a measurable change in capacity utilization, and inventories of regional suppliers. Such impacts will affect the projected baseline of the existing aggregate market by increasing production. However, existing permanent production facilities and reserves will be capable of satisfying this demand.

- Moderate Impact - The project will produce increased demands which will create temporary shortages accompanied by the increased capacity utilization of regional suppliers.

- High Impact - The project will produce maximum capacity utilization and will exhaust existing inventories. This will initiate expansion of permanent production facilities or alter the trade area delineation. In this situation, current production capacity could not completely satisfy the increase in demand. Consequently, a major shift in the aggregate supply/demand relationship will occur.

3.2.3.2.2 Soil Resources

The level of impact definitions for soils are:

- o Negligible Impact - The project will induce erosion at an undetectable rate.

- o Low Impact - The project will induce erosion at a rate less than the soil formation rate.

- o Moderate Impact - The project will induce erosion at a rate approximately equal to the soil formation rate.

- o High Impact - The project will induce erosion at a rate greater than the soil formation rate.

3.2.3.3 Determination of Significance Criteria

3.2.3.3.1 Energy and Mineral Resources

For the level of impact on aggregate resources to be considered significant, there must be a depletion in the regional resource availability that will result in a long-term decrease in revenue to the regional economy.

3.2.3.3.2 Soil Resources

The significance criteria for soil resources is based on a comparison of the rate of soil erosion to the rate of soil formation within the site-specific construction areas of the Region of Influence. The impact to soil resources is considered significant when the rate of soil erosion is greater than the rate of soil formation.

3.2.3.4 Environmental Impacts of the Proposed Action and Project Alternatives

Based on a detailed environmental data analysis the following geologic resources are considered issues for impact discussion: energy and mineral resources (aggregate resources), and soil resources (potential wind and water erosion).

Assumed mitigation measures for the geologic resource impacts include:

1) Aggregate - The only assumption made to mitigate the affects of resource development on the Region of Influence is the sequential scheduling of proposed construction to fit the existing aggregate production capabilities over a reasonable period of time.

2) Soil Resources - Assumed mitigations consist primarily of procedures normally employed during the construction phase of a large project:

   - o Strip and stockpile topsoil in areas requiring grading, other than for permanent construction, and in areas where excavated materials will be disposed, and then replace the topsoil when grading or disposal is complete.

   - o Revegetate or recrop disturbed areas with native species as soon as possible.

- o Utilize properly designed erosion control practices in any areas required to be left disturbed for extended periods of time.

- o Sequence construction, where practical, to minimize large continuously disturbed areas, especially those oriented parallel to the prevailing winds.

- o Following construction, protect areas until new cover is well established, or the site returned to desired use.

3.2.3.4.1 Energy and Mineral Resources

3.2.3.4.1.1 Baseline Future - No Action Alternative

For aggregate resources, anticipated future trends without the project will reflect historic response to market demands. A normal economic growth will result in continued low level use for aggregate.

3.2.3.4.1.2 Proposed Action

A low, not significant impact at the local level for the short and long term is expected for aggregate resources. Concrete and road building requirements will provide a demand for aggregate. Existing pits and quarries will expand production to meet this demand. These pits and quarries could produce the estimated quantities of aggregate needed for the project.

Preliminary estimates of project aggregate demands are 1,097,131 tons or approximately 625,365 cubic yards (cy). The Corps of Engineers has estimated there are approximately 9,580,000 cy of known available sand and gravel within the Region of Influence. Such a demand for aggregate could produce some direct or indirect impacts as production quantities are expanded. These impacts will last until the completion of the project and will influence areas within economical haul distances of the project.

The impact to aggregate resources is negligible at the regional level in both the short and long term. This is because there is no depletion of the regional resource availability that will result in a long-term decrease in revenue to the regional economy and therefore no decreases in revenue to the economy of the Region of Influence. Because aggregate is not a renewable resource, the utilization of it for this project will result in an irreversible and irretrievable commitment of resources.

3.2.3.4.2 Soil Resources

3.2.3.4.2.1 Baseline Future - No Action Alternative

The baseline conditions of wind and water soil erosion discussed in Section 2.2.3.2.3 will continue for the foreseeable future.

3.2.3.4.2.2 Proposed Action

A low impact at the site level is anticipated for potential wind and water erosion. Depending on where roads, communication corridors, etc., are located, some areas will be permanently or temporarily disturbed. It is anticipated that disturbed areas will be either revegetated, returned to cropland use, or covered by some nonerodable material (i.e., paving, building, etc.). The low impact is expected to last during any construction phases and until the disturbed areas are either revegetated, returned to cropland, or built upon.

The potential erosion due to wind is directly related to the amount of protective cover and the size of the area considered. Most of eastern Laramie County is rangeland where wind erosion is not a serious problem. However, substantial erosion could occur in unprotected areas such as cropland. The soils of western Nebraska along the proposed communication corridors are cropped extensively in wheat and more susceptible to wind erosion than those of eastern Laramie County. Areas disturbed within the project area could similarly be subject to substantial erosion at the site level without the mitigation measures assumed in Section 3.2.3.4. Estimated soil losses during project operation in western Nebraska will be about the same as for baseline conditions since disturbed areas are either revegetated or recropped.

Moving water is another force causing soil erosion but is not considered a serious problem in southeastern Wyoming, primarily because of the semiarid climate of the region and its rangeland areas. However, certain unprotected areas, primarily cropland such as western Nebraska, may be seriously affected by water erosion without the mitigation measures assumed in Section 3.2.3.4. Similarly, disturbed areas within eastern Laramie County and western Nebraska could potentially be seriously affected by water erosion, if not properly protected.

3.2.3.5 Summary of Impacts

3.2.3.5.1 Explanation of Detailed Impact Matrix

Aggregate resources are termed a low impact at the local level and negligible at the regional level. Estimates have shown there are more than adequate reserves of aggregate within the Region of Influence to satisfy project demands. However, the project will cause a change in capacity utilization and inventories of local suppliers. On a regional level, no measurable change in the capacity utilization rate will occur but regional supplier inventories could be affected, depending on the rate of aggregate demand.

Project impacts on soil resources are considered site-specific low and not significant as potential erosion could occur during project construction activities but will be minimal if assumed construction practices (Section 3.2.3.4) are observed. Assuming that the disturbed areas are revegetated or recropped, no long-term consequences will result. Figure 3.2.3-1 shows levels of impact for Geologic Resources.

3.2.3.5.2 Aggregation of Elements, Impacts, and Significance

The overall impacts for Geologic Resources presented in Figure 3.2.3-1 are low

and not significant at the site and local levels in the short term, and low and not significant at the local level in the long term. All other impacts, regional short term and site and regional long term, are negligible and not significant.

These overall impacts have been developed through the following combinations of element and subelement impacts (Figure 3.2.3-1). No impacts were identified for the subelements of geologic hazards. Only one subelement of energy and mineral resources, aggregate resources, was impacted by the project. Therefore, the level of impact for the subelement (aggregate resources) was directly assigned to the element level. Soil resources were only evaluated at the element level.

Each area of consideration for level of impact, site, local, and regional has only one assigned impact; soil resources at the site level; and energy and mineral resources at the local level. Therefore, the level of impact of the applicable element was directly assigned to the overall resource. Because there is only one level of impact for each overall impact area, aggregation was not necessary.

3.2.3.6 Mitigation Measures

One potential mitigation measure will be considered for Geologic Resources. This measure concerns aggregate resources, and identifies the party responsible to implement, but not necessarily to pay for, the measure. The recommendation is that prior to determination of final aggregate source locations by subcontractors, an evaluation of all available sources within a similar economic haul distance should be made and topographically high (ridge-forming) deposits should be avoided where possible.

For soil resources, no mitigation measures are recommended beyond the assumed mitigations described in Section 3.2.3.4.

3.2.3.7 Unavoidable Adverse Impacts

No significant unavoidable adverse impacts are anticipated to geologic resources from the implementation of the project.

FIGURE 3.2.3-1

GEOLOGIC RESOURCES SUMMARY IMPACT MATRIX

LEGEND		ADVERSE IMPACTS	SIGNIFICANT ADVERSE IMPACTS
LEVEL OF IMPACT*	LOW	o	•
	MODERATE	○	●
	HIGH	◯	⬤
POTENTIAL BENEFICIAL EFFECTS			

* MEASURE OF THE AMOUNT OF ENVIRONMENTAL CHANGE

	PROJECT IMPACTS					
	SHORT TERM			LONG TERM		
	SITE	LOCAL	REGIONAL	SITE	LOCAL	REGIONAL
GEOLOGIC RESOURCES	o	o			o	
Energy and Mineral		o			o	
Aggregate		o			o	
Soil Resources	o					

3.2.4 Noise

3.2.4.1 Introduction

For the Area of Concentrated Study determination, F.E. Warren AFB was included because of the proposed construction activity on the base. Portions of Cheyenne, Wyoming, are potential sites for project-related (induced-residential development) construction activity. In addition, Cheyenne is the location of major roadway arterials, the airport, and the railroad station. Kimball, Nebraska, was included since it represents the largest project-related increase in vehicular operation outside of the Cheyenne area. Other roadways within the project area which are predicted to convey personnel to the various Launch Facilities were included since potential increases in vehicular operation may result in additional noise effects.

3.2.4.2 Definition of Levels of Impacts

A noise effect due to project-related increases in vehicular, air traffic, railroad, or construction activity (individually or in combination) will be classified as having a negligible, low, moderate, or high impact depending upon the magnitude and/or duration of that effect upon the existing ambient noise environment, relative to the local population and/or land use. Noise impacts are confined to the local vicinity of the noise sources.

The following levels of impact will be used in the analysis:

- Negligible Impact - Predicted noise impacts will not exceed ambient noise levels by more than 2.9 dBA. The increase is perceived as barely noticeable.
- Low Impact - Predicted noise impacts will exceed ambient noise levels by 3 to 4.9 dBA. The increase is perceived as generally noticeable.
- Moderate Impact - Predicted noise impacts will exceed ambient noise levels by 5 to 9.9 dBA. The increase is perceived as clearly noticeable.
- High Impact - Predicted noise impacts will exceed ambient noise levels by 10 dBA or more. The increase is perceived as doubling of the noise level.

3.2.4.3 Determination of Significance Criteria

For the noise level analysis, an increase in noise will be considered significant if any of the following conditions occur for an extended period of time:

1) An increase in noise levels of 10 dBA if the existing noise levels are below 55 dBA (creates a potential significant nuisance effect);

2) An increase in noise levels that causes an exceedance of noise level standards if the existing noise levels are between 55 and 60 dBA (violates existing regulatory requirement); or

3) An increase in noise levels of 5 dBA if the existing noise levels are above 60 dBA (violates or worsens an existing regulatory requirement).

For vehicular traffic, a noise level of 65 dBA L_{eq} (Federal Highway Administration) will be used. For railroad and aircraft operations, the L_{dn} standard (FAA, EPA) of 65 dBA will be used. For construction activity, applicable federal, state, and/or local standards, criteria, or ordinances will be applied. For purposes of comparing noise level indices the L_{eq} (for the peak traffic period) is approximately equivalent to the L_{dn}.

3.2.4.4 Environmental Impacts of the Proposed Action and No Action Alternative

The following discussion presents the noise impacts of the No Action Alternative and Proposed Action in the project area. Included in the discussion are descriptions of the analytic methodologies used for the assessment, and assumptions and assumed mitigations upon which the assessment was based.

As with the assessment of the existing conditions, the Federal Highway Administration STAMINA 2.0 model was used to determine vehicular noise levels for 1985 and 1990 for the No Action Alternative and the Proposed Action. Traffic volume projections for these future years were supplied by the Transportation task group in the form of peak hour volumes.

The vehicular noise assessment assumed that Cheyenne local roadways, exclusive of Interstates 25 and 80 which operated at posted limits, operated at a minimum of 30 mph during the peak hour period. This speed limit is the lowest threshold for which STAMINA 2.0 can predict associated noise levels. It represents a conservative estimate for worst-case noise analysis since lower assumed speeds would result in correspondingly lower noise level predictions. For purposes of determining impacts of noise levels, the roadway right-of-way was assumed to define the beginning of the receptor (residential) property line. No assumed mitigations were included as part of this assessment.

The vehicular noise assessment was performed for those roadway segments in Cheyenne that were anticipated to convey increased traffic volumes as a result of implementing the project. The selection of these roadways was coordinated with the Transportation task group and reflects any concerns voiced by state and local agencies and the public. The two major arterials in Kimball, U.S. 30 and Route 71, were evaluated as a worst-case noise assessment for the non-Cheyenne project area.

For air traffic noise, the FAA airport noise exposure contouring procedure, as discussed in Section 2.2.4.1.2.2, was also used for evaluation of future L_{dn} noise levels associated with the Cheyenne Airport in 1985 and 1990 for the No Action Alternative and Proposed Action. Predictions of future airport operations were developed by the Transportation task group.

For railroad noise, the Wyle Laboratories procedure, as discussed in Section 2.2.4.1.2.2, was also used for evaluation of future L_{dn} noise levels associated with Cheyenne's railroad station.

Standard references were reviewed to define noise levels generated by various types of construction activities and construction equipment. It was assumed that all construction equipment will be operating with their baffles and mufflers.

3.2.4.4.1 Vehicular Noise

3.2.4.4.1.1 Baseline Future - No Action Alternative

The results of the STAMINA 2.0 noise analysis for the No Action Alternative are shown in Table 3.2.4-1. This table presents L_{eq} noise levels predicted to the roadway right-of-way and beyond in 100-foot increments. All levels were predicted to be below 65.0 dBA within 200 feet of the right-of-way. As noted previously, the roadway right-of-way was assumed to represent the residential property line.

The 65 dBA noise level was predicted to be exceeded at the right-of-way boundary in Cheyenne along segments of Interstate 25, Prairie Avenue, Central Avenue, Pershing Boulevard, College Drive, and Interstate 80 with a maximum of 68.9 dBA in 1985 and 70.2 dBA in 1990 occurring along Interstate 25 between Central Avenue and Missile Drive. The analysis also indicated that only about 37 dwelling units (along Interstate 25 between Central Avenue and Pershing Boulevard), with an estimated population of 96 people, fall within the calculated 65 dBA L_{eq} contour which extends beyond the right-of-way for both 1985 and 1990.

3.2.4.4.1.2 Proposed Action

The results of the STAMINA 2.0 noise analysis for the Proposed Action are also shown in Table 3.2.4-1. For 1985, the Proposed Action was predicted to result in a negligible impact of vehicular noise. The maximum predicted increase in noise levels along College Drive between Parsley Boulevard and Walterscheid Boulevard with an increase in the L_{eq} noise level of 2.2 dBA. The predicted noise levels for the Proposed Action in 1990 are identical with those for the No Action Alternative.

For both 1985 and 1990 the Proposed Action resulted in no additional impacts on dwelling units (population) when compared to the No Action Alternative. No cumulative noise effects between roadways and other noise sources (i.e., airport, railroad) were predicted. In addition, no effects on land use adjacent to roadways are anticipated.

Table 3.2.4-1

PREDICTED L_{eq} NOISE LEVELS (dBA) AT SELECTED RECEPTORS FOR 1985 AND 1990

Roadway Segments	Year	Project Option	Right-of-Way	Difference Between Proposed Action and No Action	Distance from Right-of-Way Line (feet) 100	200
Cheyenne, Wyoming						
I-25	1985	No Action	68.9		65.7	63.6
(Central Ave. to Pershing Blvd.)	1985	Proposed Action	69.2	0.3	66.0	63.9
	1990	No Action/ Proposed Action	70.2		67.0	64.8
I-25	1985	No Action	68.9		65.7	63.6
(Pershing Blvd. to Missile Drive)	1985	Proposed Action	69.6	0.7	66.3	64.1
	1990	No Action/ Proposed Action	70.2		67.0	64.8
I-25	1985	No Action	67.7		64.5	62.4
(Missile Drive to I-80)	1985	Proposed Action	68.8	1.1	65.5	63.3
	1990	No Action/ Proposed Action	69.0		65.8	63.6
I-25	1985	No Action	68.1		64.7	62.4
(I-80 to College Drive)	1985	Proposed Action	68.8	0.7	65.3	63.1
	1990	No Action/ Proposed Action	69.3		65.8	63.4
Prairie Avenue	1985	No Action	66.8		58.3	54.7
(Yellowstone Rd. to Dell Range	1985	Proposed Action	66.9	0.1	58.5	54.8
Blvd.)	1990	No Action/ Proposed Action	67.5		59.1	55.4
Central Ave.	1985	No Action	65.6		58.3	54.8
(I-25 to Yellowstone Rd.)	1985	Proposed Action	65.8	0.2	58.5	55.0
	1990	No Action/ Proposed Action	66.2		58.9	55.4

Table 3.2.4-1 Continued
PREDICTED L_{eq} NOISE LEVELS (dBA) AT SELECTED RECEPTORS
FOR 1985 AND 1990

Roadway Segments	Year	Project Option	Right-of-Way	Difference Between Proposed Action and No Action	Distance from Right-of-Way Line (feet) 100	200
Central Ave.	1985	No Action	67.1		59.8	56.3
(Yellowstone Rd. to Warren Ave.)	1985	Proposed Action	67.1	0.0	59.8	56.3
	1990	No Action/ Proposed Action	67.3		60.0	56.5
Pershing Blvd.	1985	No Action	64.8		57.5	54.0
(Central Ave. to Warren Ave.)	1985	Proposed Action	64.9	0.1	57.6	54.7
	1990	No Action/ Proposed Action	65.6		58.3	54.8
I-80	1985	No Action	65.2		62.6	60.6
(I-25 to College Dr.)	1985	Proposed Action	65.6	0.4	62.9	61.0
	1990	No Action/ Proposed Action	65.6		63.1	61.2
College Dr.	1985	No Action	67.4		54.5	52.2
(RR Tracks to Parsley Blvd.)	1985	Proposed Action	67.4	0.0	57.3	55.0
	1990	No Action/ Proposed Action	65.4		55.5	53.2
College Dr.	1985	No Action	65.9		58.4	54.9
(Parsley Blvd. to Walterscheid	1985	Proposed Action	68.1	2.2	60.4	56.8
Blvd.)	1990	No Action/ Proposed Action	67.6		60.0	56.5
College Dr.	1985	No Action	65.4		58.1	54.6
(Walterscheid Blvd. to U.S. 85)	1985	Proposed Action	67.5	2.1	60.2	56.7
	1990	No Action/ Proposed Action	66.7		59.4	55.9

The impacts of vehicular noise with respect to construction of any of the alternative road access routes at F.E. Warren AFB, staging area options or cable route options were predicted to be negligible and not significant.

3.2.4.4.2 Air Traffic Noise

3.2.4.4.2.1 Baseline Future - No Action Alternative

The FAA noise contouring procedure bases determination of noise contour configuration on annual air traffic operations. Based on the projected operations for 1985 and 1990, L_{dn} noise level contours were developed.

Anticipated growth of jet aircraft operations at Cheyenne Airport were projected to be low between 1985 and 1990. Since jet aircraft are the noisiest operation at the airport and, hence, are the controlling factor in the size of the noise contours, the contours developed for 1985 are also considered representative of 1990. The noise contour representing the 65-dBA L_{dn} noise level is presented in Figure 3.2.4-1.

The analysis indicates that about 513 dwelling units (south and northwest of the airport) with an estimated population of 1,334 people, fall within the calculated 65 dBA L_{dn} noise level contour which extends beyond the airport boundary. The slightly smaller area covered by the 65-dBA contour, when compared to existing conditions, results from a projected decrease in turbojets among business jet aircraft.

3.2.4.4.2.2 Proposed Action

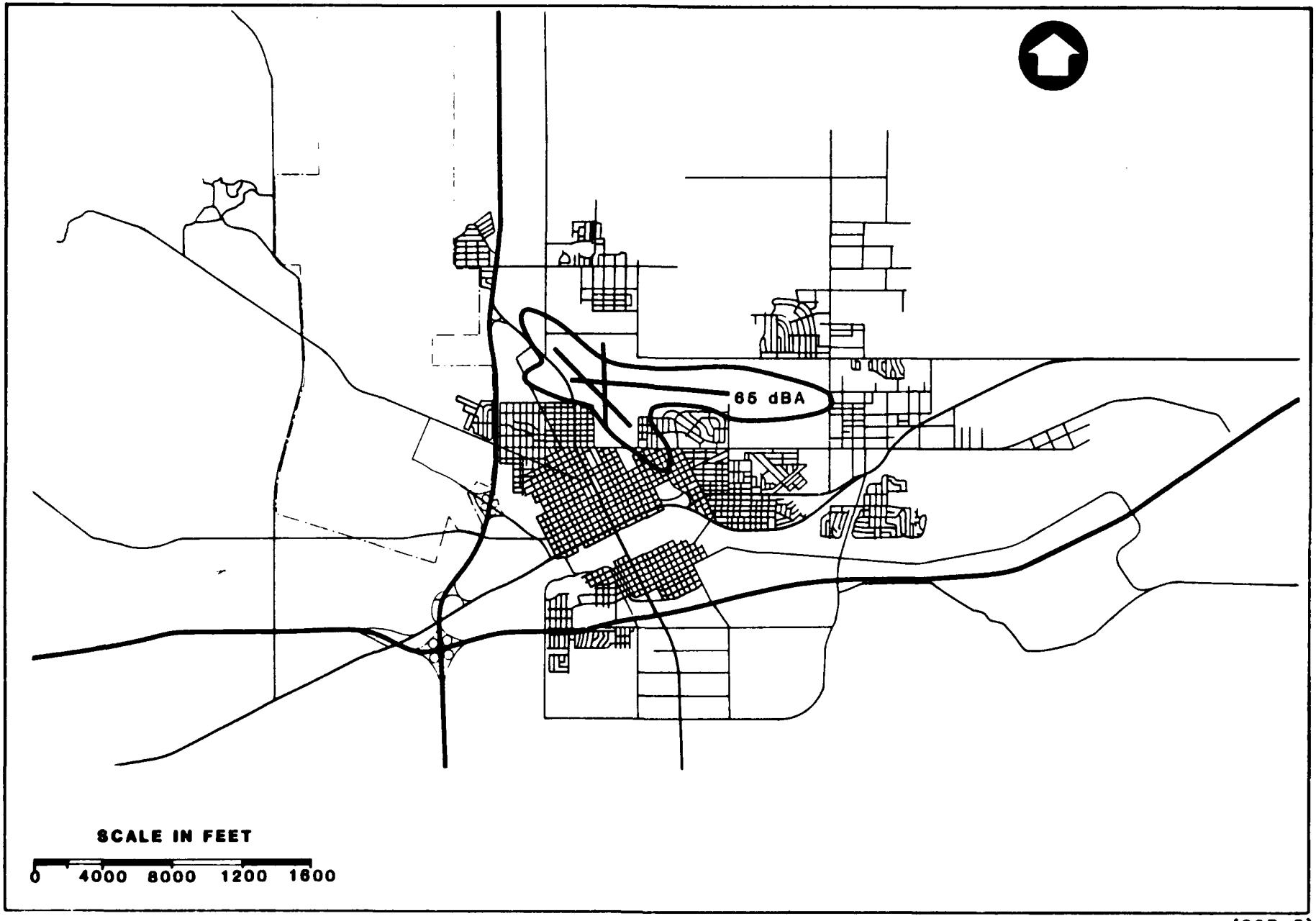
The calculated 1985 65-dBA L_{dn} noise level contour for the Proposed Action is also shown in Figure 3.2.4-1. It is identical to the contour for the 1985 No Action Alternative because the number of project-generated aircraft operations falls within the same range of operations that is representative of the No Action Alternative. The 1990 Proposed Action 65-dBA noise contour is also represented by the No Action Alternative as shown in Figure 3.2.4-1 because no project-related air traffic activity is projected for 1990. No long-term impact on land use adjacent to the airport is anticipated. No cumulative noise impacts between the airport and area roadways or the railroad station were predicted. Air traffic noise impact will be negligible.

The impact of air traffic noise with respect to construction of any of the alternative road access routes at F.E. Warren AFB, staging area options, or cable route options was predicted to be negligible and not significant.

3.2.4.4.3 Railroad Noise

3.2.4.4.3.1 Baseline Future - No Action Alternative

The L_{dn} noise level contours for rail operations in 1985 and 1990 are identical to those projected for the existing conditions due to negligible growth in railroad



(08B-6)

1985 AND 1990 CHEYENNE AIRPORT 65 dBA
NOISE LEVEL CONTOURS (Ldn)
NO ACTION ALTERNATIVE/PROPOSED ACTION

FIGURE NO. 3.2.4-1

activity. A total of 61 dwelling units (approximately 159 people) were predicted to fall within the 65-dBA noise level contour which extends beyond the railroad boundary.

3.2.4.4.3.2 Proposed Action

The L_{dn} railroad noise level contours for the Proposed Action in 1985 and 1990 are also identical to the 1983 existing conditions. Impacts are therefore predicted to be negligible and not significant. No cumulative noise impacts between the railroad and area roadways or airport operations were predicted.

The impact of railroad noise with respect to construction of any of the alternative road access routes at F.E. Warren AFB, staging area options, or cable route options were predicted to be negligible and not significant.

3.2.4.4.4 Construction Noise

3.2.4.4.4.1 Baseline Future - No Action Alternative

No difference in the typical ranges of noise levels from general construction activities or construction equipment is expected from that of existing conditions.

3.2.4.4.4.2 Proposed Action

Noise level increases due to construction are expected to occur within close proximity of the project activities. Predicting construction noise for a specific project is difficult because of the variability of several factors, which are critical in estimating construction-related noise but which often cannot be precisely known in advance of the actual work. These factors include the specific types of equipment on the job, the construction methods, and the scheduling of work. These details of the job are not generally specified in the contract documents but are left up to the contractor, thereby giving the contractor flexibility in utilizing equipment and personnel.

Construction activity on F.E. Warren AFB is not anticipated to affect offbase residential land uses since such noise levels attenuate quickly with distance and the nearest residential dwelling is approximately 2,000 feet from the AFB.

With respect to grading and construction at the Launch Facilities, assuming bulldozer and dumptruck activity only, the L_{eq} noise levels could be approximately 85.0 dBA at 50 feet but will be expected to attenuate to 61.0 dBA at about 800 ft. This activity will be of short duration.

Current projections indicate that some 400 miles of roadway will be widened and/or improved. Noise impacts from such construction activities, which primarily involve scrapers, graders, and dumptrucks, will be of extremely short duration at any given location because of the speed at which gravel roads can be laid.

The Proposed Action was predicted to result in negligible and not significant impacts from construction noise.

The impact of construction noise with respect to any of the alternative road access routes at F.E. Warren AFB, staging area options, or cable route options were predicted to be negligible and not significant.

3.2.4.5 Summary of Impacts

3.2.4.5.1 Explanation of Detailed Impact Matrix

The noise impact matrix presents results of the analyses performed in this study including a summary of the levels of impact and significance determination for each element (Figure 3.2.4-2). The overall aggregated levels of impact and significance determination are provided in Figures 3.0-1 and 3.0-2.

Negligible, short-term local impacts from vehicular traffic noise were predicted in Cheyenne during 1985. The impact of increased air traffic due to project activities was determined to be negligible and not significant. Impact from increased railroad activity was determined to be negligible and not significant. Noise impacts from construction activities were also determined to be negligible and not significant. All long-term impacts were determined to be negligible and not significant.

All the alternative road access routes at F.E. Warren AFB, staging area options, and cable route options were predicted to result in negligible, not significant impacts.

3.2.4.5.2 Aggregation of Elements, Impacts, and Significance

Figure 3.0-1 presented the aggregation of impacts for Noise as a whole. The aggregated rating of noise for the Proposed Action resulted in negligible short-term local impacts and negligible, long-term, not significant, local impacts.

Determination of the overall rating for Noise involved aggregation of the impact ratings for the elements (component sources) of noise. The noise sources were evaluated as described in Section 3.2.4.4 and then aggregated to the resource level by giving an equal weighting factor to the impacts and significance of those component sources which are associated with potential violation of standards (which is equivalent to impact on sensitive noise receptors and land use). Ambient noise level standards have been established by various regulatory agencies. These standards, in some cases, are redefined more stringently by state and local agencies. These standards set noise level limits, either absolute and/or incremental, which are not to be exceeded by a new or modified noise source. Vehicular, air traffic, railroad, and construction noise were given an equal weighting factor since these elements are in reality the sources of noise in general. Since noise levels are determined by the cumulative impact of all noise sources, the noise source with the highest impact and significance would influence the overall noise level of impact and significance.

FIGURE 3.2.4-2

NOISE SUMMARY IMPACT MATRIX

LEGEND		ADVERSE IMPACTS	SIGNIFICANT ADVERSE IMPACTS
LEVEL OF IMPACT*	LOW	○	●
	MODERATE	◯	●
	HIGH	◯	●
POTENTIAL BENEFICIAL EFFECTS			

* MEASURE OF THE AMOUNT OF ENVIRONMENTAL CHANGE

	PROJECT IMPACTS					
	SHORT TERM			LONG TERM		
	SITE	LOCAL	REGIONAL	SITE	LOCAL	REGIONAL
NOISE						
Vehicular Noise						
Air Traffic Noise						
Railroad Noise						
Construction Noise						

3.2.4.6 Mitigation Measures

Potential mitigation measures that will be considered are identified below. One, some, or all of the mitigation measures may ultimately be selected. Each measure identifies the party responsible to implement, but not necessarily to pay for, the measure.

- Placement of new roadways remote from potential identified sensitive noise receptors or in cuts below grade (Air Force on F.E. Warren AFB, appropriate governmental agency off F.E. Warren AFB);
- Rerouting of traffic to roadways more remote from identified sensitive noise receptors (Air Force on F.E. Warren AFB, appropriate governmental agency off F.E. Warren AFB);
- Shielding of existing or new structures from external noise sources by acoustic treatment (Air Force);
- Placement of barrier walls and/or earth berms (Air Force on F.E. Warren AFB, appropriate governmental agency off F.E. Warren AFB);
- Minimization of new roadway grades to attenuate noise levels from medium and heavy-duty trucks (Air Force on F.E. Warren AFB, appropriate governmental agency off F.E. Warren AFB);
- Speed restrictions on those roadways adjacent to identified sensitive noise receptors (Air Force on F.E. Warren AFB, appropriate governmental agency off F.E. Warren AFB);
- Restriction of air traffic operations to between 7:00 AM and 10:00 PM (Airport management);
- Modification of flight paths away from residential or other identified noise sensitive areas (Airport management); and
- Relocation of concentrated noise sources, such as start-up, taxiing and ground testing areas (Airport management).

3.2.4.7 Unavoidable Adverse Impacts

No significant, unavoidable noise impacts have been identified through the course of this assessment.

3.2.5 Air Quality

3.2.5.1 Introduction

With respect to Area of Concentrated Study determination, F.E. Warren AFB was included since it represents a potentially major pollutant source for fugitive dust emissions associated with onbase construction. Cheyenne was included due to project-related induced residential development as well as increases in transportation pollutant sources. Kimball, Nebraska was included since it represents the largest project-related increase in vehicular operation outside of the Cheyenne area. Other roadways within the project area which are predicted to convey personnel to the various Launch Facilities were included since potential increases in vehicular operation could result in additional air quality effects. Since fugitive dust emissions and subsequent potential impairment of visibility may occur wherever project-related disturbances of land surfaces are required, the Area of Concentrated Study also includes those areas where total suspended particulate (TSP) concentrations were expected to exceed Environmental Protection Agency (EPA) minimum threshold values.

3.2.5.2 Definition of Levels of Impacts

Effects on air quality and visibility will be classified as having negligible, low, moderate, or high impact depending upon the general health effects of the pollutants generated by project facilities and/or activities as measured by ground level concentrations and their relationships to applicable ambient air quality standards or criteria. Analysis will include a breakdown of levels of impact both by geographic scale and duration, as appropriate.

3.2.5.2.1 Carbon Monoxide

The effects of carbon monoxide (CO) will be confined to the local scale due to its rapid dispersion characteristics. The levels of impact for this pollutant are defined as follows:

- Negligible Impact - Predicted CO concentrations will not equal or exceed EPA minimum threshold levels (500 ug/m^3 or 0.45 ppm over an 8-hour period, or 2,000 ug/m^3 or 1.8 ppm over a 1-hour period). No general health effects will occur.

- Low Impact - Predicted CO concentrations will equal or exceed minimum threshold levels, but the concentrations plus background will not exceed 50 percent of the National Ambient Air Quality Standards (5,000 ug/m^3 or 4.5 ppm over an 8-hour period, or 20,000 ug/m^3 or 17.5 ppm over a 1-hour period). No general health effects will occur but pollutant concentration increases will be detectable.

- Moderate Impact - Predicted CO concentrations plus background will exceed 50 percent of the National Ambient Air Quality Standards, but the concentrations plus background will not exceed the National Ambient

Air Quality Standards (10,000 ug/m^3 or 9 ppm over an 8-hour period, or 40,000 ug/m^3 or 35 ppm over a 1-hour period). No general health effects will occur but pollutant concentrations rise measurably.

- High Impact - Predicted CO concentrations will exceed National Ambient Air Quality Standards (10,000 ug/m^3 or 9 ppm over an 8-hour period, or 40,000 ug/m^3 or 35 ppm over a 1-hour period) when combined with background concentrations. General health effects will include mild aggravation of symptoms in susceptible people and initial symptoms will occur in the healthy population.

3.2.5.2.2 Fugitive Dust (Total Suspended Particulates)

The effects of fugitive dust on the local and regional scale will be classified as follows:

- Negligible Impact - Predicted concentrations of fugitive dust will not equal or exceed EPA minimum threshold levels (1.0 ug/m^3, averaged annually or 5.0 ug/m^3 over a 24-hour period). No general health effects will occur.

- Low Impact - Predicted concentrations of fugitive dust will exceed minimum EPA threshold levels, but the increment plus background concentration will not exceed Wyoming Ambient Air Quality Standards of 60 ug/m^3 averaged annually or 150 ug/m^3 over a 24-hour period. No general health effects will occur but pollutant concentrations will rise measurably.

- Moderate Impact - Predicted concentrations of fugitive dust will exceed minimum EPA threshold levels and the increment plus background concentration will exceed Wyoming Ambient Air Quality Standards of 60 ug/m^3 averaged annually or 150 ug/m^3 over a 24-hour period but will not exceed the National Ambient Air Quality Standards of 75 ug/m^3 averaged annually or 260 ug/m^3 over a 24-hour period. The onset of minor general health effects may appear among susceptible people.

- High Impact - Predicted concentrations of fugitive dust will exceed the National Ambient Air Quality Standards (75 ug/m^3 averaged annually or 260 ug/m^3 over a 24-hour period) when combined with background concentrations. General health effects would begin with mild aggravation of symptoms in susceptible people and symptoms of irritation in the healthy population. As concentrations become higher, general health effects would include major aggravation of symptoms and decreased exercise tolerance in people with heart or lung disease.

3.2.5.2.3 Visibility

The air quality effects on visibility are determined for the regional scale. The level of impairment of visibility as applicable to the project area will be classified as follows:

- o Negligible Impact - Predicted levels of visual range will not be less than the existing project area median yearly visual range of 64 miles.
- o Low Impact - Predicted levels of visual range will be between 50.0 to 63.0 miles.
- o Moderate Impact - Predicted levels of visual range will be between 30.0 to 49.0 miles.
- o High Impact - Predicted levels of visual range will be less than 30.0 miles (standard adopted by States of California and Nevada).

3.2.5.3 Determination of Significance Criteria

3.2.5.3.1 Air Quality

For the Air Quality analysis, an increase in predicted concentration of an individual pollutant when combined with background concentration levels, will be significant if it will equal or exceed the applicable Ambient Air Quality Standard, thus, creating a law violation and potential health hazard. Predicted concentrations plus background measuring less than the applicable Ambient Air Quality Standard will be considered not significant. The impact on regional visibility would be considered significant if the predicted visual range is below 30 miles (creates a potential significant nuisance effect).

3.2.5.4 Environmental Impacts of the Proposed Action and Project Alternatives

The following discussion presents the analytical results for the Air Quality impact analyses of the No Action Alternative and Proposed Action for the years 1985 (peak year of construction) and 1990 (beginning year of project operation). The No Action Alternative assumes no project and is based on anticipated, normal growth within the project area.

The analytic evaluation concentrated on carbon monoxide (CO) and fugitive dust (total suspended particulates) because these were the only pollutants that are expected to have large increases in emission quantities for the level of activity associated with the project. The increases in sulfur dioxide, nitrogen dioxide, and hydrocarbons from construction activity and vehicular traffic were determined to be much lower than for CO and fugitive dust, and are not expected to approach regulatory values.

The assessment of CO concentrations from vehicular operation in the project area was undertaken using the Gaussian dispersion model, CALINE 3, in conjunction with vehicular emission factors generated from EPA's MOBILE 2 mobile source emissions model. These models are discussed in Section 2.2.5.1.2.2.

The assessment was performed for those roadway segments and roadway intersections that were anticipated to convey increased traffic volumes as a result of implementing the project. The selection of these roadways was coordinated with the Transportation task group and reflects the concerns voiced by various state and local agencies and the public.

The assessment of fugitive dust concentrations from construction activities at F.E. Warren AFB, the Deployment Area, and in Cheyenne (induced residential housing development) was undertaken using the Industrial Source Complex Model-Short Term (EPA 1979) for 24-hour impact analysis and the Climatological Dispersion Model-Wyoming (EPA 1973, Wyoming Department of Environment Quality 1983) for the annual assessment. Emission factors for input into these models were developed from AP-42 (EPA 1981) and Wyoming's Guideline for Fugitive Dust Emission Factors (Wyoming Department of Environment Quality 1979). The CRSTER Model (EPA 1977) was used to determine the worst-case meteorological dispersion day for the 24-hour analysis. Surface meteorological data collected at the Cheyenne National Weather Service station, and upper air data collected at the Denver National Weather Service station for the period, 1960 to 1964, were used in this analysis.

The analysis assumed standard good engineering practice construction mitigation measures, such as use of chemical dust palliatives, which are at least 50 percent efficient in curtailing fugitive dust emissions.

The EPA Visibility Workbook (EPA 1980) was used to determine potential regional visibility impairment resulting from project-related increases in fugitive dust (total suspended particulates).

3.2.5.4.1 Carbon Monoxide

3.2.5.4.1.1 Baseline Future - No Action Alternative

The results of the CO assessment of the No Action Alternative in 1985 and 1990 are shown in Table 3.2.5-1. The CO concentrations represented in the table include 1 and 8-hour background concentrations of 1.0 parts per million (ppm) and 0.5 ppm, respectively.

The highest concentrations were predicted at intersections since CO emissions increase as vehicular speeds decrease. The intersection of Yellowstone Road and Prairie Avenue was predicted to have the highest CO concentrations in both 1985 and 1990. The predicted 1-hour concentrations in 1985 and 1990 were 27.5 and 22.8 ppm, respectively, while the 8-hour concentrations were 5.0 and 4.4 ppm, respectively. The highest predicted 1-hour concentrations along a roadway segment, sections of College Drive, were 3.2 and 3.1 ppm in 1985 and 1990, respectively. Eight-hour concentrations were 0.9 ppm for both 1985 and 1990. All 1 and 8-hour predicted CO concentrations were below applicable Ambient Air Quality Standards.

Table 3.2.5-1

PREDICTED CARBON MONOXIDE (CO) CONCENTRATIONS (PPM) AT SELECTED RECEPTORS FOR 1985 AND 1990[a]

Roadway Configurations	Averaging Time	No Action 1985	Proposed Action 1985	Difference Between Proposed Action and No Action	No Action 1990	Proposed Action 1990	Difference Between Proposed Action and No Action
Intersections							
Cheyenne, Wyoming							
16th St./Warren Ave.	1-hour	20.1	27.1	7.0	21.5	21.5	0
	8-hour	4.4	4.5	0.1	3.8	3.8	0
Pershing Blvd./Central Ave.	1-hour	18.1	19.2	1.1	16.7	16.7	0
	8-hour	3.1	3.2	0.1	3.0	3.0	0
Pershing Blvd./Warren Ave.	1-hour	21.9	23.1	1.2	20.5	20.5	0
	8-hour	3.7	3.8	0.1	3.6	3.6	0
Yellowstone Rd./Prairie Ave.	1-hour	27.5	28.6	1.1	22.8	22.8	0
	8-hour	5.0	5.7	0.7	4.4	4.4	0
Pershing Blvd./Randall Ave.	1-hour	9.0	9.6	0.6	7.4	7.4	0
	8-hour	1.8	1.9	0.1	1.6	1.6	0
Kimball, Nebraska[b]							
Chestnut St. (Rt. 71)/U.S. 30	1-hour	10.6	11.6	1.0	10.7	10.7	0
	8-hour	2.4	2.6	0.2	2.4	2.4	0
Roadway Segments							
Cheyenne, Wyoming							
I-25 (Central Ave. to Pershing Blvd.)	1-hour	2.4	2.8	0.4	2.5	2.5	0
	8-hour	0.8	0.8	0	0.8	0.8	0
I-25 (Pershing Blvd. to Missile Dr.)	1-hour	2.4	3.0	0.6	2.5	2.5	0
	8-hour	0.8	0.8	0	0.8	0.8	0

Table 3.2.5-1 Continued
PREDICTED CARBON MONOXIDE (CO) CONCENTRATIONS (PPM) AT SELECTED RECEPTORS FOR 1985 AND 1990[a]

Roadway Configurations	Averaging Time	No Action 1985	Proposed Action 1985	Difference Between Proposed Action and No Action	No Action 1990	Proposed Action 1990	Difference Between Proposed Action and No Action
I-25 (Missile Dr. to I-80)	1-hour	2.1	2.8	0.7	2.2	2.2	0
	8-hour	0.7	0.7	0	0.7	0.7	0
I-25 (I-80 to College Dr.)	1-hour	2.1	2.6	0.5	2.2	2.2	0
	8-hour	0.7	0.7	0	0.7	0.7	0
I-80 (I-25 to I-180)	1-hour	1.6	1.7	0.1	1.5	1.5	0
	8-hour	0.7	0.7	0	0.6	0.6	0
I-80 (I-180 to College Dr.)	1-hour	1.5	1.6	0.1	1.5	1.5	0
	8-hour	0.6	0.7	0.1	0.6	0.6	0
College Drive (I-25 to Parsley Blvd.)	1-hour	2.4	4.2	1.8	2.3	2.3	0
	8-hour	0.8	0.8	0	0.8	0.8	0
College Drive (Parsley Blvd. to Walterscheid Blvd.)	1-hour	3.1	4.8	1.7	3.1	3.1	0
	8-hour	0.9	0.9	0	0.9	0.9	0
College Drive (Walterscheid Blvd. to U.S. 85)	1-hour	3.2	5.0	1.8	3.1	3.1	0
	8-hour	0.9	0.9	0	0.9	0.9	0

Notes: a Includes 1.0 ppm and 0.5 ppm background CO levels for 1-hour and 8-hour periods, respectively.

b Peak year occurs in 1989.

3.2.5.4.1.2 Proposed Action

The results of the CO assessment, in 1985 and 1990, are shown in Table 3.2.5-1. These values, likewise, include the 1 and 8-hour background CO concentrations.

For 1985, the Proposed Action was predicted to result in low, but not significant impacts of CO in Cheyenne at the intersections of 16th Street and Warren Avenue with an increase in the 1-hour concentration of 7.0 ppm over the 1985 No Action Alternative, and Yellowstone Road and Prairie Avenue with an increase in the 8-hour concentration of 0.7 ppm, and along several segments of College Drive with increases in the 1-hour concentration of 1.8 ppm. No project-related increases in CO levels were predicted for 1990. In fact, decreases in CO concentrations were predicted due to a greater use of pollution control devices. All 1 and 8-hour predicted CO concentrations were below Ambient Air Quality Standards.

The impact of CO with respect to construction of any of the alternative road access routes at F.E. Warren AFB, staging area options or cable route options was predicted to be negligible and not significant.

3.2.5.4.2 Fugitive Dust

3.2.5.4.2.1 Baseline Future - No Action Alternative

Increases in fugitive dust emissions will be expected to occur due to population growth and nonproject-related construction in the project area. The assessment of these increases was not possible since the exact time, location, type, and level of construction and operational activities are necessary for quantification of impacts. The existing fugitive dust (TSP) background concentrations have been assumed to remain constant for the future conditions.

3.2.5.4.2.2 Proposed Action

24-Hour Impacts. Maximum 24-hour concentrations of fugitive dust from each proposed construction site on F.E. Warren AFB were predicted to be less than 1.0 ug/m^3. No cumulative impacts were predicted. Roadway construction activities at the AFB were predicted to result in maximum concentrations of about 47 ug/m^3 at a distance of about 100m, the shortest downwind distance Industrial Source Complex Model-Short Term analyzes. The maximum 24-hour concentration from projected residential development construction, a large mobile home tract in southeast Cheyenne, was predicted to be about 42.9 ug/m^3 at a distance of about 100m.

Proposed roadway reconstruction activities resulted in a predicted maximum 24-hour concentration of about 34 ug/m^3 while the cable trenching operations resulted in a predicted concentration of about 18 ug/m^3. If both activities are assumed to occur simultaneously, the maximum concentration would be about 52 ug/m^3.

Proposed construction-related activities in and around Launch Facility sites were predicted to result in a maximum concentration of about 48 ug/m^3. No cumulative impacts were predicted between Launch Facility sites.

Annual Impacts. Maximum annual concentrations of fugitive dust from each proposed construction site on F.E. Warren AFB were predicted to be about 0.2 ug/m^3 at a distance of 500m, the shortest distance Climatological Dispersion Model-Wyoming analyzes. The maximum annual concentration from projected residential development construction in Cheyenne was predicted to be about 5.9 ug/m^3 at a distance of 500m. No cumulative impacts were predicted.

Annual impact analyses were not undertaken for roadway construction at F.E. Warren AFB, roadway construction in the Deployment Area, Launch Facility construction and cable trenching operations because these activities would be of a limited and temporary nature at any given location.

The 24-hour and annual analyses indicate that the impact of fugitive dust concentrations, when added to the appropriate rural or urban background values, will be low and not significant.

The impact of fugitive dust with respect to construction of any of the alternative road access routes at F.E. Warren AFB, and cable route options was predicted to be low and not significant while the impact of the staging area options was predicted to be negligible and not significant.

3.2.5.4.3 Visibility

3.2.5.4.3.1 Baseline Future - No Action Alternative

The median yearly visual range of 64 miles for the project area is expected to be unchanged.

3.2.5.4.3.2 Proposed Action

No degradation of regional visibility at the nearest Prevention of Significant Deterioration (PSD) Class I areas (Rocky Mountain National Park and Rawah Wilderness) was predicted, thus the impact was negligible and not significant.

The impact on regional visibility with respect to construction of any of the alternative road access routes at F.E. Warren AFB, staging area options, or cable route options was predicted to be negligible and not significant.

3.2.5.5 Summary of Impacts

3.2.5.5.1 Explanation of Detailed Impact Matrix

The air quality impact matrix presents results of the various analyses performed in this study including a summary of the levels of impact and significance determination for each element (Figure 3.2.5-1). The overall aggregated levels of impact and significance determination is provided in Figures 3.0-1 and 3.0-2.

Low, short-term, not significant local impacts of CO were predicted for several intersections and road segments in Cheyenne during 1985. Construction activities in Cheyenne and the Deployment Area were predicted to result in low, short-term,

FIGURE 3.2.5-1

AIR QUALITY SUMMARY IMPACT MATRIX

LEGEND		ADVERSE IMPACTS	SIGNIFICANT ADVERSE IMPACTS
LEVEL OF IMPACT*	LOW	o	●
	MODERATE	○	●
	HIGH	◯	●
POTENTIAL BENEFICIAL EFFECTS			▒

* MEASURE OF THE AMOUNT OF ENVIRONMENTAL CHANGE

	PROPOSED ACTION					
	SHORT TERM			LONG TERM		
	SITE	LOCAL	REGIONAL	SITE	LOCAL	REGIONAL
AIR QUALITY		o				
Carbon Monoxide		o				
Fugitive Dust		o				
Visibility						

not significant local impacts and negligible, short-term, not significant regional impacts of fugitive dust for 1985. Negligible, short-term, not significant regional impacts on visibility were also predicted.

All long-term impacts for the three air quality elements were predicted to be negligible and not significant.

All the alternative road access routes at F.E. Warren AFB and cable route options were predicted to result in low, not significant impacts of fugitive dust and negligible not significant impacts of CO and visibility while the impact of all the staging area options were predicted to be negligible and not significant.

3.2.5.5.2 Aggregation of Elements, Impacts, and Significance

Figure 3.0-1 presented the aggregation of impacts for Air Quality as a whole. The aggregated rating of air quality for the Proposed Action resulted in low, short-term, not significant local impacts; negligible, short-term, not significant regional impacts; and negligible long-term, not significant local and regional impacts. The alternatives aggregated to a low, not significant impact for the F.E. Warren AFB access road and the cable routes (Figure 3.0-2). The staging area alternatives will have negligible, not significant impacts.

Determination of the overall impact rating for Air Quality involved aggregation of the impact ratings for the elements (components) of Air Quality. The air quality components were evaluated as described in Section 3.2.5.4 and then aggregated to the resource level by giving a higher weighting factor to the impacts and significance of those components which have the potential to cause health effects (which may be equivalent to causing exceedance of standards). Ambient air quality standards have been established by the EPA and in some cases (i.e., Wyoming), redefined more stringently by state regulatory agencies. These standards set concentration limits which are not to be exceeded by a new or modified emissions source when added to background concentrations. Both CO and fugitive dust were given an equal but higher weighting factor than visibility. Since air quality levels are determined by the cumulative impact of all atmospheric pollutants, the pollutant ("criteria pollutant") with the highest impact and significance would influence the overall air quality level of impact and significance.

3.2.5.6 Mitigation Measures

Potential mitigation measures that will be considered are identified below. One, some, or all of the mitigation measures may ultimately be selected. Each measure identifies the party responsible to implement, but not necessarily to pay for, the measure.

- Use of covered trucks to haul aggregate to construction sites (Air Force, project contractors);
- Use of tarp and/or revegetation on disturbed surfaces (Air Force, project contractors);

- o Speed restrictions for vehicles traveling on unpaved roads (Air Force on F.E. Warren AFB, appropriate governmental agency off F.E. Warren AFB);

- o Paving of roads as early in the project life as practical in order to reduce fugitive dust (Air Force); and

- o Establishment of an emissions control program to ensure that emission levels comply with federal, state, and local air quality regulations, including an inspection and maintenance program for construction vehicles (Air Force, project contractors).

3.2.5.7 Unavoidable Adverse Impacts

No significant, unavoidable air quality impacts have been identified through the course of this assessment.

4.0

COORDINATION WITH OTHERS

4.0 COORDINATION WITH OTHERS

4.1 Introduction

During development of this environmental impact statement, both prescoping and formal scoping occurred and are described in this chapter. Also identified in this chapter are the recipients of the Draft Enviromental Impact Statement (DEIS).

4.2 Scoping Activities

A three-phased scoping process was part of the assessment of the environmental impacts of the proposed deployment of Peacekeeper missiles. Prescoping, the first phase, consisted of all activities that preceded the formal scoping meetings. Prescoping activities assisted in the early identification of issues, familiarized the Air Force with local concerns, and identified data availability. Prescoping began in June, 1983 with a review of the information collected for the Peacekeeper Closely Spaced Basing (CSB) project. This included a review of the work-in-process Environmental Planning Technical Reports prepared for each resource group under the CSB project. Also, the Air Force concentrated on developing an understanding of the study area and of the local concerns within the study area. This was accomplished through a series of contacts with a variety of governmental and private entities, and the exchange and gathering of data. A system of key contacts was jointly established by representatives of the Air Force; the cities of Cheyenne, Wheatland, and Kimball; the town of Torrington; the counties of Laramie, Goshen, Platte, Banner, and Kimball; and agencies of the States of Wyoming and Nebraska. These contacts, in addition to those with federal and Colorado state and local agencies, individuals, and private groups in all states, were made to gain a basic understanding of the study area and its concerns.

The second phase was a set of formal public scoping meetings. Participants included federal, regional, state, and local agencies; organizations; interest groups; and the general public in the geographic area potentially affected by the proposed project. Meetings were held on the following dates in the noted locations.

June 27, 1983 7:00 P.M.	East High School Cheyenne, Wyoming
June 28, 1983 1:00 P.M.	Central High School Cheyenne, Wyoming
June 28, 1983 7:00 P.M.	Pine Bluffs High School Pine Bluffs, Wyoming
June 29, 1983 7:00 P.M.	Central High School Harrisburg, Nebraska
June 30, 1983 7:00 P.M.	Kimball High School Kimball, Nebraska

July 1, 1983 1:00 P.M.	Eastern Wyoming College Torrington, Wyoming
July 1, 1983 7:00 P.M.	Wheatland High School Wheatland, Wyoming

In addition to the public scoping meetings, three meetings were held in the following locations:

July 6, 1983 1:00 P.M.	Federal Offices-EPA Region VIII Denver, Colorado
July 7, 1983 9:00 A.M.	Federal Offices-EPA Region VII Kansas City, Missouri
July 8, 1983 8:00 P.M.	State of Nebraska Lincoln, Nebraska

At scoping meetings, handouts entitled "Peacekeeper in Minuteman Silos-Environmental Impact Statement Process" were distributed along with comment sheets. Participants were encouraged to express their comments to the Air Force, either verbally or in writing, at the meeting or by mail before July 10, 1983.

Each scoping meeting convened in a main auditorium with an introductory presentation by the Air Force that explained:

- o The Peacekeeper scoping process;
- o The major features of the Peacekeeper system; and
- o The schedule for the EIS and definitions of major resource categories under consideration.

In a question-and-answer period after the presentation, comments were invited from the public concerning the environmental impacts of the deployment of the Peacekeeper system. Following the hour-long questionand-answer period, the group was asked to adjourn to any of 10 separate workshop groups established to encourage the exchange of detailed information and identify specific issues of concern. Air Force representatives were available for detailed discussion and recorded the concerns of the public. The workshop groups were:

Peacekeeper System Definition/Policy
Socioeconomics/Public Services and Facilities
Water Resources
Biological Resources
Utilities/Energy
Land Use
Cultural Resources
Transportation
Air Quality/Noise
Geologic Resources

Within each workshop group the Air Force representative made a short presentation that defined the particular environmental resource being addressed, the proposed study methods, the areas of interest, and the initial data collected. Information concerning these areas was included in the handouts. The workshop was then opened for general discussion and comment.

The time allotted for the workshop discussions was one and one-half hours, and the Air Force workshop presentations were limited to 15 or 20 minutes. This allowed the public to move from one workshop to another to express their various concerns. As part of the workshop, public comments and issues were recorded by Air Force representatives.

The third phase of the scoping process included the analysis, documentation, and inclusion of the concerns and issues generated during the first two phases of scoping. During this phase of scoping, the Air Force selected those issues which merit in-depth consideration in the EIS and determined which issues do not require detailed analysis.

The third phase of the scoping process consisted of the compilation and analysis of the following:

Prescoping Contacts and Data
Public Scoping Meetings
Public Scoping Workshops
Public Comment (written and verbal)

During this phase, the Air Force considered all information generated during prescoping and scoping as well as public comments pertinent to specific areas. Issues have been summarized and a determination made as to whether or not the EIS should address an issue (See Appendix "D"). If an issue is addressed, the location where it is addressed in the EIS is identified. If an issue is not addressed in the body of the EIS, it is addressed in Appendix "D".

The following list of individuals either attended or sent a letter in response to scoping:

CHEYENNE EAST HIGH SCHOOL
June 27, 1983 - 7:00 PM
SCOPING MEETING ATTENDANCE LIST

Mary Ackerman
Mr. & Mrs. R. Auly
Tom Bogsty
Sharon Breitweisor
Kilomae Brown
Elizabeth Brumage
Richard Bryant
Linda Best
Lynn Buleffi
MaryAnn Buscay
Fred Cariaso
Neil Carroll
Norma Deselms
Dale Doremis
William Edwards
Darren Erickson
J. Erickson
Seath Fanir
Mauriel Frank
Joe Gonzales
Janet Gordon
Scott Gray
Gwynne Hallock
Celise Hand
Bonnie Lace
Earl Long
Joann Mallok
Kevin Mallok
Lou Mankus
Janet Marks
Prudy Marshall
Craig McCune
Dave McGuire
Vivian McMullen
Mary Lou Melling
Lisa Moore
Jack Reppert
Paul Ross
Randy Ross
Sr. Frances Russell
Anne Saunders
Beverly Schwieger
James Coctberg
Andrea Conboy
Dave Cromley
Dennis E. Curran
John Curtis
Liza Daly
Kathy Darcy
Thomas Dehoff
Diane Denison
Jessica Denison
Harvey Deselms
Kenneth Deselms
Ed Heimsoth
Mark Hindenmeyer
Keith Johnson
Kathie Joyner
Richard Kean
John Kefalos
Bernard W. Kelly
Bob Kimble
Tom Kilty
Mark Koons
Florence Korvegay
Sid Korvegay
Jim O'Connor
Brian Olsen
Sally L. Palmer
John Payne
John Pederson
John Pederson II
Charles Pelhey
Linda Putman
KFBC Radio
John Rainier
Doug Reeves
Matthew Reinlsauin
Pat Swan
Amy Tamlin
Rev. Robert E. Thomas
Jim Thompson
T.J. Tobias
Cathy S. Walter

CHEYENNE EAST HIGH SCHOOL (Continued)

Paul Schwieger
M. Shaw
Donna Spohn
Doris Stansbury
Joe Stern
Tim Strand
Thomas Williams
Jim Woodward
Susan Webster
Dianne Wiganowshy
Wm. Wiganowshy
C.F. Williams
Liz Williams
Nancy Williams
John Winkel

CHEYENNE CENTRAL HIGH SCHOOL
June 28, 1983 - 1:00 PM
SCOPING MEETING ATTENDANCE LIST

Betty Sue Allen
Wayland Anderson
John Barnett
Diedre Broick
Jim Castberg
Joseph Clements
John Dean Jr.
Dale Dorems
Gwen Finderson
Mrs. Frank Galicia
Dennis N. Grasso
Lorraine Griesby
Val Roberts
David Romero
Bryon Rookstool
Paul Ross
John Sandahl
Amy Seidl
Dan Shaney
Margaret Shaw
Anna Sherman
Virgil Slough
Joan Snow
Jean Stout
Alice M. Iurson
Lorna Johnson
Mrs. Rodney Kinlerudi
Edmond Leueuing
Michael McFaul
Jerry Morse
Sue Murray
Fred & Nadin Newland
Bob Nicholls
Maryann O'Brian
Garry Oliver
Grant Parker
Gary Thorson
Tammy Schuback
John Turner
Bob Unruh
Ed Usui
Richard Vose
Rosann Wattonirlts
Lilly Willand
Rev. J. Willard
Mark Winkel
Rizzo Zars

PINE BLUFFS HIGH SCHOOL
June 28, 1983 - 7:00 PM
SCOPING MEETING ATTENDANCE LIST

Theron Anderson
Warren & Alice Anderson
Lynn Horsley
Carey Lann

PINE BLUFFS HIGH SCHOOL (Continued)

Lawrence Andrey
Mr. & Mrs. Ed Baker
Mrs. Kevin Baker
Bru Beburends
John Culek, Jr.
Margaret Dolson
F. Fiskes
Phyllis Grase
Sue Grass
David Hanson
Robert Lyons
Jim O'Connor
Mary Pearson
Mark Rea
Thomas Romig
Lori Sanders
Dick Stasbalski
Jake Thimesch
Steve Wordeman

HARRISBURG CENTRAL HIGH SCHOOL
June 29, 1983 - 7:00 PM
SCOPING MEETING ATTENDANCE LIST

Bill Abell
Betsi Barrash
Warren Barrash
Doug & Barb Beezley
Eva Jean Beltren
R. T. Brandt
Victoria A. Compton
Lane Darnall
Glenn David
Norma Dove
Diane Dunkerson
Rev. Roddy Dunkerson
Sue Ehrman
D. C. Eter
Wendy Farwell
Warren Frank
Monty L. Hopkins
Polly Hopkins
Barb Jansen
Jim Jensen
Marv Kammerer
Judi Kohler
C. Lander
Leonard Larson
Mr. & Mrs. Norris Leafdale
Don Lease
Bill Lyon
Frank Costa
Don Richards
Carrol E. Richards
Martha Rohrisk
Tim Gaines
Florence Gifford
Kathy Glatz
Rev. Miguel Guerara
Mico Yellow Hair
Betty Hayward
Elsie Hinuchs
Byrle Hopkins
Helen Hopkins
Kenneth Hopkins
Maj. Madujano
Donald Mar
Rusty Mecklem
Donald & Lenor Miles
Dave Mohr
Norman Nelson
William Nelson
Takanoro Nishida
Alois W. Nial
Mary L. Olsenn
Steve Osborn
Nellie Red Owl
W. F. Palmer
Carl Van Pelt
Charles Person
John M. Ralurts
George Ramiz
Robert Rile
Joann Tall
S. Tamreak
Frances Towner

HARRISBURG CENTRAL HIGH SCHOOL (Continued)

Kathy Ruser
Kevin Ruser
Floyd Sank Jr.
Eric Snook
Ivy Snowden
C.W. Stoddard
Robert Stoddard
Kathy Sullivan
T. J. Fraser
Raynor Towner
Carol Walker
Chuck Warren
Annelises Weisz
Eugene White Hawk
Robert Wilrompnor
Orvill Suilt
Arkie Suocken

KIMBALL HIGH SCHOOL
June 30, 1983 - 7:00 PM
SCOPING MEETING ATTENDANCE LIST

Bill Abell
Frank Acosta
Robert E. Arraj
Warren Barrash
Bill Bratterton
Martha Beaman
Chuck & Patti Benstead
Ed Bigler III
Neradine Bonkreiraz
Marjorie C. Borchec
Vernon J. Bounlies
E. C. Bradney
Ferne Bradney
Lloyd & Pauline Carr
Byron Collins
Carol Dunegan
Mike Fastenau
Darrell Fischer
Mr. & Mrs. Al Forking
Clyde Gadeken
Gary Gibbonn
Edith Haines
Eldon & Lori Jean Halstead
Mike Hartzler
Mr. & Mrs. Fred Hilkemier
Jim Jensen
Mr. & Mrs. Jerry Knutsen
Mike Konz
Jerome Lenzen
Marian Lenzen
James Loda
Bill Lyon
Chris Miller
Rev. James Mazurck Neredine
Ralph Olsen
John & Jean Perkins
Virgil B. F. Raddaz
George Radil
Walt Roberts
Gary E. Robinson
Jim & Sheri Robinson
Martha Rohrick
Harold Sabaths
Mr. & Mrs. Henry Stahla
Rev. James Thacker
John Van Dorn
J. L. Varkmir
R. R. Woolsey
Bonnie Ziemann

EASTERN WYOMING COLLEGE
Torrington, Wyoming
July 1, 1983 - 1:00 PM
SCOPING MEETING ATTENDANCE LIST

Carol Ackerson
Harold Anderson
Frank Barrett
Kevin Bohnenblust
Harold Bovee
Flo Burden
Beverly Bymum
Michael Carr
Alex Chamberlain
Joe Clements
Gail Craig
Andrew Denirson
Maria Holt
Richard Kent
Ruth Keogh
Bob Kimble
Joseph Mancuso
Thomas Palmerlere
J.E. Marovey
Bill Marsh
Laura Matthew
Earl Michael
Lisa Moore
Kevin Moorey
Richard Schultz
Carl Setright
Francis Sharp
David Tompkins
Stephen Walker
Dorothy Zavorka
Dan Dern
Rev. Roddy Dunkerson
Beverly Erickson
Harvey F. Lattium
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David Gaines
Curtis Granduloff
Helen Goering
Rev. Miguel Guerara
Julian Hadley
George Hankin
Marcia Hayatt
Albert Muller
Garvin Norine
June Oaks
Nancy Otta
Lee Otto
Joseph Mancuso
Mary Paxson
Marilyn Punke
Tim Punke
Verle Punke
Linda Putnam
Tim St. Onge
Tahoma Schultz
Charles Sharp
Phil Shellen
Mr. & Mrs. George F.Urbanek
Diane Yoder
Majorie Zavorka

WHEATLAND HIGH SCHOOL
July 1, 1983 - 7:00 PM
SCOPING MEETING ATTENDANCE LIST

Frank Ahearn
Allegra Anderson
S. Armando
Jeanette Barber
Roger Barber
Kevin & Mary Kay Bohnenblust
Andy Booz
Bruta Boyer
Betty Dower
Bud Dower
Pat Ferrier
Myrtle Flaherty
Jenny Geringer
Mr. & Mrs. Jim Geringer
Julian L. Hadley
Mrs. Myrna Hanna

WHEATLAND HIGH SCHOOL (Continued)

Gail Morley-Bryant
Mary Ann Buscaj
Joe Clements
Norm Crocker
David P. Lovetere, P.E.
Mark Koons
John Montgomery
Sue Nelson
Jim Ritterhouse
Ronald V. Rufenacht
Diana Savoy-Marcos
Eileen M. Heneny
Jim Hicks
Kent Kermin
Ernie Kittell
Carolyn Teter
Willard J. Weberg
John Murray
Ruthann Norris
Dee Rodekohr
Kenneth Saunders

FEDERAL OFFICES - EPA REGION VIII
Denver, Colorado
July 6, 1983 - 1:00 PM
SCOPING MEETING ATTENDANCE LIST

John Andersen
U.S. Army Corps of Engineers

Howard Chase
Small Business Administraiton

William C. Evan
U.S. Dept. of Transportation

Timothy Hepp
U.S. Dept. H.U.D.

Monte Mingus
Federal Emergency Management Agency

Robert E. Pizel
U.S. Dept. of Interior-BLM

Dave Davies
U.S. Forest Service

Mike Hammer
U.S. Environmental Protection Agency

David Le Fevre
Housing & Urban Development

Stan Oleson
Federal Aviation Administration

FEDERAL OFFICES EPA REGION VII
Kansas City, Missouri
July 7, 1983 - 9:00 AM
SCOPING MEETING ATTENDANCE LIST

Ron Brown
U.S. Dept. of Energy

Marlee Carroll
Federal Emergency Mgmt. Agency

William A. Powell
Small Business Administration

Ron Ritter
U.S. Environmental Protection Agency

FEDERAL OFFICES EPA REGION VII (Continued)

Terry Deen
U.S. Environmental Protection Agency

Dick Taylor
U.S. Army Corps of Engineers

Bob Fenemore
U.S. Environmental Protection Agency

Gary Uttican
U.S. Dept. of HUD

Patricia Keyes
U.S. Dept. of Transportation

Edward Vest
U.S. Environmental Protection Agency

Nelson Krueger
U.S. Dept. of Transportation

Glen Yaeger
U.S. Environmental Protection Agency

Lance Long
U.S. Dept. of HUD

Jim Meyers
Federal Aviation Administration

Grant Peters
U.S. Dept. of Transportation

STATE OF NEBRASKA
Lincoln, Nebraska
July 8, 1983 - 8:00 AM
SCOPING MEETING ATTENDANCE LIST

Bill Bailey
Nebraska Game & Parks Comm.

Marie Martin
Nebraska Crime Commission

J. Buist
Nebraska State Patrol

Betty Olson

Marvin P. Carlson
University of Nebraska

W. Palmer
Nebraska State Patrol

Gerald Chaffin
Nebraska Games & Parks Comm.

Randall Pence
c/o Senator Zorinsky

Bill Edwards
Nebraska Dept. of Motor Veh.

E.P. Schroeder
Nebraska Real Estate Commission

Mike Gomez
Nebraska Dept. of Pub.Welfare

Steve Soberski
Nebraska Resources Commission

Ginger Goomis
Nebraska Dept. of Roads

Ken Wade
Nebraska Supreme Court

STATE OF NEBRASKA (Continued)

V. Gale Hutton
Nebraska Dept. of Env. Control

Rollie Heedum
Nebraska Dept. of Roads

John Larson
Nebraska Dept. of Aeronautics

Bob Lester
AFRCE-CR/ROV

Rod Wagner
Nebraska Crime Commission

Don Westover
Nebraska Forest Service

Larry K. Zink

WRITTEN COMMENTS SUBMITTED

Mary Ackerman
Carol Ackerman
Given Anderson
Harold D. Anderson, R. S.
Sharon Breitweisor
Lt. Col. J. E. Buist
Mrs. Florence Buredon
Mary Ann Buscaj
Andrea L. Cook
Richard Deyo
Betty Jean Dower
G. J. Edwards
Joel Engelhardt
Mayor Don Erickson
Friends of the Earth
Kathleen Glatz, R.N.
James L. Green
Mayor Edith Haines
Charles H. Hajinian
Gwynne Hallock
Elwood and Myra H. Hanna
Elizabeth Marsh Jensen
Jimmie E. Jinks
Kathy Joyner
John Kefalas
Ernie Kittell
Laramie Co. Health Planning
Louis Leichtweis
Marian Lenzen
Mark Lindenmeyer
Don Mai
Mary Lou Marcum
Prudy S. Marshall, Ph.D.
David McGuire
Vivian J. McMullen
Mrs. Lenore P. Miles
Paul A. Moyer
Diana Savoy-Marcos
Nebraska Library Commission
Nebraskans for Peace/Scottsbluff Chapter
Herman Noe
Garry Oliver
Lee A. Otto
Nelly Red Owl
Major W. F. Palmer
The Planning Studio
Melon Roberts
Paul R. Ross
Sister Francis Russell
Doris Stanbury
Lloyd Sisson
Eric Snook
Janet Snyder
Joe Stern
Tim Strand, O.D.
Kathleen Talgoom
Joann Tall
Frances S. Tower
Tri-State Coalition
Upland Industries Corporation
Susan Webster
Wyoming Solidarity
Wyoming Church Coalition
Wyoming Recreation Commission

4.3 Comments Requested on the Draft Environmental Impact Statement

The following agencies, groups, and individuals received copies of this DEIS at the time the announcement of availability was made in the Federal Register.

MEMBERS, UNITED STATES CONGRESS

SENATE

CHAIRMAN	RANKING MINORITY MEMBER
Honorable John G. Tower Chairman, Committee on Armed Services United States Senate	Honorable Sam Nunn United States Senate
Honorable Mark O. Hatfield Chairman, Committee on Appropriations United States Senate	Honorable John C. Stennis United States Senate
Honorable Ted Stevens Chairman, Subcommittee on Defense Committee on Appropriations United States Senate	Honorable John C. Stennis United States Senate
Honorable William V. Roth, Jr. Chairman, Committee on Governmental Affairs United States Senate	Honorable Thomas F. Eagleton United States Senate
Honorable Pete V. Domenici Chairman, Committee on Budget United States Senate	Honorable Lawton Chiles United States Senate

HOUSE

Honorable Melvin Price Chairman, Committee on Armed Services House of Representatives	Honorable William L. Dickinson House of Representatives
Honorable Jamie L. Whitten Chairman, Committee on Appropriations House of Representatives	Honorable Silvio O. Conte House of Representatives

Honorable Joseph P. Addabbo
Chairman, Subcommittee on Defense
Committee on Appropriations
House of Representatives

Honorable Jack Edwards
House of Representatives

Honorable William D. Ford
Chairman, Committee on Post Office and Civil Service
House of Representatives

Honorable Gene Taylor
House of Representatives

Honorable James R. Jones
Chairman, Committee on Budget
House of Representatives

Honorable Delbert L. Latta
House of Representatives

Nebraska

Honorable James J. Exon
United States Senate

Honorable Virginia Smith
United States House of Representatives

Honorable Edward Zorinsky
United States Senate

Wyoming

Honorable Alan K. Simpson
United States Senate

Honorable Richard B. Cheney
United States House of Representatives

Honorable Malcolm Wallop
United States Senate

AIR FORCE AGENCIES

HQ USAF
Washington DC 20330

HQ AFSC/DE
Andrews AFB DC 20334

HQ SAC/DE/XP
Offutt AFB NE 68113

AFRCE-WR/CC
630 Sansome Street
San Francisco CA 94111

HQ AFESC/DEV
Tyndall AFB FL 32403

90th SMW/CC/PA/JA
F.E. Warren AFB WY 82005

AFRCE-CR/CC
1114 Commerce St.
Dallas TX 75024

90th CSG/CC/DE
F.E. Warren AFB WY 82005

HQ AFLC/DE
Wright-Patterson AFB OH 45433

Peacekeeper SATAF/CC
F.E. Warren AFB WY 82005

HQ ATC/DE
Randolph AFB TX 78148

Cadet Library
USAF Academy CO 80840

FEDERAL OFFICES EPA REGION VII

U.S. Department of Energy
Kansas City, MO

U.S. Department of HUD
Kansas City, MO

Federal Emergency
Management Agency
Kansas City, MO

Federal Aviation Administration
Kansas City, MO

U.S. Environmental Protection
Agency
Region VII
Kansas City, MO

Small Business Administration
Region VII
Kansas City, MO

U.S. Department of
Transportation
Kansas City, MO

U.S. Army Corps of Engineers
Kansas City, MO

U.S. Department of Labor
Kansas City, MO

FEDERAL OFFICES EPA REGION VIII

U.S. Army Corps of Engineers
Omaha District
Omaha, NE

Federal Emergency
Management Agency
Denver, CO

Small Business Administration
Denver, CO

Federal Aviation
Administration
Aurora, CO

U.S. Forest Service
Lakewood, CO

U.S. Department of Interior
Bureau of Land Management
Denver, CO

U.S. Department of Transportation (FHWA)
Denver, CO

U.S. Department of Interior
Bureau of Mines
Intermountain Field
Operation Center

U.S. Environmental Protection Agency
Region VIII
Denver, CO

U.S. Department of HUD
Denver, CO

STATE OF NEBRASKA

Games and Parks Commission

University of Nebraska
Conservation and Survey Division

Dept. of Revenue

Dept. of Public Welfare

Nebraska Dept. of Env. Control

Dept. of Roads

State Civil Defense

State Patrol

Real Estate Commission

Natural Resources Commission

Crime Commission

Nebraska Supreme Court

Library Commission

Nebraska Forest Service

Dept. of Motor Vehicles

Nebraska Dept. of Aeronautics

STATE OF WYOMING

Adjutant General, General J.L. Spence
Department of Administration and Fiscal Control, Budget Division
State Advisory Council for Vocational Education
Department of Agriculture
Attorney General's Office
Disaster and Civil Defense
Department of Economic Planning and Development
Department of Education
Employment Security Commission
State Engineer's Office
Department of Environmental Quality
Game and Fish Department
Wyoming Geological Survey
Division of Health & Medical Services
Department of Health and Social Services
Department of Health and Social Services, D-PASS
Department of HSS, Division of Community Programs
Highway Department
Industrial Siting Administration
Department of Labor
Manpower Planning
Oil and Gas Commission
State Planning Coordinator's Office
Public Lands
Public Service Commission
Wyoming Recreation Commission

STATE OF WYOMING (Continued)

Research and Statistics, DAFC
Revenue and Taxation
Division of Vocational Rehabilitation
Water Development Commission

COUNTIES

County of Albany, WY
County Clerk
County Board of Commissioners

County of Banner, NE
County Clerk
County Board of Commissioners

County of Cheyenne, NE
County Clerk

County of Goshen, WY
County Clerk
County Board of Commissioners
Goshen/Platte Co. Sanitarian

County of Kimball, NE
County Clerk
County Board of Commissioners

County of Larimer, CO
County Clerk

County of Laramie, WY
County Clerk
County Board of Commissioners
Laramie County Health Planning

County of Logan, CO
County Clerk

County of Morrill, NE
County Clerk

County of Platte, WY
County Clerk
County Board of Commission

County of Scotts Bluff, NE
County Clerk
County Board of Commissioners

County of Weld, CO
County Clerk

CITIES

City of Bayard, NE
City Clerk

City of Bridgeport, NE
City Clerk

City of Burns, WY
City Clerk

Village of Bushnell, NE
City Clerk

City of Minatare, NE
City Clerk

City of Mitchell, NE
City Clerk

City of Morrill, NE
City Clerk

City of Pine Bluffs, WY
City Clerk

City of Cheyenne, WY
City Clerk
Mayor
City Council

City of Chugwater, WY
City Clerk

Village of Dalton, NE
City Clerk

Village of Dix, NE
City Clerk

City of Ft. Collins, CO
City Clerk

City of Ft. Laramie, WY
City Clerk

City of Gering, NE
City Clerk

City of Lyman, WY
City Clerk

City of McGrew, NE
City Clerk

City of Melbeta, NE
City Clerk

City of Potter, NE
City Clerk

City of Rock River, WY
City Clerk

City of Rock Springs, WY
City Clerk

City of Scottsbluff, NE
City Clerk

City of Sidney, NE
City Clerk

Village of Terrytown, NE
City Clerk

Town of Torrington, WY
Town Clerk
Mayor
Town Council

City of Wheatland, WY
City Clerk
Mayor
City Council

City of Yoder, WY
City Clerk

IMPACT COMMITTEES

Civil Defense Impact Team
c/o City of Cheyenne, WY

Mayor's Impact Committee
c/o City of Cheyenne, WY

Public Safety Impact Team
c/o City of Cheyenne, WY

Social & Helping Services Impact Team
c/o City of Cheyenne, WY

Wyoming-Nebraska Intergovernmental
Executive Impact Council
c/o City of Cheyenne, WY

LIBRARIES: UNIVERSITIES, STATE & LOCAL

STATE

Nebraska State Library
Lincoln, NE

Colorado State Library
Denver, CO

Wyoming State Library
Cheyenne, WY

COLLEGES/UNIVERSITIES

Casper College
Casper, WY

Central Wyoming College
Riverton, WY

Chadron State College
Chadron, NE

Colorado State University
Ft. Collins, CO

Creighton University
Omaha, NE

Eastern Wyoming College
Torrington, WY

Kearney State College
Kearney, NE

Laramie County Community College
Cheyenne, WY

Nebraska Wesleyan University
Lincoln, NE

Nebraska Western College
Scottsbluff, NE

Northern Wyoming Community College
Sheridan, WY

Northwest Community College
Powell, WY

South Dakota State University
Brookings, SD

Southeast Community College
Lincoln, NE

University of Colorado
Boulder, CO

University of Nebraska
Lincoln, NE

University of Wyoming
Laramie, WY

Wayne State College
Wayne, NE

Western Wyoming Community College
Rock Springs, WY

Union College
Lincoln, NE

LOCAL

Albany County Public Library
Laramie, WY

Banner County Library
Harrisburg, NE

Gering City Library
Gering, NE

Goshen County Library
Torrington, WY

Kimball City Library
Kimball, NE

Laramie County Public Library
Cheyenne, WY

Laramie County/Burns Branch Library
Burns, WY

Lincoln City Library
Lincoln, NE

Lyman Public Library
Lyman, NE

Mitchell Public Library
Mitchell, NE

Minatare Public Library
Minatare, NE

Morrill Public Library
Morrill, NE

Platte County Public Library
Wheatland, WY

Scottsbluff Public Library
Scottsbluff, NE

Scotts Bluff County Library
Gering, NE

CITIZENS' COALITION GROUPS

Albany County Nuc. Freeze Campaign
Laramie, WY

All-American Solidarity
Cheyenne, WY

Committee on Defense Alternatives
Sheridan, WY

Common Cause
Denver, CO

Nebraska Nuc. Weapons Freeze Campaign
Lincoln, NE

Nebraskans Opposed to MX
Scottsbluff, NE

Nuclear Freeze Campaign (Cheyenne)
Laramie, WY

Peacemaking Task Force for
the Presbytery of Box Butte

Save America Now
Sidney, NE

Tri-State MX Coalition
Cheyenne, WY

University of Wyoming Nuc. Club
Laramie, WY

Western Solidarity
Denver, CO

Wyoming Church Coalition
Casper, WY

CITIZENS' GROUPS/ORGANIZATIONS

American Legion and Auxiliary
Kankakee, Illinois

American Legion Dept. of Wyoming
Cheyenne, WY

The Conservation Foundation
Washington, D.C.

Environmental Action Foundation
Washington, D.C.

Environmental Policy Center/
Environmental Policy Institute
Washington, D.C.

Friends of the Earth
San Francisco, CA

Friends of the Earth
Washington, D.C.

Izaak Walton League of America, Inc.
Nebraska Division
Columbus, NE

Izaak Walton League of America, Inc.
Wyoming Division
Casper, Wy

Trout Unlimited Wyoming Chapter
Cheyenne, WY

Wildlife Society
Kearney, NE

Wildlife Society Wyoming Chapter
Sheridan, WY

League of Women Voters
Washington, DC

National Audubon Society
New York, NY

Nebraska Assoc. of Res. Dist.
Wakefield, NE

Nebraska Bass Chap. Federation
Lincoln, NE

Nebraska Ornithologists Union
Lincoln, NE

Nebraska Wildlife Federation
Lincoln, NE

Powder River Basin Resource
Council
Sheridan, WY

Sierra Club
Lander, WY

Sierra Club
Omaha, NE

Wyoming Association of
Conservation Districts
Baggs, WY

Wyoming Outdoor Council, Inc.
Cheyenne, WY

Wyoming Wildlife Federation
Cheyenne, WY

INDIVIDUALS

Kathy Joyner
Laramie, WY

John Kefalas
Ft. Collins, CO

Nelly Red Owl
Badland, SD

Mayor W.F. Palmer
North Platte, NE

Ernie Kittell
Wheatland, WY

Louis Leichtweis
Cheyenne, WY

Marian Lenzen
Sidney, NE

Mark Lindenmeyer
Ft. Collins, CO

Don Mai
Harrisburg, NE

Mary Lou Marcum
Cheyenne, WY

Prudy S. Marshall
Cheyenne, WY

David McGuire
Laramie, WY

Vivian J. McMullen
Ft. Collins, CO

Lenore P. Miles
Kimball, NE

Paul A. Moyer
Timnath, CO

Diana Savoy-Marcos
Wheatland, WY

Herman Noe
Cheyenne, WY

Garry L. Oliver
Laramie, WY

Lee A. Otto
Yoder, WY

Given Anderson
Ft. Collins, CO

Sharon Breitweisor
Laramie, WY

The Planning Studio
Cheyenne, WY

Melon Roberts
Dix, NE

Paul R. Ross
Laramie, WY

Doris Stansbury
Cheyenne, WY

Lloyd Sisson
Pine Bluffs, WY

Erick L. Snook
Chadron, NE

Janet L. Synder
Denver, CO

Joe Stern
Ft. Collins, CO.

Tim Strand, O.D
Cheyenne, WY

Kathleen Talgoom
Green River, WY

Joann Tall
Porcupine, SD

Frances Towner
Scottsbluff, NE

Susan Webster
Ft. Collins, CO

Mary Ackerman
Ft. Collins, CO

Carol Ackerson
Torrington, WY

Joel Engelhardt
Greeley, CO

Mayor Don Erickson
Cheyenne, WY

Lt. Col. J. E. Buist
Lincoln, NE

Mrs. Florence Buredon
Torrington, WY

Elizabeth Marsh Jensen
La Grange, WY

Mary Ann Buscaj
Wheatland, WY

Andrea L. Cook
Cheyenne, WY

Richard Deyo
Ft. Collins, CO

Betty Jean Dower
Wheatland, WY

G.J. Edwards
Cheyenne, WY

Kathleen Glatz
Chadron, NE

James L. Green
Alliance, NE

Mayor Edith Haines
Kimball, NE

Gwynne Hallock
Ft. Collins, CO

Elwood & Myra Hanna
Wheatland, WY

Upland Industries Corp.
Omaha, NE

APPENDICES

APPENDIX A

GLOSSARY OF ACRONYMS

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GLOSSARY OF ACRONYMS

AFB	Air Force Base
AFRCE	Air Force Regional Civil Engineer
AFRCE-BMS	Air Force Regional Civil Engineer - Ballistic Missile Support
AFSEM	Air Force Socioeconomic Evaluation Model
BLM	Bureau of Land Management
BMO	Ballistic Missile Office
BMS	Ballistic Missile Support
CFR	Code of Federal Regulations
DEIS	Draft Environmental Impact Statement
DoD	United States Department of Defense
EIAP	Environmental Impact Analysis Process
EIS	Environmental Impact Statement
EPA	Environmental Protection Agency
FAA	Federal Aviation Administration
FEIS	Final Environmental Impact Statement
FY	Fiscal Year
LEIS	Legislative Environmental Impact Statement
LPN	Licensed Practical Nurse
M-X	Missile Experimental
RN	Registered Nurse
SCS	Soil Conservation Service, U.S. Department of Agriculture
USAF	United States Air Force
USDA	United States Department of Agriculture
USGS	United States Geological Survey

APPENDIX B

GLOSSARY OF TERMS

APPENDIX B

GLOSSARY OF TERMS

Acre-Foot: the volume of water that would cover 1 acre to a depth of 1 foot.

Active Fault: a fault along which there is recurrent movement, which is usually indicated by small periodic displacements or seismic activity.

Ad Valorem Tax: a tax imposed at a rate percent of the value of goods.

Aggregate: any of several hard, inert materials, such as sand, gravel, slag, or crushed stone, used for mixing with a cementing material to form concrete, mortar, or plaster; or used alone, as in road-base or graded fill.

Agricultural Conversion: the change of land use from agricultural purposes to some other form of land use.

Algorithm: a fixed step-by-step procedure for accomplishing a given result.

Alluvium: sediments deposited by a stream, or running water.

Ambient Air Quality Standards: standard defined on a state or federal level which defines the ceiling height for allowable ambient air quality levels for the designated criteria pollutants: NO_x, SO_2, CO, 0_3, Pb, HC, and TSP.

American Indians: used in a collective sense to refer to all the peoples native to the North American continent, usually excluding Eskimos and Aleuts.

American Indian Cultrual Resources: American Indian cultural resources include districts, sites, structures, biota, objects, and other evidence of human use considered to be of cultural value and importance by American Indians for traditional, religious, curatorial, and other reasons. These resources may be prehistoric sites and artifacts, historic American Indian areas of occupation and events, and other archaeological/historical features that may be eligible for nomination to the National Register of Historic Places (NRHP). These resources may include contemporary sacred sites and areas, materials for the production of sacred objects, hunting and gathering areas, craft materials, and other ethnobotanical, ethnobiological, and ethnogeological resources.

Ancillary Facilities: sites and structures associated with construction or operation of the project, but located outside of the ACS. Included are power lines, rock quarries, and access roads.

Animal Unit Month (AUM): food requirements for a 1,000 pound cow for 1 month.

Annexation: a legal procedure, usually described in state statutes, followed by towns and cities when expanding their boundaries.

Annual Average Daily Traffic: denotes that the specified period includes only weekdays, Monday through Friday.

Annual Average Weekday Traffic: denotes that the specified period includes only weekdays, Monday through Friday.

Anthropology: in a general sense, the scientific study of the human organism and its behavior.

Anticline: a fold, generally convex upward, whose core contains the stratigraphically older rocks.

Aquifer: the water-bearing portion of subsurface earth materials that presently yields or is capable of yielding useful quantities of water to wells.

Aquitard: a confining bed that retards but does not prevent the flow of water to or from an adjacent aquifer.

Archaeology: a scientific approach to the study of human ecology, culture history, and cultural process emphasizing systematic interpretation of material remains.

Area of Concentrated Study: an area(s) within the Region of Influence which will receive the majority of environmental impacts. Environmental existing conditions and impact analyses is focused within the ACS for this EIS. The ACS is defined for each Environmental Resource.

Area Source: pollution emissions from a spacial surface or area (e.g., dust from a tilled field).

Argillaceous: said of a rock or sediment composed of, or containing clay-size particles or clay minerals.

Artifact: anything that owes its shape, form, or placement to human activity. Archaeological studies generally restrict use of the term to portable objects such as tools and discrete nonportable items (features) such as housepits, fire hearths, cairns, buildings, etc.

Aseismic: an area or region that is not subject to earthquakes.

Assemblage: the sum total of items produced by a particular culture; also used to refer to a group of items produced by a particular technology (usually called an "industry").

Assessed Valuation: a certain percentage of the value of a home set by the local government and used for tax purposes. In Cheyenne and Laramie County's case, 25 percent of the 1967 full value of the home.

At-Grade Road: roadway surface is at the same elevation as surrounding land, rather than on an elevated or depressed right-of-way.

Atmospheric Dispersion: the transport and mixing of gases or suspended particles in the atmosphere by winds and turbulent processes.

Attainment Area: an area that has been designated by the Environmental Protection Agency (EPA) 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 (NAAQS).

Attenuation: a reduction in the amplitude or energy of a signal such as might be produced by passage through a filter.

Attitude: a mental position with regard to a tenet or body of tenets.

Average Cost Analysis: a method of determining the financial impacts associated with construction of projects on a government entity utilizing ratios based on historical per capita expenditure patterns and revenue generation.

Average Daily Traffic (ADT): the average number of vehicles passing a specified point during a 24-hour period.

Baseline: the existing characterization of an area under no-project conditions.

Base Metal: any of the more common and more chemically active metals, e.g., lead, copper, etc.

Behavioral Norms: a principle of right action for members of a group serving as a guide to the proper manner of conduct.

Belief: mental acceptance of a tenet or body of tenets.

Bentonite: a clay composed essentially of the montmorillinite group, commonly has the ability to absorb large quantities of water accompanied by an increase in volume.

Big Game Critical-Winter-Yearlong Habitat: critical habitats are areas which determine an animal population's status and potential for growth and usually provide food, water, and cover even during severe weather. Winter-yearlong habitat is occupied by animals during more than one season, but is most important to the herd during winter.

Big Game Winter-Yearlong Habitat: habitat occupied by animals during more than one season, but is most important to the herd during winter.

Big Game Yearlong Habitat: includes areas where all or part of a herd is found throughout the year.

Biochemical Oxygen Demand (BOD): the amount of dissolved oxygen, in milligrams/liter, used by microorganisms in the biochemical oxidation of organic matter.

Biota: all of the organisms of an area; the flora and fauna of a region.

BOD_5 or 5-Day Biochemical Oxygen Demand: the quantity of oxygen in mg/l, used by microorganisms in the biochemical oxidation of organic matter during a 5-day period at 20^{o} C.

Body Wave: an earthquake wave that travels through the interior of the earth (P and S waves).

Boomtown: a rapid, widespread expansion of economic activity in a town.

British Thermal Unit (Btu): approximately the amount of heat required to raise the temperature of 1 pound of water by 1 Fahrenheit degree, at 60^{o} F. International Steam Table Btu x 1.055 = kJ.

Candidate Species (also candidate threatened or endangered species): taxa (species or subspecies) of plants and animals currently being considered for listing by the U.S. Fish and Wildlife Service.

Capacity: in transportation studies, the maximum number of vehicles having a reasonable expectation of passing over a given section of a lane or a roadway in one direction (or in both directions for a two-lane or a three-lane highway) during a given time period under prevailing roadway and traffic conditions.

Capdet: a computer simulation and cost analysis model promulgated by the EPA and the US Army Corps of Engineers for the determination of needed capacity and for the estimation of costs for various waste treatment processes.

Capital Improvements Plan or Program: a plan or program that forecasts or anticipates the timing and costs of expenditures for major equipment, facilities, or projects. Generally, the plan establishes a 5-year program with a yearly priority allocation of projects and expenditures and yearly review and update.

Cartesian Coordinates: coordinates that locate a point on a plane by its measured distance from two straight-line axes which intersect each other at right angles.

Category 1 Species: taxa for which the U.S. Fish and Wildlife Service presently has sufficient information on hand to support the biological appropriateness of their being listed as endangered or threatened species.

Category 2 Species: taxa for which information now in the possession of the U.S. Fish and Wildlife Service indicates the probable appropriateness of citing as endangered or threatened, but for which sufficient information is not presently available to biologically support a proposed rule.

Cenozoic: an era in geological history extending from the beginning of the Tertiary period, 70 million years ago, to the present time, characterized by the rapid evolution of mammals, birds, grasses, shrubs, and higher flowering plants.

Cheyenne Proper: City of Cheyenne.

Cheyenne Urban Area - defined as the Census definition of the Cheyenne Division.

Cheyenne Urbanized Area: by U.S. Department of Commerce, Bureau of the Census definition, an urbanized area comprises an incorporated area and an adjacent densely settled surrounding area that together has a minimum population of 50,000. The Cheyenne and the adjacent densely settled areas of Laramie County.

Chinook: a warm dry wind undergoing adiabatic processes that descends the eastern slopes of the Rocky Mountains.

Chronology: the science of arranging time in periods and ascertaining the dates and historical order of past events.

Clearwell: a storage tank or tanks for filtered water at a water treatment plant, normally located adjacent to the filter units. Typically the clearwell provides detention time to allow injected chlorine to disinfect the water.

Climate: the prevalent or characteristic meteorological conditions, and their extremes, of any given location or region.

Climatology: the science that deals with climates and their phenomena.

Codominant Vegetation Types: vegetation cover with two plant species of equal dominance.

Color: the property of reflecting light of a particular wavelength that enables the eye to differentiate otherwise indistinguishable objects.

Combustion Turbine: directly fired turbine of the gas turbine type.

Complex: a group of related traits or characteristics that combine to form a complete activity, process, or culture unit. Lithic complexes are identified by the presence of several key implements or tool types in association.

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 proposed within that government's jurisdiction, along with goals, objectives, makers who review proposals for new development or changes in zoning.

Compressive Stress: a normal stress that tends to push together material on opposite sides of a real or imaginary plane.

Contact Basin: a tank within a water or waste treatment process in which coagulation/flocculation or other chemical or biochemical reactions are designed to occur.

Contrast: the effect of a striking difference in form, line, color, or texture of a landscape's features.

Cooling Degree-Day: a degree elevation in the mean outdoor temperature above $75^{O}F$ averaged over a 24-hour period.

Corridor: a strip of land of various widths described on both sides of a particular linear facility such as a highway or transmission line.

Count (Traffic): a volume counted on the street, which may be used for comparison with the present traffic volume assigned to the corresponding link. The count may be directional or total two-way, peak hour morning and/or afternoon - and/or a 24-hour value.

Cretaceous: the last period of the Mesozoic era, extending between 136 and 65 million years ago.

Critical Intersections: roadway intersections classified as level of service E (highly congested) where there is a potential for an exceedance of the CO ambient air quality standards from vehicular emissions.

Crude Birth Rate: number of live births per 1,000 population.

CT Scan: X-ray medical equipment capable of photographing cross sections of internal body parts.

Cultural Continuity: the retention of traditional roles, statuses, and identities through time by a specific cultural group, often occurring in spite of the addition of foreign language proficiency and the adoption of modern technological skills and innovations.

Cultural Modification: any man-made change in land, water forms, or vegetation (roads, bridges, buildings, fences); the addition of structure which creates a visual contrast to the natural character of the landscape. A negative cultural modification is disharmonious with the existing scenery. A positive cultural modification can actually complement and improve a particular scene by adding variety and harmony.

Cultural Resource: any building, site, district, structure, object, data, or other material significant in history, architecture, archaeology, or culture.

Cultural Resources Reconnaissance: a literature search and records review, plus an on-the-ground surface examination of selected portions of the area to be affected, adequate to assess the general nature of the resources probably present and the probable impact of a project.

Cultural Resources Survey: an intensive, on-the-ground survey and testing of an area sufficient to permit determination of the number and extent of the resources present, their scientific importance, and the time factors and cost of preserving, recovering, or otherwise mitigating adverse effects on them.

Cultural Sequence: an archaeologically distinct segment of a region's cultural history.

Culture: broadly, the system of behavior, beliefs, institutions, and objects that human social groups use to cope with the environment.

Culture History: an aspect of archaeology in which archaeological data are organized to produce a historical sequence for an area. The culture historian seeks to determine the historical order and nature of cultural changes within a geographical area of study.

Cumulative Effects: the aggregation of project-induced effects and the project's Region of Influence (ROI). The term cumulative has also been used to denote aggregated effects over several years as against net effects in a given year.

Debitage: lithic debris produced in tool manufacture.

Debt Service: a scheduled repayment of amortized debt usually resulting from the sale of bonds.

Decommissioning: removal of Minuteman III missiles for purpose of replacement by Peacekeeper missiles.

Degree Day, Heating: a unit, based upon temperature difference and time, used in estimating fuel consumption and specifying nominal heating load of a building in winter. For any one day, when the mean temperature is less than 18.3^{o}C (65^{o}F), there are as many Degree Days as degrees Celsius (Fahrenheit) difference in temperature between the mean temperature for the day and 18.3^{o}C (65^{o}F).

De Minimus: the level designated by the EPA below which there is no practical value in conducting an extensive PSD review. De minimus levels are defined for both the criteria and noncriteria pollutants. The de minimus emission rate is the cutoff emission rate at which pollutant emissions are considered to be "significant".

Deposition: fallout of particulates from a plume, the rate being dependent on particulate size and the concentration being dependent on the size distribution in the initial plume.

Design Life: the anticipated useful life of a facility.

Designated Wilderness Area: a tract of land that has been approved congressionally for incorporation into the National Wilderness Preservation System as mandated by the Wilderness Act of 1964.

Deterministic Process: a process in which there is or assumed to be an exact mathematical relationship between the independent and dependent variables in the system.

Developed: a lot, parcel, or area which has been built upon or has had public services installed preparatory to development.

Diagnostic Artifact: a sufficiently distinct artifact feature or type that can be placed into an existing cultural tradition.

Digester Performance: the rate or amount of volume reduction achieved by biological treatment of waste sludge.

Direct Effects: effects resulting solely from project implementation.

Disinfection: the use of ultraviolet light or chemical or gaseous agents for the destruction of bacteria and viruses that cause waterborne diseases in man.

Displacement: a general term for the relevant movement of the two sides of fault, measured in any chosen direction.

Dissected Terrain: a land form intersected by gullies, arroyos and valleys.

Dissected Topography: an area of land characterized by numerous valleys and gullies caused by extensive surface water runoff.

Distance Zones: areas of landscape denoted by specified distances of an observation point or observer.

Disturbed Area: that specific land which has had its surface altered by grading, digging, or other activities related to construction.

Diurnal Temperature Ranges: the daily range of temperature extremes (i.e., highest, lowest) for any designated seasonal period or period of study.

Divorce Rate: number of divorces per 1,000 population.

Dry-Bulb Temperature: the temperature indicated by an ordinary thermometer.

Dry Cropland: land devoted to the production of crops without the need for irrigation.

Ecology: the study of the interrelationships of organisms with and within their environment.

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 unit costs of inputs.

Ecosystem: a group of plants and animals, including their environment, arranged in a trophic structure and participation in energy flow nutrient cycling.

Edaphic: of or relating to the soil.

Effect: a change in an attribute. Effects can be caused by a variety of events, including those that result from project 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; those that

result from attributes of other projects or other attributes that change due to other projects (cumulative effects); and those that result from natural causes (e.g., seasonal change).

Effective Stack Height: the height to which a hot buoyant plume will rise when released from a point source. This height is dependent on the ambient air temperature, the height of the mixing layer, and the characteristics of the plume.

Effluent: wastewater discharged from a wastewater treatment facility.

Emergency Medical Care: services provided on an outpatient basis to victims of sudden illness, injury, or accident.

Emission Factor: the rate at which a pollutant is emitted from a point, line, or area source.

Endangered Species: a species that is threatened with extinction throughout all or a significant portion of its range.

Endemic Species: a species whose natural distribution is confined to a specific locality, area, or region.

Endogenous Variables: variables whose values are determined completely from the exogenous or other endogenous variables in a model or system of equations.

Energy: the capacity for doing work; taking a number of forms which may be transformed from one into another, such as thermal (heat mechanical work), electrical, and chemical; in customary units, measured in kilowatt hours (kWh) or British thermal units (Btu).

Environment: the sum total or the resultant of all the external conditions which act upon an organism.

Enterprise Authority: a governmental function established to be self-supporting in expenditure commitments and in generating revenues.

Ephemeral Stream: a stream that flows briefly only in response to precipitation in the immediate vicinity and whose channel is at all times above the water table.

Epicenter: the point on the earth's surface directly above an earthquake.

Equivalent Sound Level: the level of a constant sound which, in a given situation and time period, has the same sound energy as does a time-varying sound. Technically, equivalent sound level is the level of the time-weighted, mean square, A-weighted sound pressure. The time interval over which the measurement is taken should always be specified.

Estimation Equation: an equation that yields an estimated value for the dependent variable given values for one or more independent variables that are thought to affect the dependent variable.

Ethnographic Research: the detailed, first-hand, systematic collection of facts about a contemporary social unit, usually a small-scale society or culture, used to produce a descriptive case study.

Ethnography: the description of human groups and their behavior by direct observation and/or by transcription of statements by living persons.

Ethnohistory: history of nonliterate human groups consisting of oral literature or ethnographic records.

Ethnology: a branch of anthropology dealing with extant races and cultures ("peoples").

Exogenous Variables: variables whose values are assumed in order to forecast values for the endogenous variables. Exogenous variables are variables whose values are determined outside the model or system of equations under consideration.

Expenditure: a disbursement of funds by a government entity.

Extended (Long-term) Care: care at nursing homes and other long-term care facilities.

Fauna: animals; organisms of the animal kingdom of a given area taken collectively.

Fecal Coliform Bacteria: a group of organisms found in the intestinal tracts of people and animals. Their presence in water indicates the likelihood of pollution and possibly dangerous bacterial contamination.

Feral: refers to a domestic animal that has become wild.

Firefighting Vehicles: vehicles directly used in fire supression excluding ambulances, equipment vans, vehicles solely used to transport personnel.

Flake: any piece of stone removed purposefully from a larger stone.

Flat Yard: a type of railroad yard where cars are switched and classified on level ground.

Flights: an irregular polygon circumscribed around 10 missile silos that are treated as a unit.

Floodplain: for inland waters, the area subject to a 1 percent or greater chance of flooding in any given year (i.e., the area adjacent to a stream expected to be inundated in a 100-year flood). Executive order 11988, Floodplain Management, places limitations on the construction of projects in floodplains and promulgates guidelines to ensure public health and safety both to protect aginst property loss and to protect natural and beneficial values of floodplains.

Flora: plants; organisms of the plant kingdom taken collectively.

Form: the mass or shape of an object, which appears unified; often defined by edge, outline, and surrounding space.

Formation: a sequence of similar rock layers that can be traced over a large area.

Frictional Vacany: those housing units on the market that have sold or rented but are awaiting occupancy.

Fringe Area: that unincorporated area adjacent to Cheyenne containing residential and nonresidential uses similar in character to the incorporated portions of Cheyenne.

Fugitive Dust Emissions: emissions released directly into the atmosphere, which could not reasonably pass through a stack, chimney, vent, or other functionally equivalent opening.

F Statistic: a statistical measure used to judge statistical significance.

Furbearers: mammal species which are harvested by trappers - such as muskrat, raccoon, or beaver.

Gallinaceous Birds: birds of the Order Galliformes. Includes pheasant, grouse, and quail.

Game Fish: fish species generally found on the higher end of the food chain that are considered sport fishes by anglers.

Gaussion Diffusion: the dispersion of a plume from the centerline corresponding to normal distribution (bell-shaped).

Geometric Mean: the nth root of the product of n numbers.

General Acute Care: inpatient treatment provided in short-stay hospitals, according to a plan of care established by a physician. Acute care hospital services normally provided are medical-surgical, intensive care, intensive cardiac care or coronary care, obstetric-gynecological, neonatal special care, perinatal, pediatric, psychiatric, emergency, and organized outpatient.

Geochronology: that branch of geology specializing in the dating of specific geological events.

Geomorphology: that branch of geology specializing in the origin, development, and characteristics of the surface features of the earth.

Gravity Model: a system of equations which balances the gravity, or size of a community, with its proximity to a work site.

Growth Management: the philosophy of using land development controls (regulations, plans, and policies) to influence the rate, direction, and quality of growth and development within a governmental jurisdiction.

Habitats: places or physical areas with particular kinds of environments in which organisms live.

Habitation Site: location bearing evidence of prehistoric human occupation (village or campsites) and distinguished by developed midden deposits.

Harmony: the combination of parts into a pleasing or orderly whole; congruity; a state of agreement or proportionate arrangement of form, line, color, and texture.

Heating Degree-Day: a degree declination in the mean outdoor temperature below 65°F averaged over a 24-hour period.

Heavy Trucks: all vehicles having three or more axles and designated for the transportation of cargo. Generally, the gross vehicle weight is greater than 26,000 pounds.

Historic: a period of time after the advent of written history. In the ROI, the historic period ranges from about A.D. 1800 to the present. It also refers to items primarily of Euro-American manufacture.

Historic Cultural Resources: consist of physical evidence of past cultural activity postdating the advent of written records in a given region. These resources may be archaeological, architectural, or archival in nature. Only two of these resource subelements, historic archaeological properties and historic architectural properties, need be considered because they alone are subject to potential effects from PIMS deployment.

Holocene: the most recent period in geological history, beginning about 25,000 years ago, marked by the rise of Homo sapiens.

Holocene Period: the time since the end of the Pleistocene, characterized by absence of large continental or Cordilleran ice sheets and extinction of large mammalian life forms.

Homogenous: of a uniform structure culturally or racially.

Horizon (Cultural): an archaeological manifestation of a particular time period, often used to refer to an occupational period at a site or groups of related sites.

Household Size: the average number of individuals residing in a single dwelling unit.

Housing Market Mechanism: the ability of the market to respond to an increase in demand for housing with an adequate housing supply.

Hump Yard: a type of railroad yard where cars are switched by passing over a rise in topography which gives them momentum to ride to different tracks.

Hydrogeologic Unit: one or more geologic formations with similar water-bearing and transmitting characteristics.

Impact: an assessment of the meaning of changes in all attributes being studied for a given resource, an aggregation of all the effects, usually measured using a qualitative and nominally subjective technique.

Impoundment: a man-made area for the purpose of detention or retention of surface water.

Indirect Effects: effects resulting from the attributes of other resources acting on the attribute being studied. For example, direct project 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 effect".

Indirect Employment: employment resulting from the purchases of workers who are directly working on a specified project. Indirect employment also includes any subsequent employment that may arise from the increase in output/purchases in the area.

Induced Effects: Refers to a tertiary level of demand change in the target economy resulting from direct and indirect effects.

Industry Specific Location Coefficient: ratio of the share of earnings for a specific sector in region to the share of earnings for that sector nationally.

Infiltration: the leakage of groundwater into a sewer from defective or deteriorating pipe joints.

Inflow: the entrance of stormwater runoff into a sanitary sewer through defective or deteriorating manhole structures or via the illicit connection of roof drains or street storm drains to sanitary sewers.

Infrastructure: the system of public utility lines, communication facility networks, and roadways which connect all the structures and facilities in a given locale.

Inmigrants: all people relocating into a defined geographic area usually calculated on an annual basis.

Input/Output Model: an analytical method which disaggregates the economy into industrial sectors tracing the flow of goods and services among these sectors to indicate the systematic relations among them.

Intercontinental Ballistic Missile (ICBM): a large land based missile capable of accurate delivery over intercontinental ranges (usually greater than 5,000 miles).

Intermittent Stream: a stream that does not have continuous flow during all periods of the year.

Inversion: a reversal of the normal atmospheric temperature gradient causing increasing temperatures with height.

Investor-Owned Utility: utility owned by private investors as contrasted to utilities owned by federal, state, or local governments or cooperatives owned by consumers.

Irrigated Cropland: land devoted to the production of crops which require and benefit from periodic irrigation.

Kill Site: archaeological site indicated by the presence or association of faunal remains, butchering tools, and hunting equipment such as projectile points.

Labor Market Friction: that component of the labor force which is unable to find employment due to time lags between job opening and job findings, but is otherwise employable.

Landowner: a person or entity indicated as the owner of property on the various ownership maps maintained by the Office of the County Assessor.

Land Use (Subsistence)/Settlement Pattern: settlement patterns are characteristic distributions of artifacts at habitation sites occupied by members of a particular society and show the relationship between specific activity areas within a residence or community.

L_{dn} Noise Level: the 24-hour average-energy sound level expressed in decibels, with a ten-decibel penalty added to sound levels between 10 PM and 7 AM.

L_{eq} Noise Level: the level of a constant noise source which has an amount of acoustic energy equivalent to that contained in the measured time varying noise for a given time interval. It is expressed in (dBA).

Leakage Parameters: those portions of salary and wages which are not spent within the region. These include taxes, savings, and other expenditures made elsewhere.

Level of Impact: for each environmental resource there are specific definitions for negligible, low moderate, and high impacts for this EIS.

Level of Service: in transportation studies a qualitative measure of the flow of traffic along a given road in consideration of a wide variety of factors, including speed and travel time, traffic interruptions, and freedom to maneuver. Levels of service are designated A through F - A being a free-flow condition with low volumes and high speeds, and F being a congested condition of low speeds and stop-and-go traffic. Intermediate levels describe conditions between these extremes.

Light Duty Vehicles: automobiles and light trucks with two axles and four wheels, designed primarily for transportation of nine or fewer passengers (automobiles) or for transportation of cargo (light trucks). Generally, the weight is less than 10,000 pounds.

Lignite: a brownish-black coal that is intermediate in coalification between peat and subbituminous coal.

Line: the path that the eye follows when perceiving abrupt differences in form, color, or texture. In the landscape, ridges, skylines, structures, changes in vegetation, or individual trees and branches may be perceived as a line.

Lithic Debris: the waste material produced in the manufacture of stone tools; chips. Also, debitage and detritus.

Lithology: the physical character of a rock such as its color, hardness, mineralogic composition, and grain size.

Loam: a rich permeable soil composed of equal amounts of clay, silt, and sand, usually containing organic matter.

Location Quotient: the ratio of the share of earnings for a specific sector in a region to the share of earnings for that sector nationally. Alternatively, sectoral employment may be used as the basis for measurement.

Long Term: denotes the steady-state operations phase of the project when a constant level of project employment is attained.

Long Term Impact: after the construction phase during full operation after 1990.

Lot: a parcel of land created by and identified in a subdivision.

Magnitude (earthquake): a measure of the strength of an earthquake or the strain energy released by it.

Management Activity: an activity of man imposed on a landscape for the purpose of harvesting, transporting, or replenishing natural resources.

Mean: a value that is computed by dividing the sum of a set of terms by the number of terms (i.e., average).

Mesoscale: encompassing a medium scale area. For air pollution analysis, this usually covers a regional area of up to approximately 100 miles.

Mesozoic: an era of geologic time extending from about 195 million to 65 million years ago (U.S. Geological Survey).

Meteorology: the scientific study of the atmosphere.

Microenvironment: the environmental conditions actually experienced by an organism in its environment. Examples of microenvironments experiencing very different environmental conditions within the same locale would be a burrow, the area under a rock, a shaded surface, and a sunny surface.

Mill: a rate of taxation expressed in 1/10 of a cent per dollar.

Milligram: one-thousandth of a gram.

Millimeter: one-thousandth of a meter.

Miocene: an epoch of the Tertiary period, 10 to 6 million years ago, marked by the development of apes and appearance of ancestral gibbons.

Mitigations: methods to reduce or eliminate adverse project impacts.

Mixing Height: the elevation to which a plume rises until its temperature and density equals that of the atmosphere.

Mobile Home: a single-family dwelling unit which 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.

Mobile Source: mobile air pollution sources are comprised of all air, water and land transportation vehicles.

Model: a mathematical formula that expresses the actions and interactions of the elements of a system in such a manner that the system may be evaluated under any give set of conditions; i.e., groundwater, erosionsedimentation, and water quality.

Modified Mercalli Intensity: an arbitrary measure of an earthquake's intensity based on the effect on people and structures. Ranges from I (not felt by people) to XII (damage nearly total).

Mortality/Morbidity: Incidence of death/disease for a given population; key health status and indicators.

Multifamily Housing: renter occupied units, including apartments, duplex, and fourplex.

Multiplier: a numerical factor that relates economic quantities.

National Register of Historic Places (NRHP): the National Register of Historic Places, which is a register of districts, sites, buildings, structures, and objects significant 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.

Nominal Treatment Capacity: hydraulic design capacity of waste treatment plant at which an effluent of acceptable quality can be produced.

Noncompliance: action contradicting a specified procedure or causing results outside specified limits.

"Non-Firm" Power: electric power supplied under a contract which allows the supplier to cut-off supply at his option when demands on his system excel his capacity. This type of contract may be offered by a generator with a large hydroelectric capacity which is subject to water shortages during periods of low precipitation.

Nonfranchised Local Operations: privately owned local hotels and motels that are not members of a regional or national chain.

Noise Sensitive Areas: specific locations (or general areas) of types of land use activities which may be affected by traffic noise.

Nonattainment Area: an area that has been designated by the Environmental Protection Agency (EPA) and the appropriate state air quality agency as violating one or more National Ambient Air Quality Standards (NAAQS).

Noncompliance: action contradicting a specified procedure or causing results outside specified limits.

Nongame Fish: fish species that are generally found near the lower end of the food chain and are not considered as sport fishes by anglers.

Normal Fault: a fault in which the overlying side of the fault appears to have moved downward relative to the underlying side of the fault.

Occupancy Rate: persons per year-round housing unit.

Open Camp: habitation site exhibiting a weakly developed midden deposit with no evidence of structures.

Operating Costs: costs incurred in operating a government entity.

Orogeny: the process of formation of structures within mountains.

Outside Economy: that economy that is outside the boundary of the economy under study.

Paleo-: prefix denoting "past" or "extinct".

Paleo-Indian: earliest documented hunting and gathering groups in North America, generally dating from 12,000 -6,000 B.C.

Paleontological Resources: consist of physical remains of extinct life forms or other that may still have living representatives. These include fossilized remains of animals or plants or parts thereof, casts or molds of the same, or trace fossils such as impressions, burrows, and tracks. Collecting localities are areas where such remains can be found. These typically include surface exposures, subsurface deposits exposed by ground-disturbing activities, and circumstances affording special environments for preservation (e.g., caves, peat bogs, tar pits, etc.).

Paleozoic: an era of geologic time extending from about 570 million to 195 million years ago (U.S. Geological Survey).

Parcel: a plot of land with definable boundaries which is not a lot.

Parks Master Plan: planning document projecting future need for parks and other recreational facilities.

Participation Day: a single occurrence of an activity lasting for any period of time up to 12 hours.

Pasquill Gifford Stability Classes: measures of atmospheric stability ranging from A-F (1-6) where stability class A-C (1-3) represents unstable atmosphere, D (4) a neutral atmosphere and E-F (5-6) a stable atmosphere.

Patient Origin: the study of geographical, residential origins of patients admitted to hospitals for medical services. Same as Service Area.

Patrol Cars: marked vehicles used in day to day patrol duties.

Peak Flow: the maximum discharge of a stream during a specified period of time.

Peak Hour: the 60 minutes observed during either the morning or evening peak period that contains the largest amount of travel.

Peak Period: the two consecutive morning or evening 60-minute periods which collectively contain the maximum amount of morning or evening travel. Peak period can be associated with person-trip movement, vehicle-trip movement, or transit trips.

Peak Year: the year in which some particular project-related effect, e.g., total employment, is greatest.

Per Capita Expenditures: amount of expenditures in a given category calculated on a per person basis.

Per Capita Personal Income: average annual income per person (in a specified region).

Per Capita Revenues: amount of revenues in a given catregory calculated on a per person basis.

Perennial Stream: a stream that has continuous flow during all periods of the year.

Peripheral Species: a species whose distribution extends only into a small portion of the ROI.

Permeability: the property or capacity of a porous rock, sediment, or soil for transmitting a fluid.

Persistence Factor: for air pollution studies, a factor which can be applied to a 1-hour CO concentration to yield an 8-hour CO concentration. It includes the effects of both meteorology and traffic.

Personal Income: total annual income earned by individuals before taxes including interest income, transfer payments, and employee fringe benefits.

Petroliferous: said of a geologic unit which contains oil and/or gas.

Physical Infrastructure: capital facilities, such as roads, water and sewer lines, etc.

Physiographic Province: a region of which all parts are similar in geologic structure and climate and which have consequently had a unified geomorphic history.

Physiography: a description of the surface features of the earth.

Plat (Platted): the map which is approved by the local governmental legislative body and officially recorded by the Office of the County Clerk and Recorder, which creates lots for sale and/or development; a lot or area included within a plat.

Plat Boundaries: zone of seismic and tectonic activity along the edges of lithospheric plates presumed to indicate relative motion between plates.

Pleistocene: a million year span of geological history, marked by repeated glaciation and the first indication of social life in human beings.

Pliocene: an epoch of the tertiary period 6 to 3 million years ago characterized by the development or the first man-like primates.

Plume: the theoretical cloud of pollutant emitted from a source (e.g., stack, exhaust pipe).

Plume Rise: the elevation a plume rises following emission from a source which is dependent upon ambient air temperature height of the mixing layer and plume temperature and density.

Point Source: any single source of air emissions from a stack, chimney, vent or other functionally equivalent opening.

Polar Coordinates: coordinates that locate a point in space on a plane by its vector (direction and magnitude).

Precambrian: all geologic time before the beginning of the Paleozoic, equivalent to about 90 percent of geologic time.

Precious Metal: a general term for gold, silver, or any of the minerals in the platinum group.

Predictive Model: a statement or set of statements which attempt to define the conditions surrounding the occurrence of a certain class of phenomena. For example, an archaeologist might predict that prehistoric settlements would tend to occur at stream confluences.

Prehistoric: that period of time prior to the written record; in the ROI area, generally the prehistoric period before A.D. 1800.

Prehistoric Cultural Resources: consist of those physical properties considered important to a culture, subculture, or community for scientific or humanistic reasons that predate the advent of written records in particular geopraphic region. These include geographical districts, networks, structures, sites, objects, and other physical evidence of past human activity.

Preliminary Treatment: the first processes at a wastewater treatment facility to remove coarse debris from the wastewater. Typically, the treatment involves bar or mechanical screening, grit removal, and sometimes comminution.

Preservation: action taken to maintain physical integrity of cultural resource sites by limiting the effects of geological processes, human disturbance, and predation.

Pressure Zone: a water service area delineated by a range of water pressures at which water is delivered to a customer's connection point. Typically, pressure zone boundaries indicate areas with water pressure below 40 psi and above 100 psi.

Prevention of Significant Deterioration (PSD): air quality regulations intended to maintain air quality by regulating the amount of further deterioration. Lands are designated as Class I, II, or III according to the amount of allowable further degradation.

Primary Care: basic, general care usually provided in a physician's office, clinic, or ambulatory care center. Primary care physicians are general or family practice physicians, obstetricians, pediatricians, osteopaths, and internists. Other primary care personnel are nurses and public health nurses, nurse practitioners, and physician support personnel.

Primary Impact: impacts due to direct influences from project activities.

Pristine Areas: an air quality region with background air quality levels representative of a Class I airshed.

Probability Analysis: an analysis conducted to evaluate the chance that a given event will occur.

Projectile Point: implement which probably served as the tip of darts, lances, spears, arrows, and other launched piercing tools (weapons).

Protohistory: that period in which nonliterate Native American cultures were affected by the Euro-Americans without direct contact. For instance, in land Indian tribes received trade goods and reports of the white cultures from other Indian tribes long before their arrival.

Provenience Data: information about the location of artifacts.

PSD Class I Areas: lands in which existing air quality is to be most stringently maintained.

PSD Increments: maximum pollutant concentration increases allowed to all new or modified sources in PSD Class I, II, and III areas.

PSD Increment Consumption: the extent to which the total allowable PSD increment has been used up in an area by all new or modified sources that are subject to PSD regulations.

Qualitative Measures: measures relating to inherent, intangible features that are hard to quantify.

Quantitative Measures: measures that assess the degree of association between variables.

Quantity Distance: the prescribed safety zone or required safe distance between places where explosives (including rocket propellants) are stored or processed, and other specified location such as inhabited buildings, public traffic routes, recreational areas, utilities, petroleum storage facilities, and storage or processing facilities for other explosives.

Quaternary: geologic period including Pleistocene and Holocene epochs.

Queue Length: length of vehicles backed up at a signalized intersection during the red cycle period.

Rangeland: that land devoted to the grazing and keeping of animals such as cattle, sheep, and horses.

Raptors: birds of prey, such as eagles, hawks, falcons, vultures, and owls.

Rare Animal: an animal species that occupies only a small percentage of the preferred habitat within its range or a species that is found throughout its range in extremely low densities; cannot always be found by a skilled observer even during intensive survey work.

Rational Medical Service Area: national geographic areas for delivery of primary medical care services as determined using federal (public health service) criteria for designation of health man power shortage areas (1980).

Reclamation: the process of restoration of an area which has been disturbed.

Recreational Standard: the standard used to project future recreational needs based on population levels.

Recreational Vehicle: a self-propelled vehicle designed to provide mobile, temporary living accommodations.

Region of Influence: the largest region which would be expected to receive measurable impacts from the Proposed Action.

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 (secondary succession).

Revenue: the yield of sources of income that a government entity collects or receives.

Riffles: turbulent water resulting from a high rate of flow through a shallow area of a stream channel with a congregation of larger particles (boulders, gravel) in the substratum.

Riparian: pertaining to features on the bank of a natural water course.

Rural: that area outside of towns, cities, or communities; characterized by very low density housing concentrations, agricultural land uses, and general lack of most public services.

Rural Electric Association (REA): cooperative sponsored by the Rural Electrification Administration of the U.S. Department of Agriculture to supply electricity to a rural area.

Rural Subdivision: a platted area located away from an incorporated town or city; characterized by very low densities, onsite wells for water supply, and septic systems.

Scenic Quality: a relative index of the visual distinctiveness of landscape based on the diversity of form, line, color, and texture including visual intrusions, but excluding viewer sensitivity.

Secondary Impact: impacts due to indirect influence from project activities, i.e., transporting materials to project site.

Secondary Treatment: the reduction of biochemical oxygen demand in wastewater by aerated biological processes and sedimentation.

Section: a subdivision of a township that is 1 mile square.

Seismic: pertaining to an earthquake or earth vibration, including those that are artificially induced.

Seismic Source Zone: a zone determined by tectonics, historic seismicity, or both which is believed capable of generating earthquakes.

Seismotectonic Provinces: a region of which is characterized by similar tectonic and seismic characteristics.

Short-Term Impact: during the construction period up to 1990.

Significance: the importance to the resource of the impact on the resource. Council of Environmental Quality (CEQ) regulations specify several tests to determine whether an action will significantly affect the quality of the human environment.

While these test apply to the entire action, they can also be used in an amended form to judge impact significance for individual resources. It is important to note that a high impact may not be significant, while a low impact may. Significance is an either/or determination: the level of impact described either is significant or is not significant. Additionally, beneficial significance must be determined at the same level as adverse significance. As specified in the CEQ regulations, significance needs to be determined for each of three geographic areas: local, regional, and national. This places the impact into context. Significance is also determined in terms of intensity.

Site Specific: conditions characteristic of a geographically defined location that may vary considerably from characteristics of adjacent locations or the characteristics of a larger area within which the location in question is contained.

Species of Special Concern: species protected by state legislation and/or species identified by state agencies as requiring special attention due to limited distribution and/or population declines.

Stability: in relation to air pollution disciplines, the property of the atmosphere that causes it, when disturbed from a condition of equilibrium, to develop forces or movements that restore the original condition.

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 liasion for purposes of implementing the National Historic Preservation Act.

Storm Water Management Model: a computer model promulgated by the EPA for hydraulic and quality simulation of storm sanitary, and combined sewers, treatment processes, and receiving waters; known as the SWMM model.

Stratigraphy: natural, often differing, deposits that have accumulated in one place over a period of time and now lie layered in the earth's surface, the oldest deposits being the deepest. Cultural materials are dated relative to each other by their position in the stratigraphic layers.

Subdivision: an area of land for which a plat has been approved.

Subdivision Moratorium: an action by a local government legislative body which causes the creation and/or development of lots to cease until the moratorium is lifted.

Subdivision Regulations: a public document which establishes requirements for legally dividing land for sale or development.

Sublimation: an effect similar to evaporation, whereby a substance passes directly from a solid to gaseous phase. For example, snow or ice can sublimate into the atmosphere without ever becoming a liquid.

Subsidence: the sudden sinking or gradual downward settlement of the earth's surface with little or no horizontal motion.

Substance Abuse: the misuse of alcohol or other drugs.

Surcharge: the condition within a gravity sewer wherein flow changes from nonpressurized to pressurized flow. Typically this involves the water level rising above the top of a sewer line in manholes, sometimes causing flooding of streets above.

Surface Roughness: a measure of the irregularity of the terrain used to determine the extent of turbulant mixing near the land surface from body of air passing over the terrain.

SWMM Officer: uniformed law enforcement personnel who are authorized to make arrests and to carry guns.

Tectonics: of or dealing with the broad architecture of the upper part of the earth's crust, i.e., the regional assembling of structural or deformational features, and their mutual relationships, origins, and historical evolution.

Tensile Stress: a normal stress that tends to cause separation across the plane on which it acts.

Terrace: any long, narrow, relatively level or gently inclined surface, bounded along one edge by a steeper descending slope and along the other by a steeper ascending slope.

Tertiary Care: tertiary or specialty care services are those which require sophisticated equipment and specialized training, involve risks to the patient, and are rarely required, such as open heart surgery, radiation therapy, cardiac catheterization, computer tomographic scanners, and end-stage renal disease.

Texture: the visual manifestation of the interplay of light and shadow created by variations in the surface of an object.

Threatened Species: a species that is likely to become endangered in the foreseeable future.

Threshold Limit Value: the maximum acceptable concentration for worker exposure to a potentially toxic material; determined on the basis of a 8-hour work day and 40-hour week.

Total Vacancy: total (gross) vacancy less frictional vacancy for all year-round housing units.

Township: a surveyed tract of land containing 36 sq mi and identified relative to its relationship to defined parallels of latitude.

Unavoidable Adverse Impact: a project-induced effect determined to be adverse that cannot, or will not, be mitigated or avoided.

Unincorporated: not included within the corporate limits of a city or town.

Union Catalog: a listing of all books and/or periodicals available in a given library, library system, or other area.

Upland Game: hunted species other than big game or waterfowl, including gallenaceous birds, cottontails, and squirrels.

Urban: that area within towns, cities, or communities, characterized by densities greater than one dwelling unit per acre.

Urban Fringe: area associated with a city but beyond the municipal boundaries.

Urban Service Area: the areas in and immediately surrounding a city that are entitled to service amenities such as water and sewer.

Use Tax: a tax on construction materials purchased outside of the taxing unit's jurisdiction but used within the unit's boundaries.

Vacancy Rate: the average number of a single family, multifamily or mobile homes that are unoccupied at any given time.

Values: the principles or qualities intrinsically desirable to a person or group of people.

Variety: the condition of having differentiated parts; the absence of monotony or sameness.

Viewer Sensitivity: a relative index of the sensitivity of a view area based on the number of viewers, purpose of observation, length of observation, and number of view points from which the view area can be seen.

Viewshed: the segment of landscape that is seen from an observation point or travel route.

Visibility Degradation: any adverse change in visibility consisting of either a reduction of visual range from some reference value, or a reduction in contrast between an object and the horizon sky, or a shift in coloration or light intensity of the sky or distant objects compared to what is perceived on a "clear day".

Visitor Day: one or more visits totaling a 12-hour day.

Visual Intrusion: a man-caused alteration in the landscape that, due to the introduction of form, line, color, or texture and/or disproportionate scale, sequence or repetitions, introduces discord or discontinuity into the landscape, thereby reducing its visual quality.

Watsim: a propietary computer models available under several lease agreements, for the simulation of water distribution pipe networks and storage volumes, plus appurtenances.

Wedge-Out: the edge or line of a pinch-out of lensing or truncated rock formation.

Weighting Factors: numerical weights of ten, determined by judgment, used to increase or decrease the relative score of a particular impact category. The use of such factors are designed to emphasize important or sensitive issues in grading of impacts and ranking of sites.

Wetlands: areas defined by the prevailing vegetations and soil moisture content and consisting of vegetation typical of soils that are saturated for a major portion of the year.

Worst Case: the combination of all the worst possible effects to result potentially from the actions of a project.

Xeric: characterized by, or requiring only a small amount of moisture or dry conditions.

APPENDIX C

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APPENDIX D

ISSUES IDENTIFIED DURING SCOPING

APPENDIX D

ISSUES IDENTIFIED DURING SCOPING

D.1 ISSUES IDENTIFICATION

Scoping activities are undertaken as part of the process to determine the nature and range of issues to be addressed by an environmental impact statement (EIS). Scoping activities are also intended to eliminate from detailed study the issues which are not pertinent to a particular EIS. Through the scoping process reported herein a range of issues were identified by governmental agencies and officials, private groups, and individuals. The issues raised at the scoping meetings and workshops plus written comments submitted at the meetings and by mail have been collected, reviewed, and identified.

This appendix provides a guide to the location in the EIS of issues raised during public scoping of issues. Responses to issues not addressed in the body of the EIS are found in Section D.3 of this appendix.

D.2 LOCATION OF ISSUES DISCUSSED

A. PEACEKEEPER SYSTEM/POLICY ISSUES

		Addressed In EIS	Addressed In Section D.3
A-1	Object to missile on moral grounds		A-1
A-2	Missile is first strike weapon not a defensive one like Minuteman. Impact of this change as it relates to Cheyenne as a target		A-2
A-3	Do not want the missile		A-3
A-4	Name "Peacekeeper" is offensive		A-4
A-5	Expected life of missile	1.6.9	A-5
A-6	Survivability of missile in attack-electromagnetic pulse		A-6
A-7	Number of missiles to be deployed	1.1	
A-8	Number of missiles to be produced		A-8
A-9	Expansion plans		A-9

A-10	Protective measures to be employed; antiballistic missile systems; Superhardening	1.3	
A-11	Missile will continue arms race		A-11
A-12	Plans for decommissioning missile	1.6.9	
A-13	Security planned for silos and transport of missiles	1.6.3.1	
A-14	Procedure for maintenance of missile in silos and radiation monitoring	1.6.8 1.6.10.5	
B.	ENVIRONMENTAL IMPACT STATEMENT ISSUES SHOULD INCLUDE		
B-1	Construction of antiballistic missile/ ballistic missile defense systems	1.3.1.3	
B-2	Hardening of silos	1.3.1.3	
B-3	Impact of first or retaliatory strike	1.3	
B-4	Impact of nuclear attack on Cheyenne	1.3	
B-5	Impact of nuclear attack on deployed Peacekeeper	1.3	
B-6	Technological forecast		B-6
B-7	Accidental detonation	1.6.10	
B-8	Civil defense planning		B-8
B-9	Alternative basing modes should be investigated, including: on submarines, in the air, and the small missile program	1.3	
B-10	Alternative sites for Peacekeeper in Minuteman Silos	1.3	
B-11	No Peacekeeper alternative	1.1	B-11

C.	SCOPING		
C-1	Hold meetings in: Fort Collins, CO Greeley, CO Casper, WY Sidney, NE Lincoln, NE Scottsbluff, NE Laramie, WY Chadron, NE		C-1
C-2	Change format of meeting - no workshops		C-2
C-3	Continue question-and-answer period until everyone is done		C-3
C-4	Have tape recording of hearing or court stenographer		C-4
D.	NUCLEAR POLICY		
D-1	Long-range weapons planning		D-1
D-2	Launch-on warning, launch-on-attack policies		D-2
D-3	Jackson amendment: scope and meaning	1.3	
E.	GEOLOGICAL RESOURCES		
E-1	Visual impacts of gravel pits and/or ridges	3.2.3.6	
E-2	Use of superhardened silos after decommission - radioactive waste storage		E-2
E-3	Impact to silos from earthquakes	1.6.10.2	
F.	CULTURAL RESOURCES		
Architectural Survey/City of Cheyenne NEPA (40 CFR 1502.22):			
F-1	Identify data gaps		F-1

F-2	Include in EIS if not prohibited by cost		F-2
F-3	Discuss why information not included		F-3
	Architectural/Historical Inventory of F.E. Warren		
F-4	Include interiors	2.1.12.1.2.2	
F-5	Include landscaping	2.1.12.1.2.2	
G.	ENERGY		
G-1	Backup systems for silos - local systems fail due to bad weather	1.6.3.1	
G-2	Energy increases - due to boom/bust cycle? Will Air Force compensate?	3.1.8	
G-3	Gasoline prices - impact of boom/bust on prices	3.1.8.4.3	
G-4	Amount of increase in electric usage at each site proposed for conversion from Minuteman to Peacekeeper	3.1.8.4.1	
G-5	Will the required voltage remain the same. If not, what will be required?	3.1.8.4.1	
G-6	Will power lines need to be raised for construction equipment or the transporter?	3.1.8.4.1	
G-7	Impact of the project on the AC/DC electrical power ties at Stegal and Sidney, Nebraska		G-7
G-8	Project impact upon electrical purveyors in the Region of Influence	3.1.8.4.1	
G-9	Project impact upon fuel availability to local residents; capability of fuel distribution system to meet the added demands	3.1.8.4.3	
G-10	Impact of induced residential energy use	3.1.8.4.1.2 3.1.8.4.2.2	

G-11	Potential conflict of project with existing energy transport systems	3.1.8	
G-12	Nonresidential energy needs of project workers		G-12
G-13	Impact of the project upon agricultural sector energy needs		G-13
G-14	Need for special fuels	3.1.8.6	
G-15	Impact of the project upon local energy rates	3.1.8.4	
H.	BIOLOGICAL RESOURCES		
H-1	Fishing pressure on small streams in study	3.2.2.4.3.2	
H-2	Fisheries in Crow Creek downstream of Cheyenne	2.2.2.2.3.3 3.2.2.4.2.2	H-2
H-3	Waterfowl and upland game hunting pressures	3.2.2.4.2.2	
H-4	Possibility of radiological effects due to accident with the transport of the missile components including warheads	1.6.10.5	H-4
H-5	Concern expressed on effects of nuclear blast on Cheyenne	1.3	
H-6	Inmigration - increase in population on services and safety	3.1.6.4.2	
H-7	Effect of inmigration on fish and wildlife may be detrimental	3.2.2.4.2	
H-8	Concern about nuclear accident effect on wildlife		
H-9	Concern related to increased water use on fisheries		H-9
H-10	Poaching	3.2.2.4.2.1	

I.	WATER RESOURCES		
I-1	Will the water demand created by the following be addressed in the EIS: Antiballistic missile/ballistic missile defense; silo hardening; small missile; construction workers and dependent use; road network requirements	1.3 3.2.1.4.1	I-1
I-2	Impact of project on wells on ranch land in Nebraska near existing silos	3.2.1.4.4	
I-3	Disposition of groundwater simulation model (Crow Creek watershed) for local use after project	2.2.1.2.4 3.2.1.6	I-3
I-4	Effects of accidental release of radio-active material on groundwater		I-4
I-5	Impact of project on wells near silos and possible mitigation measures - will impacts be monitored	3.3.1.4.4 3.2.1.6	
I-6	Impact of project on wells in the vicinity of project water supply wells and types of compensation	3.2.1.1 3.2.1.4.4	
I-7	Existing water level declines in Pumpkin Creek Valley, NE	2.2.1.2.4	
I-8	Groundwater investigations should include Sidney, NE and Cheyenne Co., NE	2.2.1.1.1	I-8
I-9	Impact of project on Kimball water supply well near D-5	3.2.1.4.4	I-9
I-10	Criteria for location of any new wells	3.2.1.6	I-10
I-11	Analysis of future groundwater research needs	2.2.1.2.4	I-11
I-12	Impacts to well water quality due to project water use. Will groundwater quality be monitored and mitigated?	3.2.1.4.4 3.2.1.6	

I-13	Interference with road use during harvest (late July-August) significant	3.1.9.4.1.2	
I-14	Impacts should be addressed for both a wet year versus a drought period	2.2.1.2.1 3.2.1.4.3	I-14
I-15	Identification of needs relative to construction/deployment schedule	3.2.1.4.1	
I-16	Evaluate water use in concept with other water development in area	2.2.1.2.1 3.2.1.4.1	
I-17	Address purchase of water or existing water rights	2.2.1.2.2 3.2.1.1	
I-18	Will Air Force follow state water law, and will the procedures be in EIS?	2.2.1.2.2 3.2.1.1	
I-19	Strategy if farmers refuse to sell water rights	3.2.1.4.4 3.2.1.6	I-19
I-20	Disposal of nuclear waste in accordance with state laws	2.2.1.2.2	I-20
I-21	Address Snowy Range in EIS as source for Cheyenne Stage I and II	2.2.1.2.1	I-21
I-22	Construction of water transfer from Nebraska to Wyoming	3.2.1.4.2	
I-23	Impacts to Lodgepole Creek from construction	3.2.1.4.3	
I-24	Identify source of construction water use	3.2.1.4.4	I-24
I-25	Effects of accidental release of radioactive material on downstream surface water		I-25
I-26	Impacts to Nebraska Lodgepole Creek users from increased upstream demands	2.2.1.2.3 3.2.1.4.4	
I-27	Effect of Nebraska water used for construction in Wyoming	3.2.1.4.2	

I-28	Administrative burden on engineering staff (WY) if source of supply is temporary	2.2.1.2.2	I-28
I-29	Use of agreements will require staff to process agreements and to monitor retirement of existing use	3.2.1.4.2	I-29
I-30	Need to mitigate pollution and erosion from project construction	3.2.1.4.3 3.2.1.6	
J.	LAND USE		
J-1	Disturbance to agricultural lands around silo - average length of time	3.1.10.4.2.2	
J-2	Effect of nuclear blast on land surrounding silo	1.3 1.6.10.3	
J-3	Effect of radiological mishaps on land from transport.	1.6.10	J-3
J-4	Interference of missile convoys with agricultural activities need for proper scheduling	3.1.9.4.1.2	
J-5	Boomtown effects	3.1.10.4.1.2	J-5
J-6	Adequacy of development regulations - management capacity	3.1.10.4.1.2	J-6
J-7	Impact to areas outside urban areas - from growth to services		J-7
J-8	Impacts to parks from overuse and overcrowding	3.1.11.4.1	
J-9	Cheyenne recreation facilities unique - high participation levels	3.1.11.4.1	
J-10	Need for applicable standards for Cheyenne parks and recreation facilities	2.1.11.2.2	
J-11	Mitigation measures to alleviate increased use of local recreation facilities due to influx of population	3.1.11.6.2	

K.	**UTILITIES**		
K-1	Types of hazardous materials shipped to/from missile silos: Quantities Frequency Safety measures State/City regulations relating to shipments	1.6.10	K-1
K-2	Storage and handling of nuclear materials	1.6.10.6 2.1.7.2.3 3.1.7.4.3	
K-3	Potential for leakage of radioactive materials into the environment	1.6.10.5	K-3
K-4	Impact of such leakages		K-4
K-5	Amount of construction solid wastes	3.1.7.4.3	
K-6	Location of disposal and whose responsibility	3.1.7.4.3	
K-7	Concern over additional operational costs for Cheyenne to accept construction wastes	3.1.7.4.3	
K-8	Coordination with Wyoming Department of Environmental Quality regarding timing of Cheyenne 201 expansion funding	3.1.7.4.2	
K-9	Existing condition of Cheyenne storm sewers needs to be examined	2.1.7.2.4 3.1.7.4.4	
K-10	Communication needs during construction period versus operating phase	3.1.7.4.5	
K-11	Impact of project-induced population increase on utilities, particularly water supply	3.1.7.4.1	
K-12	Interference with existing telephone service due to construction activities	3.1.7.2.5	

K-13	Will utilities survey include Scottsbluff, Gering, and Sidney?	2.1.7.1	K-13
K-14	Contact Panhandle Resources Council and irrigation districts for data gathering		K-14
L.	TRANSPORTATION		
L-1	Traffic generation during construction and operations phases of the project	3.1.9.4.1.1	
L-2	Percentage of trucks and their weights during construction and operation phases of project	3.1.9.4	
L-3	Weight of stage transporter	3.1.9.4 1.3.2	
L-4	*Analysis of stage transporter* routes for: Adequacy of roads, bridges, and overpasses Adequacy of road surfaces (gravel roads may not be adequate)	3.1.9.4.1.2	
L-5	Existing number of commuters going to Cheyenne	2.1.9.2.1.1	
L-6	Extent of increases in civilian traffic	3.1.9.4.1.1	
L-7	Will changes to the transportation network be required?	3.1.9.4.1.1	
L-8	*Methods of transport for construction* materials		L-8
L-9	Additional local expenditures to maintain existing local roads		L-9
L-10	Additional federal funding available to maintain state and federal highway systems		L-10
L-11	Additional capital construction and main$l-tenance costs local communities will incur for new road construction		L-11

M.	SOCIOECONOMICS/PUBLIC SERVICES	
M-1	Housing for workers	3.1.2.4 3.1.2.4.2
M-2	Work camps as an alternative	3.1.2.6
M-3	Need to have further examination of housing issues	2.1.2 3.1.2
M-4	Impact to housing in Torrington, WY from construction workers	3.1.2.1
M-5	Examine psychological profile of existing and future residents	3.1.5.6
M-6	Increased awareness of deployment should be addressed	3.1.5.4.2.2
M-7	Social Well-Being studies should be localized	3.1.5.4.1.2
M-8	Methodology for Social Well-Being studies should be explained	3.1.5.4.1.2
M-9	Local hiring should be considered as a mitigation measure	3.1.1.6
M-10	Will Air Force train local individuals if they do not have proper skills?	3.1.1.6
M-11	Number of workers for Peacekeeper compared with 1962 Minuteman effort	3.1.1.4.2
M-12	Number of jobs created by transferring all Peacekeeper funds to economic recovery	3.1.1.4.2
M-13	Categories of needed workers	3.1.1.4.2
M-14	Number of skilled workers	3.1.1.4.2
M-15	Impact of onbase workers	3.1.1.4.2
M-16	Hiring should be initiated through union halls	3.1.1.4.2
M-17	Impact on school from transient populations	3.1.6.6

M-18	Funding for school facilities	3.1.6.6	
M-19	Education of children about deployment and consequences of nuclear war		M-19
M-20	Need for additional guidance counselors to deal with tension between inmigrant children and local children	3.1.6.6.1	
M-21	Examine educational data-enrollment/ capacity	3.1.6.6	

D.3 RESPONSE TO ISSUES

A-1 The purpose of Peacekeeper is to deter nuclear war.

A-2 The U.S. has selected and sized its forces so as to enhance deterrence, not to achieve a disarming first-strike capability.

A-3 The elected civilian leadership of the U.S. (President & Congress) have directed the military to implement the development/deployment of the Peacekeeper system.

A-4 The purpose of the missile system is to deter nuclear war. As such, the President choose the designation most appropriate, "Peacekeeper," for that is its primary goal.

A-5 The Peacekeeper missile is designed to provide an effective deterrent into the next century. Continual flight, aging, and surveillance testing is conducted during the life of the system to confirm missile performance compliance. Based on Minuteman experience, the expected life of the missile will significantly exceed the requirements.

A-6 The Peacekeeper missile system as well as Minuteman is designed to be survivable to electromagnetic pulse in any attack mode.

A-8 Two hundred twenty-three (223) missiles would be produced but only 100 are proposed for deployment.

A-9 There are no proposals for expansion.

A-11 If U.S. intercontinental ballistic missile forces are not modernized, the U.S. will have to reexamine the levels of reductions it has proposed in the START talks to maintain its nuclear deterrent strategy. Deployment of Peacekeeper is essential to our national security and provides incentive to the Soviets to negotiate equitable, verifiable agreements at reduced levels.

B-6 The deployment of Peacekeeper in Minuteman Silos will utilize existing facilities and electronics. Minor electronic and power improvements are being made to integrate the new missile into the existing system and to achieve post-attack survivability.

B-8 The proposed project would not require any change to the present civil defense program in the area.

B-11 If no Peacekeeper alternative is provided the present Minuteman would be retained. Our ability to hold adversary hard targets at risk would continue to diminish. Abandoning Peacekeeper at this time in search of a substitute would jeopardize, not enhance, the likelihood of reaching a stabilizing and equitable arms control agreement with the Soviets.

C-1 Consistent with the National Environmental Policy Act and Council on Environmental Quality regulations, the Air Force conducted a lengthy scoping process for the proposal of deployment and peacetime operation of the Peacekeeper missile in southeastern Wyoming and western Nebraska. The process was "early and open" (40 CFR 1501.7) and appropriate notice was made in the Federal Register. The Air Force conducted a series of scoping meetings with federal, state and local agencies, and the public. The public meetings were held in southeastern Wyoming and western Nebraska where the deployment and operation is proposed to take place.

To maximize the public input to the scoping process the meetings included general sessions where the Proposed Action and the environmental analysis process were described. Environmental resource workshops were held, where interested members of the public could raise their concerns about project impacts on particular resources, e.g., air quality, water supply, and endangered species, etc. Since neither the general sessions nor the workshops were intended to be formal, adjudicatory hearings, a verbatim record was not made. In this respect the scoping meetings differ from public hearings on a draft environmental impact statement which is intended to be more formal.

C-2 See response to C-1.

C-3 See response to C-1.

C-4 See response to C-1.

D-1 Long-range planning in the strategic land-based intercontinental ballistic missile area concerns primarily silo hardening and small single warhead missile development. Understanding the technology and costs of hardening is very important. New concepts and developments in hardening are quite promising. This could lead to the capability to harden such targets as intercontinental ballistic missile silos far in excess of what we thought possible only a short time ago. Eventually the survival of even the hardest targets would be doubtful in light of improved missile accuracy. Nonetheless, increased hardness would raise the weapons requirements, limit the Soviet ability to increase the number of small, low-yield weapons on its missiles, and raise the risk for the attacker for some years. Hardening will also be able to postpone vulnerability to, and therefore the probability of, attack by less accurate submarinelaunched ballistic missiles. Basing modes and development of a future small, single-warhead missile are being considered; study of multiple modes is recommended. Hardened silos

could be one such basing mode. These long-range R&D efforts, however, are independent of the actual deployment of Peacekeeper in Minuteman Silos.

D-2 It is not the policy of the U.S. to rely on launch-on-warning/ launch-under-attack for survivability. However, because we have that capability, adversaries cannot dismiss it in their planning, it offers the President additional response options.

E-2 The Minuteman facilities slated to receive the Peacekeeper missile are not proposed to be superhardened. At present there are no plans to decommission any of the Minuteman Launch Facilities (silos).

F-1 Although several historic structures currently are listed on the state inventory and the National Register of Historic Places, no systematic survey has ever been undertaken of historic architectural resources within the city of Cheyenne. Such an inventory was not undertaken as part of the Peacekeeper in Minuteman Silos environmental assessment effort because the Proposed Action will have no direct effect on any historic architectural resource located within Cheyenne's city limits, and the same holds true for the other municipalities expected to incur project-induced population growth. Although consideration is not given to specific structures potentially subject to indirect effects, the general level and significance of such impacts are addressed in Section 3.1.12.4.2 and 3.1.12.5.1.2.

F-2 See F-1 above.

F-3 See F-1 above.

G-7 Increased electrical demand in the Nebraska communities as a result of the project will be 1 percent or less. No substantial impact on either electrical AC/DC tie is expected.

G-12 This aspect of induced energy need was not examined, primarily due to the difficulty in obtaining per-capita energy data specifically applicable to the type of commercial stimulus that inmigrating workers might trigger. For instance, Cheyenne Light, Fuel and Power Company has a commercial category, but it includes the extensive energy needs of the numerous state buildings in Cheyenne, an aspect not likely to be affected by project workers. Per-capita commercial consumption based upon this data would therefore overestimate induced commercial demand. it is not expected that the induced commercial demand would significantly raise the 1 to 2 percent baseline increases attributable to induced residential energy demands.

G-13 Although this subject of energy impact was not specifically examined, one can conclude from subsections 3.1.8.4.1 and 3.1.8.4. that the impacts will be low to negligible.

H-2 This portion of Crow Creek is not within the Area of Concentrated Study and will incur no direct project-related impacts. It is not considered a high quality stream. The Region of Influence includes this portion of Crow Creek, with EIS Section 2.2.2.2.3.3 addressing existing conditions, and Section 3.2.2.4.3 addressing indirect impacts.

H-4 The Peacekeeper missile components i.e., missile stages and guidance systems, do not contain any radiological materials. However, the transport and handling of these components must meet strict safety regulations and satisfy independent safety reviews before Peacekeeper deployment is permitted.

The warhead transport is covered in detail in Section 1.4.11 in the EIS which covers nuclear safety compliance with Department of Defense requirements.

H-8 The potential for nuclear accidents is discussed in 1.6.10.4. The impacts specifically on wildlife are not addressed.

H-9 Concern related to increased water use or fisheries was addressed during the EIS analysis. However, the potential drawdown of Crow Creek due to the increased usage of the Cheyenne well fields would not be significant, therefore creating negligible impacts on fisheries.

I-1 No proposals exist for antiballistic missile/ballistic missile defense, silo hardening, or small missiles.

I-3 The model is being developed by Ertec, Inc. in conjunction with local agencies and will be provided for such use.

I-4 No release of radioactive material is expected.

I-8 The project will not influence conditions in these areas outside the Area of Concentrated Study.

I-9 Impact on Kimball supply wells, as for other municipal wells except Cheyenne, is low and not significant.

I-10 The 2,000-foot spacing exceeds Nebraska and Wyoming requirements.

I-11 Basic research is not required in this case to define impacts. Water development planning for the project (Ertec, Inc. 1983) is examining capability of groundwater supplies.

I-14 Water supply evaluations for Cheyenne for 1976 to 1982 cover both wet and dry periods.

I-19 The Air Force would obtain water from another source.

I-20 No such wastes are expected.

I-21 The Cheyenne Stage II FEIS covers this issue.

I-24 Source will be wells, locations will vary.

I-25 No such impact is expected.

I-28 Staff load is expected to be small.

I-29 Staff load is expected to be small.

J-3 The safeguards to preclude radiological mishaps on land are covered in detail in Section 1.6.10 of the EIS.

J-5 Effects are addressed in Section 3.1.10.4.1.2 in terms of vacant land available during the growth cycle and potential for underutilization of developed land in the decline cycle.

J-6 Adequacy of development regulations and management capacity are addressed in Section 3.1.10.4.1.2 in terms of whether development controls have been adopted and, if so, whether enforcement could be affected.

J-7 The population allocation model projects population inmigration to communities and urban areas only, because these are the areas where housing and services are generally available. Because growth-related land use impacts are population-driven, impacts to areas outside urban areas are not addressed under Land Use.

K-1 Identified hazardous material to be transported includes the missile stages, the reentry system, the launch eject gas generator, and the lithium batteries. These are discussed under headings I and II, following.

I. Peacekeeper Missiles

Quantities - One hundred Peacekeeper missiles will be transported to replace the present 100 Minuteman missiles which will be removed and sent to the appropriate depot.

The missile and essential launch component hazards are classified as follows:

- o Stage I, II-Class B explosive
- o Stage III-Class A explosive
- o Stage IV-Hypergolic
- o Launch eject gas generator-Class B explosive
- o Lithium Batteries-Class B explosive

Frequency - Initial one-time deployment with approximately 10 remove-and-replace test and maintenance cycles per year for the life of the system.

Safety Measures - All safety measures as required by Department of Defense regulations will be imposed throughout the life of the system. See Section 1.6.10.

State/City Regulation Relating to Shipments - Transport of the Missile components comply with the Code of Federal Regulations Part 49 and required state and county permits. Communities are avoided where possible, but if necessary, local police escort is requested.

II. Lithium Batteries

Quantities - Each Launch Facility has 18 units of lithium batteries.

Frequency - The lithium batteries will be transported to the Launch Facility and emplaced during installation and checkout and will remain in the site in a readiness condition until the next replacement cycle which is projected to be about 13 years.

Safety Measures - The lithium batteries have been designed, developed, and qualified under appropriate regulations. Design improvements included strengthening the submodule case. Each unit will undergo production verification. A safe method of deactivation, a submodule, has been developed and proven. A damaged submodule is rendered safe by use of cryogenic cooling. All submodules are equipped with scrubber units to neutralize venting of gases. Under normal operating conditions and handling, venting does not occur.

The submodules are deactivated chemically by use of water and acidic solution neutralization with sodium carbonate.

State/City Regulations Relating to Shipment During Transportation - The lithium submodules are always transported in shipping containers. The Code of Federal Regulations Part 49 apply, and Department of Transportation authorization has been granted for commercial transportation. State and county permits will be requested as required.

K-3 The MK-21/Warhead design incorporates provisions to preclude leakage of radioactive materials in either a normal or abnormal environment such as propellent fire. The probability for leakage is negligible.

K-4 Cleanup procedures are required and available.

K-13 Sidney was not in the Utilities Region of Influence and was not inventoried or analyzed.

K-14 Irrigation matters were not treated in Utilities. The Water Resources task group did contact the North Platte Resources Council and consulted state publications concerning irrigation and irrigation districts in the Scottsbluff region and throughout its Region of Influence.

L-8 Normal construction transport is assumed.

L-9 Funding for extra-ordinary road construction and maintenance due to the project may be provided through the Defense Access Roads program. This funding is provided to the applicable state and county governments through the Military Transportation Command in cooperation with the U.S. Air Force and the Federal Highway Administration.

L-10 See response to L-9.

L-11 See response to L-9.

M-19 The appropriateness of that suggestion is a matter for local consideration.

APPENDIX E

REFERENCES CITED AND REVIEWED

APPENDIX E

REFERENCES CITED AND REVIEWED AND PERSONAL COMMUNICATIONS

Albany County
1982-1983 Albany County Budget.

Algermissen, S.T., and D.M. Perkings
1976 A Probabilistic Estimate of Maximum Acceleration in Rock in the Contiguous United States. U.S. Geological Survey Open File Report 76-416.

Algermissen, S.T., D.M. Perkins, P.C. Thenhaus, S.L. Hansen, and B.L. Bender
1982 Probabilistic Estimates of Maximum Acceleration and Velocity in Rock in the Contiguous United States. U.S. Geological Survey Open File Report 82-1033.

America Finance
1983 Personal communication with the staff, Cheyenne.

American Continental Mortgage
1983 Personal communication with the staff, Cheyenne.

American National Bank
1983 Personal communication with the President, Cheyenne.

American National Bank
1983 Personal communication with the staff, Cheyenne.

American Public Works Association, Institute for Solid Wastes
1970 Municipal Refuse Disposal (third ed.). Public Administration Service, Chicago.

Anderson, Elaine
1974 A Survey of the Late Pleistocene and Holocene Mammal Fauna of Wyoming. In Applied Geology and Archaeology: The Holocene History of Wyoming, edited by Michael Wilson. Geological Survey of Wyoming, Report of Investigations 10:79-87.

Associated Financial Services
1983 Personal communication with the staff, Cheyenne.

AUCO
1983 Personal communication with the staff, Wyoming.

Babcock, D. Ronald, and William E. Morgan
1975 Highway Travel in Wyoming, An Analysis of Highway Travel in Wyoming: An Origin-Destination Study. College of Commerce and Industry, University of Wyoming, Laramie.

Babcock, D. and D. Ronald
1976 Projection of Highway Travel in Wyoming 1970-1975: An Orgin-Destination Study. Division of Business and Economic Research, College of Commerce and Industry, University of Wyoming, Laramie.

Baker, Sweeney and Associates
1981 Report on the Sanitary Sewer System. Prepared for F.E. Warren AFB, Scottsbluff, Nebraska.

Baker, Sweeney and Associates
1982 Investigation and Conceptual Study for Rehabilitation of the Sanitary Sewer System. Prepared for F.E. Warren AFB, Scottsbluff, Nebraska.

Banner Associates, Inc.
1974 Construction Plans for the Happy Jack Water Treatment Plant, unpublished material, Water Department, City of Cheyenne.

Banner Associates, Inc.
1982 201 Facilities Plan Final Report: City of Cheyenne, South Cheyenne Water and Sewer Districts, Laramie County. Laramie, Wyoming.

Banner Associates, Inc.
1983 Crow Creek Watershed Channel Characterization Study. Prepared for URS-Berger, Cheyenne.

Banner Associates, Inc., and R. Dixon Speas Associates
1979 Airport Master Plan for General Brees Field (Final Report). Prepared for City of Laramie and Albany County.

Barnett, J.
1983 A Parks and Recreation Facilities Master Plan for Greater Cheyenne (Preliminary Draft). Cheyenne-Laramie County Regional Planning Office.

Baxter, George T., and J.R. Simon
1970 Wyoming Fishes. Bulletin No. 4, Wyoming Game and Fish Department, Cheyenne.

Baxter, George T., and Michael D. Stone
1980 Amphibians and Reptiles of Wyoming. Bulletin No. 16, Wyoming Game and Fish Department, Cheyenne.

Bellrose, Frank C.
1980 Ducks, Geese, and Swans of North American (third ed.). Stackpole Books, Harrisburg, Pennsylvania.

Blatchley, Richard and Larry Welty
1980 Final Report on the Archaeological Investigations Conducted along the Tri-State Laramie River Station-AULT 345 KV Transmission

Line, Laramie and Platte Counties, Wyoming. Report prepared for Tri-State Generation and Transmission Association, Project No. WY-40-80, Permit No. 80-WY-086. Report on file, Office of the Wyoming State Archaeologist, Laramie.

Board of Public Utilities
1983 Personal communication with the Office Manager, Cheyenne.

Bolt, Beranek and Newman, Inc.
1971 Noise From Construction Equipment and Operations, Building Equipment and Home Appliances. Prepared for EPA, Cambridge, Massachusetts.

Bolt, Beranek and Newman, Inc.
1973 Fundamentals and Statement of Highway Traffic Noise. Prepared for the Federal Highway Administration, Canoga Park, California.

Bolt, Beranek and Newman, Inc.
1975 Developing Noise Exposure Contours for General Aviation Airports. Report prepared for the Department of Transportation, Federal Aviation Administration, Report No. FAA-AS-75-1 and DOT-FA-75WA-3710, Canoga Park, California.

Bolt, Beranek and Newman, Inc.
1983 Personal communication with the staff.

Bosworth, Dain, Inc.
1979 Financial Facts on Wyoming Taxing Units. Dain Bosworth Inc., Cheyenne.

Branch, Kristy, James Thompson, Jane Creighton, and Douglas A. Hopper
1982 Guide to Social Assessments. Report prepared for Social Effects Project of the Bureau of Land Management.

Briggs, G.A.
1969 Plume Rise. Atomic Energy Commission Critical Review Series TID-25075.

Briggs, G.A.
1971 Some Recent Analyses of Plume Rise Observation. Proceedings: Second International Clean Air Congress. Academic Press, New York.

Briggs, G.A.
1975 Plume Rise Predictions. Lectures on Air Pollution and Environmental Impact Analysis, American Meteorological Society, Boston.

BRW/Noblitt, Inc.
1978 Master Plan for Scotts Bluff County Airport. Report prepared for Scotts Bluff County Supervisors.

BRW/Noblitt, Inc.
1979 Cheyenne Municipal Aiport Master Plan. Report prepared for Cheyenne Airport Board.

BRW/Noblitt, Inc., and Wright-McLaughlin Engineers
1979 Dry Creek Major Drainageway Planning (Vols. I and II). City of Cheyenne and Laramie County.

Budde, James F.
1979 Measuring Performance in Human Service Systems: Planning, Organization and Control. Amacom, New York.

Burchell, Robert W., and David Listokin
1980 Practitioner's Guide to Fiscal Impact Analysis. Center for Urban Policy Research, New Brunswick, New Jersey.

Bureau of Reclamation
1977 Groundwater Manual. U.S. Department of the Interior.

Burns Town Hall
1983 Personal communication with the staff of the Clerk's Office.

Calder, K.L.
1971 A Climatological Model for Multiple Source Urban Air Pollution. Proceedings: Second Meeting of the Expert Panel on Air Pollution Modeling. NATO, Committee on the Challenges of Modern Society (CCMS), Paris.

Carlson, Gayle F., and Terry L. Steinacher
1978 A preliminary culture-historical sequence for the Plains Archaic period in Nebraska. Paper presented at the Symposium, Migration and Extinction in the Great Plains, Institute for Tertiary-Quaternary Studies, Lincoln.

Cartwright, Joseph V. and Richard M. Beemiller
1980 The Regional Impact on Military Base Spending. Office of Assistant Secretary of Defense, The Pentagon, Washington, D.C.

Chadron State College
1983 General Bulletin. Chadron, Nebraska.

Chevron Chemical Company
1982 Wyoming Industrial Siting Council Permit Application for the Chevron Phosphate Project, Sweetwater County, Wyoming. Report prepared for Wyoming Industrial Siting Administration.

Cheyenne Airport Board
1981 Cheyenne Airport Annual Report.

Cheyenne Airport Board
1982 Cheyenne Airport Annual Report.

Cheyenne Area Development Committee Land Use Task Force
1982 Cheyenne Area Development Plan 1982.

Cheyenne Area Development Committee
1982 City of Cheyenne Annexation Policies.

Cheyenne Board of Public Utilities
1980 Water System Financial Plan and Rate Study.

Cheyenne Board of Public Utilities
1982 Comprehensive Annual Report.

Cheyenne Board of Public Utilities
1982 Stage II Water Project Financial Plan.

Cheyenne Board of Public Utilities
1983 Personal communication with the staff.

Cheyenne Board of Public Utilities
1983 Water supply and water use records, unpublished, Cheyenne.

Cheyenne, City of
1973-1982 Water production record, unpublished material, Water Department.

Cheyenne, City of
1979 Summary Report of the City of Cheyenne, 1979 Housing Information Study. Department of Special Projects.

Cheyenne, City of
1979-1981 Annual Summaries of Traffic Accident Records. Compiled by the Engineering Department.

Cheyenne, City of
1981 1980 Annual Report. Engineering Department.

Cheyenne, City of
1982 1981 Annual Report. Engineering Department.

Cheyenne, City of
1982 Building Permit Data, January-December, Building Department.

Cheyenne, City of
1982 Comprehensive Annual Financial Report, FY 1982.

Cheyenne, City of
1982 Official Zoning Map.

Cheyenne, City of
1982-1983 Water Tap Fees Resolution. City Council.

Cheyenne, City of
1982-1984 Fiscal Year Budgets.

Cheyenne, City of
1983 Fleet Maintenance - Vehicle Listing by Vehicle Number Computer printout, Data Processing Department.

Cheyenne, City of
1983 Labor Authorization Listing by Department, Reviewed in the Personnel Department, June 27.

Cheyenne, City of
1983 Personal communication with the Assistant Director, Department of Welfare.

Cheyenne, City of
1983 Personal communication with the Assistant Planner.

Cheyenne, City of
1983 Personal communication with the Director of Fiscal Services, Department of Education.

Cheyenne, City of
1983 Personal communication with the Director of Public Works.

Cheyenne, City of
1983 Personal communication with the staff of the Cheyenne Board of Public Utilities.

Cheyenne, City of
1983 Personal communication with the staff of the City Engineers Office.

Cheyenne, City of
1983 Personal communication with the staff of the Regional Planning Office.

Cheyenne, City of
1983 Personal communication with the staff of South Cheyenne Water and Sewer District.

Cheyenne, City of
n.d. Organization Chart. Reviewed in the Office of the City Clerk.

Cheyenne-Laramie County Regional Planning Office
1977 Cheyenne Area Housing Study.

Cheyenne-Laramie County Regional Planning Office
1979 Subdivision Regulations, City of Cheyenne and Laramie County, State of Wyoming.

Cheyenne-Laramie County Regional Planning Office
1982 Cheyenne and Laramie County Zoning Ordinance.

Cheyenne-Laramie County Regional Planning Office
1982 M-X Preliminary Issue Paper.

Cheyenne Light, Fuel and Power
1983 Personal communication with the Operations Manager.

Cheyenne Water Conservation Advisory Group
1983 Proposed Water Conservation Plan for the City of Cheyenne.

Clark, J., W. Viessman, Jr., and J. Hammer
1977 Water Supply and Pollution Control (third ed.). Harper and Row, New York.

Clarren, Summer N., Jane P. Woodward, and Harry P. Hatry
1978 Improving the Usefulness of Programs Analysis and Evaluation Activities in Local Government: A Guidebook. The Urban Institute, Washington, D.C.

Clean Air Act
1980 40CFR, Part 50, National Primary and Secondary Ambient Air Quality Standards.

Cluff, L.S., Hanse, W.R., Taylor, C.L., Waeaver, K.D., Borgan, G.E., Idriss, I.M., McClure, F.E., and Blayney, J.A.
1972 Site Evaluation in Seismically Active Regions - An Inter-disciplinary Team Approach. Proceedings: International Conference on Microzonation 2:957-987.

Code of Federal Regulations
1976, 1978, 1979, 1980 Part 86, Office of National Archives, Washington, D.C.

Code of Federal Regulations
1979 24CFR, Part 51, Office of National Archives, Washington, D.C.

Code of Federal Regulations
1982 40CFR, Parts 81-99, P. 1,984, July, Office of National Archives, Washington, D.C.

Colorado Department of Health
1982 Colorado Air Pollution Control Regulations.

Colorado Department of Health
1982 Colorado Air Quality Data Report, 1981. Air Pollution Control Division, Denver.

Colorado Division of Wildlife
1978-a Colorado Small Game, Furbearer and Varmint Harvest 1977. Pittman Robertson W-121-R, Denver.

Colorado Division of Wildlife
1978-b Essential Habitat for Threatened or Endangered Wildlife in Colorado. Denver.

Colorado Division of Wildlife
1979 Colorado Small Game, Furbearer, and Varmint Harvest 1978. Pittman-Robertson W-121-R, Denver.

Colorado Division of Wildlife
1980 Colorado Small Game, Furbearer, and Varmint Harvest 1979. Pittman-Robertson W-121-R, Denver.

Colorado Division of Wildlife
1981 Colorado Small Game, Furbearer, and Varmint Harvest 1980. Pittman-Robertson W-121-R, Denver.

Colorado Division of Wildlife
1982 Colorado Small Game, Furbearer, and Varmint Harvest 1981. Pittman-Robertson W-121-R, Denver.

Colorado Division of Wildlife
1983 Personal communication with the staff.

Colorado Division of Wildlife
n.d. Where and How to Hunt Ducks in Colorado. Denver.

Colorado Interstate Gas Company
1983 Personal communication with the staff.

Colorado Natural Heritage Program
1983 Personal communication with the staff.

Community Action of Laramie County
1981 Information and Referral Guide. Cheyenne.

Construction Resource Analysis Group
1983 A Description of the Construction Industry in the F.E. Warren AFB Region and the Direct Impact of Peacekeeper Deployment on the Construction Labor Force. Prepared for U.S. Army Corps of Engineers, University of Tennessee, Knoxville.

Cortese, Charles F.
1977 The Sociological Analysis of Boom Towns. Western Sociological Review (Vol. B).

Cortese, Charles F.
1980 The Effects of Rapid Growth on Local Organization and Community Social Structure. Paper presented at the Western Rural Development Center Conference, Scottsdale, Arizona.

Cortese, Charles F.
1982 The Impacts of Rapid Growth on Local Organizations and Community Services. In Coping With Rapid Growth in Rural Communities, edited by Weber and Howell. Western Press, Boulder.

Court Coordinator's Office
1983 District Court Statistics, First Quarter 1983, unpublished memorandum, Cheyenne.

Court Coordinator's Office
1983 1982 Wyoming Supreme Court Caseload Statistics, unpublished memorandum, Cheyenne.

Crist, M.A.
1980 Effect of Pumpage on Groundwater Levels as Modeled in Laramie County. U.S. Geological Survey, Open File Report 80-1104.

CSSA & Wirth Associates
1977 Cheyenne Bikeway System Master Plan & Construction Documents. Report prepared for the City of Cheyenne Planning Department.

Data Resources, Inc.
1982 U.S. Long Term Review. McGraw-Hill, New York.

Data Resources, Inc.
1983 U.S. Long Term Review: The 25-year Economic Outlook Summary. McGraw-Hill, New York.

Davenport, Judith and Joseph
1979 Boomtowns and Human Services. University of Wyoming, Laramie.

Davis, Robert H.
1970 Measuring Effectiveness of Municipal Services, Management Information Services. International City Management Association, Vol. 2, No. LS-8.

DeMarrias, G.A.
1959 Wing Speed Profile at Brookhaven National Laboratory, Journal of Applied Meteorology. 16:181-189.

Denver, Regional Council of Governments
1982 1982 Denver Regional Element of the State Air Quality Implementation Plan. Denver.

DeProspo, Ernest R., Ellen Altman, and Kenneth Beasley
1973 Performance Measures for Public Libraries. American Library Association, Chicago.

Dial Finance
1983 Personal communication with the staff.

United States Environmental Protection Agency (EPA)
1973 Climatological Dispersion Model. EPA-R4-73-024.

EPA
1974 Development of Emission Factors for Fugitive Dust Sources. EPA-45/3-74-037.

EPA
1977 User's Manual for Single-Source (CRSTER) Model. EPA-450/2-27-013, Research Triangle Park, North Carolina.

EPA
1978 EPA Protective Noise Levels. Condensed Version of EPA Levels Document, EPA-550/9-79-100.

EPA
1979 Existing Visibility Levels in the United States, Isopleth Maps of Visibility in Suburban/Non-urban Areas during 1974-1976. EPA-450/5-79-010, Washington, D.C.

EPA
1979 Industrial Source Complex (ISC) Dispersion Model. Short-Term (Vol. I). EPA-450/4-79-030.

EPA
1979 Protecting Visibility. An EPA Report to Congress, Strategies and Air Standards, EPA-450/5-79-008, Research Triangle Park, North Carolina.

EPA
1980 EPA's Quiet Communities, Five-Year Plan FY 1981 - FY 1985.

EPA
1980 Prevention of Significant Deterioration. Workshop Manual.

EPA
1980 Workbook for Estimating Visibility Impairment. EPA-450/4-80-031.

EPA
1981 Compilation of Air Pollutant Emission Factors: Highway Mobile Sources. EPA 460/3-81-005.

EPA
1981 Mobile Source Emissions Model. EPA-460/3-81-006.

EPA
1981 Compilation of Air Pollutant Emmission Factors (third ed.). (Including supplements 1-12), AP-42.

EPA
1982 Storm Water Management Model-User's Manual (Version III).

EPA
1983 EPA Annual Report. National Emissions Data System, 1980.

EPA Office of Noise Abatement and Control
1974 Information on Levels of Environmental Noise Requisite to Protect Public Health and Welfare with an Adequate Margin of Safety. Arlington, Virginia.

EPA Office of Noise Abatement and Control
1981 HUSH Program (Barrier Component) Guidance Material. Washington, D.C.

Equality National Bank
1983 Personal communication with the staff.

Equality Savings
1983 Personal communication with the staff, Cheyenne.

Ertec Western, Inc.
1983 Peacekeeper Siting Investigation - Preliminary Water Supply Development Plans, Wyoming and Nebraska. Long Beach, California.

Fair, G., J. Geyer, and D. Okun
1971 Elements of Water Supply and Wastewater Disposal (second ed.). John Wiley & Son, New York.

Fancher-Beeler, M.G., et al.
1974 Measuring the Quality of Library Services: A Handbook. Scarecrow Press, Metuchen, New Jersey.

F.D.I.C.
1982 Bank Reports for Wyoming and Nebraska.

Federal Emergency Management Agency
1982 Flood Hazard Boundary Maps. City of Cheyenne and Unincorporated Areas of Laramie County. Denver.

Federal Highway Administration
1979 Caline III - A Versatile Dispersion Model for Predicting Air Pollutant Levels Near Highway and Arterial Streets. Report No. FHWA/CA/TL-79/23.

Federal Highway Adminstration
1982 Noise Barrier Cost Reduction Procedure STAMINA 2.0/OPTIMA User's Manual. Arlington, Virginia.

Federal Highway Administration
1982 Policy and Procedure Memorandum 90-2.

Federal Highway Administration and New Jersey Department of Transportation
1982 Route U.S. 206 Noise Technical Environmental Study (Draft). Report No. FHWA-NJ-82 and TQF-F-RF-U35(100), Trenton, New Jersey.

Federal Home Loan Bank Board, Twelfth District
1980-1982 Cheyenne Wyoming Housing Vacancy Survey. Seattle.

Federal Insurance Administration
1977 Flood Insurance Study, City of Cheyenne, Wyoming, Laramie County. Revised March 1982, Washington, D.C.

Federal Insurance Administration
1979 Flood Insurance Study, Laramie County, Wyoming, Unincorporated Areas, and associated Flood Boundary (PTO) and Flooding Maps. Revised December 1982, Washington, D.C.

Federal Register
1978 40CFR, Part 51, Vol. 43, No. 118, p. 26, 380, June 19.

Federal Register
1980 40CFR, Parts 51 and 52, p. 52, 676, August 7.

Federal Register
1982 40CFR, Part 52, Vol. 47, No. 183, p. 41, 598, September 21.

F.E. Warren Air Force Base (AFB)
1981 Strategic Air Command Telephone Directory. Cheyenne.

F.E. Warren AFB
1982 Resource Statement, Office of Comptroller.

F.E. Warren AFB
1983 Overall Economic Impact Analysis as of May 31, 1983, Office of Comptroller.

F.E. Warren AFB
1983 Personal communication with the Environmental Engineer.

F.E. Warren AFB
1983 Personnel Data 1972-1982, Office of the Comptroller.

F.E. Warren AFB
1983 Personal communication with the staff of the Comptroller's Office.

F.E. Warren AFB
1983 Personal communication with the staff of the Civil Engineering Office.

F.E. Warren AFB
1983 Personal communication with the staff of the Fuel Supply Office.

F.E. Warren AFB
1983 Personal communication with the staff of the Credit Union.

Findholt, Scott, Bob Oakleaf, and Bill Long
1981 Wyoming Mammal Atlas (Draft). Wyoming Game and Fish Department, Game Division, Cheyenne.

First National Bank
1983 Personal communication with the President, Wheatland.

First State Bank
1983 Personal communication with the President, Kimball.

First Wyoming Bank Corp.
1983 Personal communication with the Vice President-Real Estate, Cheyenne.

First Wyoming Bank
1983 Personal communication with the staff, Wheatland.

Flack, J.E.
1981 Residential Water Conservation Journal of the Water Resources Planning and Management Division. ASCE, Vol. 107, No. WRI, pp. 85-95.

Fiy, C.L., K. Kennedy, and E.B. Jones
1982 Wyoming Resources and Conservation Plans 1981-1985 and Beyond, Volume II Resource Conservation Accomplishments and Future Goals. State Conservation Commission of Wyoming.

Flynn, C.B., and J.H. Flynn
1982 The Group Ecology Method: A New Conceptual Design for Impact Assessment. IAIA Bulletin. 1,4: 11-19.

Fort Collins, City of
1983 Personal communication with the staff of the Department of Environmental Health.

Freudenburg, William R.
1980 The Density of Acquaintanceship: Social Structure and Social Impacts in a Rocky Mountain Boomtown. Paper presented at the 1980 Annual Meeting of American Sociological Association.

Freudenburg, William R.
1982 The Impacts of Rapid Growth on the Social and Personal Well-Being of Local Community Residents, In Coping With Rapid Growth in Rural Communities edited by Weber and Howell. Westview Press, Boulder.

Frison, George C.
1978 Prehistoric Hunter of the High Plains. Academic Press, New York.

Gering, City of
1983 Personal communication with the staff of the City Water and Sewer Department.

Gering National Bank and Trust
1983 Personal communication with the President.

Gifford, F.A., Jr., and Steven R. Hanna
1971 Urban Air Pollution Modeling. In Proceedings of the 2nd International Clean Air Congress, edited by H.M. Englund and W.T. Berry, pp.1, 146-1, 151. Academic Press, New York and London.

Goshen County
1983 Personal communication with the County Sanitarian.

Greeley, City of
1983 Personal communication with the staff of the Water Department.

Gunther, William D.
1982 A Socioeconomic Survey of Air Force Employees. Headquarters Air Force Engineering and Services Center, Tyndall AFB, Florida.

Gunter, William D.
1983 Expenditure Patterns of Off-Base USAF Employees, By Type of Employment Status, All Bases, Special Data Reduction Run. Systematic Research Inc., Tuscaloosa, Alabama.

Hammer, Siler, and George Associates
1982 Preliminary Economic Adjustment Program, M-X Missile System Impact Study Area, Utah. Washington, D.C.

Hampshire Energy
1981 Industrial Siting Permit Application, Coal to Gasoline, Gillette, Wyoming. Submitted to Wyoming Industrial Siting Administration.

Hatry, Harry P. and John F. Cotton
1967 Program Planning for State, City, County: State-Local Finances Project. George Washington University, Washington, D.C.

Hatry, Harry P., Somner N. Clarren, and Therese Van Houten, et al.
1979 Efficiency Measurement for Local Government Services: Some Initial Suggestions. The Urban Institute, Washington, D.C.

Hatry, Harry P., Richard E. Winnie, and Donald M. Fisk
1981 Practical Program Evaluation for State and Local Government Officials. The Urban Institute , Washington, D.C.

Hayes, Frederick O.
1977 Productivity in Local Government. Lexington Books, Lexington, Massachusetts.

Henningson, Durham and Richardson, Inc.
1982 A Generalized Regional Socioeconomic Analysis System (Vol. II). Santa Barbara, California.

Historian Headquarters 90th Strategic Missile Wing
1983 Personal communication with the staff, Cheyenne.

Holzer, Marc
1973 Productivity in Public Organizations. Kennikat Press, Port Washington, New York.

Holzworth, G.C.
1974 Meteorological Episodes of Slowest Dilution in Contiguous United States. EPA-650/4-74-002, U.S. Environmental Protection Agency, Research Triangle Park, North Carolina.

Holzworth, G.C.
1972 Mixing Heights, Wind Speeds, and Potential for Urban Air Pollution Throughout the Contiguous United States. No. AP-101, U.S. Environmental Protection Agency, Office of Air Programs, Research Triangle Park, North Carolina.

Hosler, Charles R.
1961 Low Level Inversion Frequency in the Contiguous United States. Monthly Weather Review 89:319-339.

Household Finance
1983 Personal communication with the Manager, Cheyenne.

Huber, A.H.
1977 Incorporating Building/Terrain Wake Effects on Stack Effluents. Preprint Volume for the Joint Conference on Applications of Air Pollution Meteorology, American Meterological Society, Boston.

Huber, A.H., and W.H. Snyder
1976 Building Wake Effects on Short Stack Effluents. Preprint Volume for the Third Symposium on Atmospheric Diffusion and Air Quality, American Meteorological Society, Boston.

Husky Oil Refinery
1983 Personal communication with the Manager, Cheyenne.

Insurance Services Office
1980 Extracts from the Commercial Fire Rating Schedule. New York.

Insurance Services Office
1980 Fire Suppression Rating Schedule, Section I and II. New York.

International City Management Association
1973 Planning and Development of Bikeway Systems. Washington, D.C.

Jewell, Loretta
1968 Homesteading the Prairie. The Little Ol' Printshop, Cheyenne.

Joseph, E.S.
1982 Municipal and Industrial Water Demands of Western United States, Journal of the Water Resources Planning and Management Division ASCE, No. WQR 2, 108:204-216.

Kansas-Nebraska Natural Gas Company
1983 Personal communication with the Vice President.

Kimball, City of
1982 Machinery and Equipment Inventory Report. Reviewed in the City Administrator's Office, July 31.

Kimball, City of
1983 Fiscal 1983 Budget. Draft Report.

Kimball, City of
1983 Personal communication with City Administrator.

Kimball, City of
1984 Fiscal 1984 Budget. Draft Report.

Kimball County Hospital
1983 Personal communication with the Director.

Kimball County
1977 Profile Socioeconomic Longitudinal Monitoring Project.

Kimball County
1982 Machinery and Equipment Inventory Report. Reviewed in the Office of County Civil Defense Coordinator, June 30.

Kimball County School Systems
1982 1982-1983 School Facilities Study. Kimball County School Systems.

Kimball County
1983 Statutory Board Meeting, January 11.

Kimball County
1983 Request For Insurance Proposals.

Kimball County
n.d. County Commissioners Record Book No. 6.

Kimball County
n.d. County Commissioners Record Book No. 7.

Kimball County
n.d. County Commissioners Record Book No. 8.

Kimball County
n.d. Employees Salaries. Records reviewed in the Office of the County Clerk.

Kimball County
n.d. List of Highway Department Employees. Reviewed in the Office of the County Clerk.

Kimball County
n.d Social Security Records, 1969-1973. Reviewed in the Office of the County Commissioners.

Kingery, Hugh E., and Walter D. Graul
1978 Colorado Bird Distribution, Latilong Study. Colorado Field Ornithologists, Denver.

Klein, Lawrence R., and Glickman, Norman J.
1977 Econometric Model-Building at Regional Level. Regional Science and Urban Economics.

Kucirek and Blackman, C.P.A
1980 Financial Statements Kimball County Manor.

Laramie County
1977-1983 Payroll Records. Computer printout, Office of the County Clerk.

Laramie County
1983 Fixed Asset List. Reviewed in the Office of the County Clerk.

Laramie County
1983 Fiscal 1983 Budget Draft Report.

Laramie County
1983 Personal communication with staff of the Office of the County Clerk.

Laramie County
1983 Personal communication with the Regional Planning Office staff.

Laramie County
n.d. Vehicle Schedule. Reviewed in the Office of the County Clerk.

Laramie County
n.d. Wyoming FY 1984 Budget. Cheyenne.

Laramie County Board of Commissioners
1981 Capital Improvement Plan.

Laramie County Community College
1983 Catalog. Cheyenne.

Laramie County Engineer
1983 Laramie County Maps and Addresses.

Laramie County Fire Control Association
1980 Laramie County Fire Control. Cheyenne.

Laramie County Planning Advisory Committee
1982 Laramie County Comprehensive Land Use Plan.

Laramie County School District No. 1
1983 Personal communication with the Assistant Superintendent.

Laramie County School District No. 1 Report
1978 Use of Facilities. January.

Laramie County School District No. 1
1983 Facility Study. District Engineers Office.

Laramie County Water and Sewer District
1973-1982 South Cheyenne Water and Sewer District Financial Statements.

Laramie County Water and Sewer District
1973-1983 South Cheyenne Water and Sewer District of Laramie County Budget.

Latimer, D.A., et al.
1980 Modeling Visibility. Paper presented at American Meteorological Society/Air Pollution Control Association, Second Joint Conference on Applications of Air Pollution Meteorology, New Orleans.

Laycock, W.A.
1979 Introduction-Grassland Types. In Perspectives in Grassland Ecology edited by Norman French. Springer-Verlag, New York.

Leistritz, F. Larry and Karen C. Maki
1981 Socioeconomic Effects of Large-Scale Resource Development Projects in Rural Areas: The Case of Mc Lean County, North Dakota. North Dakota State University, Fargo, North Dakota.

Libray of Congress, Foreign Affairs Division
1983 Personal communication with the staff

Liu, S.C. and N.J. De Capua
1975 Microzonation of Rocky Mountain States. Proceedings: U.S. National Conference on Earthquake Engineering pp. 128-135.

Lowham, H.W.
1976 Techniques for Estimating Flow Characteristics of Wyoming Streams. Water Resources Investigations pp. 76-112.

Malhota and Manninen
1981 Migration and Residential Location of Workers at Nuclear Power Plant Construction Sites, (Vols. 1 and 2). NUREG/CR-2002, prepared for U.S. Nuclear Regulatory Commission.

Manners Company
1983 Personal communication with the President, Cheyenne.

Manufactured Housing Steering Committee
n.d. Working Paper No. 3, Manufactured Housing Parks and Lots.

McConnell, Allan D., Lt. Colonel, USAF, Cormier, George
1982 Minutes of Fish and Wildlife Committee Meeting, F.E. Warren AFB, November 5.

McGrew, L.W.
1962 Quaternary Faulting in Southeastern Wyoming. Unpublished work for the Geological Survey of Wyoming and the Department of Geology, University of Wyoming.

McIsaac, Donald, D. Spuck and L. Hunter
1972 Wisconsin Information Systems for Education. Department of Educational Administration, the University of Wisconsin, Madison.

Mead, Timothy D.
1979 Measuring the Management Capacity of Local Governments. Academy for Contemporary Problems, Washington, D.C.

Mellon Mortgage Co.
1983 Personal communication with the staff, Cheyenne.

Mercer, James L., Susan L. Woolston and M.V. Donaldson
1981 Managing Urban Government Services: Strategies, Tools and Techniques for the 80's. Amacom, New York.

Midwest Research Intitute (MRI)
1983 Telephone interview with the staff.

Millett, John D.
1954 Management in the Public Service: The Quest for Effective Performance. McGraw-Hill, New York.

Mitchell, Jim
1978 Surveys and Management of Mourning Dove. Work Plan R-77, Pittman-Robertson W-15-R-34, March 1, 1977 to February 28, 1978, Prepared for the Nebraska Game and Parks Commission, Lincoln.

Mitchell, Jim
1979 Surveys and Management of Mourning Dove. Work Plan R-78, Pittman-Robertson W-15-R-35, March 1, 1978 to February 28, 1979, Prepared for the Nebraska Game and Parks Commission, Lincoln.

Mitchell, Jim
1980 Surveys and Management of Mourning Dove. Work Plan R-79, Pittman-Robertson W-15-R-36, March 1, 1979 to February 28, 1980, Prepared for the Nebraska Game and Parks Commission, Lincoln.

Mitchell, Jim
1981 Mourning Dove Breeding Population Density Surveys, Harvest Surveys. Work Plan R-80, Pittman-Robertson W-15-R-37, March 1, 1980 to February 28, 1981, Prepared for the Nebraska Game and Parks Commission, Lincoln.

Mitchell, Jim
1982 Surveys and Management of Mourning Dove. Work Plan R-81, Pittman-Robertson W-15-R-38, March 1, 1981 to February 28, 1982, Prepared for the Nebraska Game and Parks Commission, Lincoln.

Morris, Donald A. and Horace M. Babcock
1960 Geology and Groundwater Resources of Platte County, Wyoming. U.S. Geological Survey Water Supply Paper 1490.

Mountain Bell
1983 Personal communication with the Engineering Manager, Cheyenne.

Mountain Bell
1983 Personal communication with the Manager, Greeley-Fort Collins, Colorado.

Mountain Bell
1983 Personal communication with the Operations Manager, Laramie, Wyoming.

Mountain West Research Inc.
1975 Construction Worker Profile, Billings.

Mountain West Research Inc.
1982 Guide to Social Assessment - Social Effects Project. Prepared for U.S. Bureau of Land Management, Billings.

Mountain West Research Inc.
1982 PAS Model Description. Billings.

Mountain West Savings and Loan Association
1983 Personal communication with the staff, Cheyenne.

Mulloy, William T.
1958 A Preliminary historical outline for the Northwestern Plains. University of Wyoming Publications in Science (Vol. 222:1).

Murdock, Steven H. and Leistitz, Larry
1979 Energy Development in the Western United States. Praeger, New York.

National Academy of Sciences, National Research Council
1965 Highway Capacity Manual. Highway Research Board Special Report 87, Washington, D.C.

National Association of Towns and Townships
1982 Financing Public Services and Facilities in Rural Communities: Who Will Pay and How? A Public Policy Seminar, National Association of Towns and Townships, Washington, D.C.

National Earthquake Information Service (NEIS)
1982 Worldwide Earthquake Data Tape through May 1981, Boulder, Colorado.

National Highway Institute
1981 Highway Safety Engineering Study. Federal Highway Administration, Washington, D.C.

National Recreation and Parks Association
1983 Recreation Park and Open Space Standards and Guidelines.

Nathan, C., and Pouppirt, R.
1975 Two-Wheeling in Cheyenne. Cheyenne-Laramie County Regional Planning Office.

Nebraska Auditor's Office
1983 Personal communication with the staff.

Nebraska Bureau of Business Research
1982 Nebraska Population Projections.

Nebraska Bureau of Health Planning and Resource Development
1983 Application for Certificate of Need Health Project. Scottsbluff, Nebraska.

Nebraska Commission on Law Enforcement and Criminal Justice
1983 Computer Printout of Occupation and Length of Stay of Prisoners in Scotts Bluff and Kimball County Jails, Lincoln.

Nebraska Coordinating Commission for Post-secondary Education
1981 Directory of Post-secondary Institutions in Nebraska, Educational Information Systems. Lincoln.

Nebraska Department of Aeronautics
1977 State Airport System Plan for State of Nebraska 1977-1997. Lincoln.

Nebraska Department of Aeronautics
1983 Nebraska Aeronautical Chart. Lincoln.

Nebraska Department of Aeronautics
1983 Nebraska Airport Directory. Lincoln.

Nebraska Department of Economic Development
1982 Nebraska Community Profile for Kimball, Lincoln.

Nebraska Department of Education
1973-1983 Records from County Superintendent of Schools, Lincoln.

Nebraska Department of Education
1981-82 Financial Report of School Districts, Lincoln.

Nebraska Department of Education
1982 Nebraska Educational Directory, Lincoln.

Nebraska Department of Education
1982 Nebraska Career Information System, Postsecondary School Information, 1981-82. Lincoln.

Nebraska Department of Education
1983 Personal communication with the staff.

Nebraska Department of Education
1983 Projection Model, Mean Survival Ratio Method, Lincoln.

Nebraska Department of Education
1983 Statistics and Facts about Nebraska Schools 1982-83. Lincoln.

Nebraska Department of Environmental Control
1981 Rules and Regulations Pertaining to Solid Waste Management, as amended.

Nebraska Department of Environmental Control
1982 Nebraska Air Pollution Control Rules and Regulations.

Nebraska Department of Environmental Control
1982 Nebraska Air Quality Report, 1981. Air Pollution Control Division, Lincoln.

Nebraska Department of Revenue
1979-1982 State Funds. Lincoln.

Nebraska Department of Revenue
1980-1982 Annual Reports. Lincoln.

Nebraska Department of Revenue
1983 Report to State Board of Equalization and Assessment, Lincoln.

Nebraska Department of Roads
1979 Rules and Regulations of the State of Nebraska Department of Roads Pertaining to Permits for the Movement of Overweight and Over-dimensional Vehicles or Loads Effect, revised April 30, 1981.

Nebraska Department of Roads
1981 1980 Average Daily Traffic/2000 Average Daily Traffic (Forecast), Lincoln.

Nebraska Department of Roads
1981 Traffic Flow Map, Lincoln.

Nebraska Department of Roads
1983 Challenge of the 80s: Nebraska Highway Programs In Fiscal Years 1983-1988. Lincoln.

Nebraska Department of Roads
1983 Nebraska Rail Plan (Draft). Lincoln.

Nebraska Employment Security Commission
1983 Labor Force Statistics Computer Printout, Kimball County.

Nebraska Forest Service Fire Control Section
1982 Scotts Bluff County Mutual Aid Association Rural Fire Plan. Institute of Agricultural and Natural Resources, University of Nebraska, Lincoln.

Nebraska Games and Parks Commission
1972 The Nebraska Fish and Wildlife Plan (Vol 1). Nebraska Wildlife Resource Inventory, Lincoln.

Nebraska Game and Parks Commission
1983 Personal communication with the staff.

Nebraska Library Commission
1974 Standards for Public Libraries in Nebraska. Nebraska Library Commission, Lincoln.

Nebraska Library Commission
1980 Guidelines for Public Library Service in Nebraska. Nebraska Library Commission, Lincoln.

Nebraska Library Commission
1982 Library Statistical Reports for FY 1981-1982. Nebraska Library Commission, Lincoln.

Nebraska Library Commission
n.d. Panhandle Library System Service Plan: 1983-84 and Beyond. Unpublished draft, Lincoln.

Nebraska Policy Research Office
1983 Personal communication with the Budget Analyst.

Nebraska Policy Research Office
1983 Personal communication with the Policy Analyst.

Nebraska Public Service Commission
1974 Map of Nebraska, Lincoln.

Nebraska State Health Planning and Development Agency
1982 Nebraska State Health Plan. Lincoln.

Nebraska State Highway Commission
1983 Challenges of the 80s, Nebraska Highway Program for Fiscal Year 1983-1988. Lincoln.

Nebraska Tax Research Council
1981 Nebraska's New Revised Tax System. Lincoln.

Nebraska, University of
1977 Crop Information for Western Nebraska. Bulletin 677-352, Cooperative Extension Service.

Newton, Ian
1979 Population Ecology of Raptors. Buteo Books, Vermillion, South Dakota.

Noblitt & Associates
1976 Wyoming State Airport System Plan. Wyoming Aeronautics Commission, Cheyenne.

Oakleaf, Bob, Helen Downing, Bert Raynes, Meg Raynes, and Oliver K. Scott
1982 Wyoming Avian Atlas. Wyoming Game and Fish Department and Bighorn Audubon Society, Cheyenne.

O'Neal, Kathleen
1981 Cheyenne and the Development of Wyoming. Report on file, Laramie County Regional Planning Office, Cheyenne.

Orgill, M.M., and G.A. Sehmel
1975 Frequency and Diurnal Variation of Dust in the Continental United States (Part II). Report prepared for U.S. Atomic Energy Commission, Richland, Washington.

Panhandle Resource Council
1979 City of Kimball Comprehensive Plan, Scottsbluff, Nebraska.

Pignataro, Louis
1971 Traffic Engineering Theory and Practices. Prentice Hall, Englewood Cliffs, NJ.

Pindyck, Robert S. and Rubinfeld, Daniel L.
1981 Econometric Models Economic Forecasts (second ed.). McGraw-Hill Book Co., New York.

Plambeck, Maury
1982 *Waste Management Study Group Report. Unpublished material,* Sanitation Department, Cheyenne.

Platte, County of
1983 Contractor's Equipment Schedule, Platte County.

Platte Valley Federal Savings and Loan
1983 Personal communication with the President.

Premus, Robert
1982 Air Force Fiscal Impact Module. Engineering and Services Center, Tyndall Air Force Base, Florida.

Presidents Economic Adjustment Committee
1981 Community Impact Assistance Study. Interagency Task Force on Community Impact Assistance.

Reagor, B.G., C.W. Stover, and S.T. Algermissen
1981 Seismicity Map, State of Nebraska. U.S. Geological Survey Miscellaneous Field Studies Map, MF-1350.

Real Estate Research Corporation
1982 Preliminary Identification of an Strategy for Mitigating M-X Missilies Housing and Real Estate Impacts in Lincoln and Clark Counties. Chicago.

Reher, Charles A.
1971 A Survey of Ceramic Sites in Southeastern Wyoming. Unpublished master's thesis, University of Wyoming, Laramie.

Reher, Charles A.
1982 Cultural Resources in Southeastern Wyoming: the ETSI Coal Slurry Pipeline Intertie Route. Report prepared for P-III Associates, Bechtel Group, Inc. and Energy Transportation Systems, Inc.

Reiss, David
1979 A Cultural Resource Inventory of a Proposed Transmission Line Located in Laramie County, Wyoming. Report prepared for Tri-State Generation and Transmission Association, Inc., Project No. WY-69-79. MS. on file, Office of the Wyoming State Archaeologist, Laramie.

Richardson, Alan K.
1983 Estimating Water Storage Requirements. Paper presented at Water Distribution System Analysis and Design Workshop, University of Wisconsin, Madison.

Rocky Mountain Airways
1983 System Timetable, Denver.

Rocky Mountain Savings and Loan
1983 Personal communication with the Senior Vice President, Cheyenne.

Rocky Mountain Savings and Loan
1983 Personal communication with the staff, Cheyenne.

Rosenberg, Robert G.
1983 An Historic Narrative of a Nine-county Study Area in Wyoming, Colorado and Nebraska. Cultural Research and Management, Cheyenne. Report on file, URS-Berger, San Bernardino.

Rosenberg, Robert and John Gree
1981 An Intensive Cultural-Resource Survey of the Mobil Hourse Creek Unit #T24-32G Well Pad and Access Route, Laramie County, Wyoming. Report prepared for Grosch Construction Company and Mobile Oil Corporation, Ms. on file, Office of the State Archaeologist, Laramie.

Ross, John P. and Jesse Burkhead
1974 Productivity in the Local Government Sector. Lexington Books, Lexington, Massechusetts.

Scotts Bluff County
1978 Airport Master Plan.

Scottsbluff, City of
1983 Personal communication with the Sanitation Supervisor.

Scottsbluff National Bank and Trust
1983 Personal communication with the President.

Seim, Johnson and Sestak CPA
1981 Kimball County Hospital, Financial Statements 1981-1982, Auditors' Report Included. Kimball, Nebraska.

Sheshunoff
1983 Bank of the Great Plains. Austin, Texas.

Simon, R.B.
1972 Geologic Atlas of the Rocky Mountain Region. Rocky Mountain Association of Geologists.

Smith, Tim
1982 The History of the Minuteman Missile and Its Impact in Western Nebraska. MS on file, Nebraska Western College.

Social Impact Research Inc.
n.d. Socioeconomic Impact Management. Seattle, Washington.

South Cheyenne Water and Sewer District
1983 Master Meter Readings, November 30, 1981 through January 1, 1983.

South Cheyenne Water and Sewer District
1983 Personal communication with the staff.

St. Mark's Episcopal Church
1983 Personal communication with the staff, Cheyenne.

Steel, E.W. and T.J. McGhee
1979 Water Supply and Sewerage (fifth ed.). McGraw-Hill, New York, pp. 323-327.

Strickland, Dale
1979 Annual Report of Upland Game and Furbearer Harvest 1978. Project No. W-27-R-32. Wyoming Game and Fish Deartment, Cheyenne.

Strickland, Dale
1980 Annual Report of Upland Game and Furbearer Harvest 1979. Project No. W-27-R-33. Wyoming Game and Fish Department, Cheyenne.

Strickland, Dale
1981 Annual Report of Upland Game and Furbearer Harvest 1980. Project No. W-27-R-34. Wyoming Game and Fish Department, Cheyenne.

Strickland, Dale
1982 Annual Report of Upland Game and Furbearer Harvest 1981. Project No. W-27-R-35. Wyoming Game and Fish Department, Cheyenne.

Swaminatha, K., N. Kochman, S. Evans and W. Stout
1982 Economic Impacts of M-X Development: Output and Employment Projections. Analytic Services, Washington D.C.

Talmour, Vernon E.
1980 Planning Process for Public Libraries. American Library Association, Chicago.

Texas Transportation Institute
1976 Traffic Engineering. Texas A & M University, College Station, Texas.

Thompson, J.G., A.L. Bleven, Jr., and G.L. Watts
1978 Socioeconomic Longitudinal Monitoring Project (Vol. I). Old West Regional Commission, Billings, Montana.

Todd, Larry C., Danny Walker, and George Zeimens
1977 Results of an Archaeological Survey on the Cheyenne Light, Fuel and Power Company West Cheyenne Study Area, Laramie County, Wyoming. Ms. on file, Office of the Wyoming State Archaeologist, Laramie.

Torrington, Town of
1983 Personal communication with the Clerk-Treasurer.

Torrington, Town of
1983 Personal communication with the Director of Public Works.

Torrington, Town of
1983 Personal communication with the Sanitation Supervisor.

Transportation Research Board
1978 Freight Movement and Demand. Transportation Research Record 668, Washington, D.C.

Transportation Research Board
1978 Quick-Response Urban Travel Estimation Techniques and Transferable Parameters. TRB187, Washington, D.C.

Truppi, L.E.
1968 Bias Introduced by Aneomometer Starting Speeds in Climatological Wind Rose Summaries, Monthly Weather Review, 96 (5): 325-327, May.

TRW Corporation
1983 Personal communication with the Engineer, San Bernardino.

Turner, D.B.
1970 Workbook of Atmospheric Dispersion Estimates. PHS Publication No. 99-AP-26, U.S. Department of Health, Education, and Welfare, National Air Pollution Control Administration, Cincinnati, Ohio.

United Savings and Loan
1983 Personal communication with the Vice President, Cheyenne.

URS Company
1979 City of Thornton Comprehensive Water Utility Master Plan. Unpublished material, reviewed at URS Company Library.

United States Air Force (USAF) See also F.E. Warren AFB
1979 M-X: Milestone II Final EIS.

USAF
1982 Statement of Facilities and Assignment, F.E. Warren AFB.

USAF AFRCE-BMS
1982 Defense Access Roads Technical Report of Work in Progress for Near Term M-X Basing. M-X Environmental Planning Process Report for the Facility Program Manager, Air Force Regional Civil Engineer - M-X, Norton AFB, California.

USAF AFRCE-BMS
1983 Defense Access Road Needs Report for Peacekeeper in Minuteman Silos. Peacekeeper Environmental Planning Process Report for the Facility Program Manager, Air Force Regional Civil Engineer BMS, Norton AFB, California.

USAF Headquarters
1981 AF Manual 173-140 (C2), Air Force Salary Impact Report HIT6/WU, Department of the Air Force, Washington, D.C.

U.S. Army Corps of Engineers
1966 Unit Hydrograph Computer Program 23-J2-L228.

U.S. Army Corps of Engineers
1983 Personal communication with the staff.

U.S. Bureau of Industrial Economies
1983 U.S. Industrial Outlook For 250 Industries. U.S. Government Printing Office, Washington, D.C.

U.S. Bureau of Labor Statistics
1983 U.S. Industrial Outlook. Washington, D.C.

U.S. Department of Agriculture, Forest Service
1981 Cheyenne Stage II Water Diversion Proposal. Appendix, Draft Environmental Impact Statement, Laramie.

U.S.D.A., Forest Service
1981 Cheyenne Stage II Water Diversion Proposal. Final Environmental Impact Statement, Laramie.

U.S. Department of Commerce (U.S.D.C.)
1974 National Oceanic and Atomospheric Administration Atlas 2, Precipitation-Frequency Atlas of the Western United States Wyoming (Vol. II). Silver Spring, Maryland.

U.S.D.C.
1982 Local Climatological Data-Annual Summary with Comparative Data, for Cheyenne, Wyoming, 1981. Asheville, North Carolina.

U.S.D.C., Bureau of the Census,
1970 Detailed Housing Characteristics. Wyoming. Government Printing Office, Washington, D.C.

U.S.D.C., Bureau of the Census
1971 General Housing Characteristics, Nebraska. Government Printing Office, Washington, D.C.

U.S.D.C., Bureau of the Census
1971 General Housing Characteristics, Wyoming. Government Printing Office, Washington, D.C.

U.S.D.C., Bureau of the Census
1972 Detailed Housing Characteristics, Nebraska. Government Printing Office, Washington, D.C.

U.S.D.C., Bureau of the Census
1981 Characteristics of the Population, Chapter A, Vol. 1, Number of Inhabitants, PC80-1-A, Wyoming. Government Printing Office, Washington, D.C.

U.S.D.C., Bureau of the Census
1982 General Housing Characteristics, Colorado. Government Printing Office, Washington, D.C.

U.S.D.C., Bureau of the Census
1982 General Housing Characteristics, Nebraska. Government Printing Office, Washington, D.C.

U.S.D.C., Bureau of the Census
1982 General Housing Characteristics, Wyoming. Government Printing Office, Washington, D.C.

U.S.D.C., Bureau of the Census
1982 General Population Characteristics, Colorado. Government Printing Office, Washington, D.C.

U.S.D.C., Bureau of the Census
1982 General Population Characteristics, Wyoming. Government Printing Office, Washington, D.C.

U.S. Department of Housing and Urban Development
1978 Program Education and Analysis A Management Report for State and Local Governments. Public Technology, Inc., Washington, D.C.

U.S. Department of Housing and Urban Development
1979-1982 Community Development Block Grant Program Housing Assistance Plan, Survey of Housing Conditions. Cheyenne.

U.S. Department of Housing and Urban Development
1980 Multi-year Revenue and Expenditures. Government Printing Office, Washington, D.C.

U.S. Fish and Wildlife Service
1978-a Stream Evaluation Map, State of Colorado. U.S. Fish and Wildlife Service, Billings.

U.S. Fish and Wildlife Service
1978-b Stream Evaluation Map, State of Nebraska. U.S. Fish and Wildlife Service, Billings.

U.S. Fish and Wildlife Service
1978-c Stream Evaluation Map, State of South Dakota. U.S. Fish and Wildlife Service, Billings.

U.S. Fish and Wildlife Service
1978-d Stream Evaluation Map, State of Wyoming. U.S. Fish and Wildlife Service, Billings.

U.S. Fish and Wildlife Service
1983 Personal communication with the staff, Denver.

U.S. Geological Survey (USGS)
1968 Magnitude and Frequency of Floods in the United States. Water Supply Paper 16, Washington, D.C.

USGS
1981 Missouri River Basin Water Year 1 0 (Vol. I). U.S. Geological Survey Water Data Report WY-80-1.

USGS
1982 Nebraska Water Year 1918. U.S. Geological Survey, Water Data Report NE-81-1.

U.S. International Trade Commission
1980 Asphalt Roofing Shingles from Canada: Determination of the Communication in Investigation. Document No. 731-TA-29.

U.S. Rural Electrification Administration
1976 Final EIS Generation Visits 1, 2, and 3; Associated Transmission Lines and Greyrocks Reservoir. Washington, D.C.

U.S. Secretary of Defense
1982 Defense Economic Impact Modeling System. Washington, D.C.

U.S. Soil Conservation Service
1975a Users Manual, Computer Program for Project Formulation-Hydrology. Technical Release No. 20.

U.S. Soil Conservation Service
1975b Procedure For Computing Sheet and Rill Erosion on Project Areas. Technical Release No. 51. Washington, D.C.

U.S. Soil Conservation Service
1975c Urban Hydrology for Small Watersheds. Technical Release No. 55.

U.S. Soil Conservation Service
1982 Resource Conservation Planning-WY-2, Wind Erosion Equation. Casper, Wyoming.

United Telephone System
1983 Personal communication with the Vice President, Western Division.

Valev and Associated, Inc.
1982 Hampshire Energy Housing Master Plan.

Volunteer Information Center and Volunteer Action Center
1981 Information and Referral Guide. Cheyenne.

Walick and Volk
1983 Personal communication with the staff.

Water Pollution Control Federation and the American Society of Civil Engineers
1977 Wastewater Treatment Plant Design. Manual of Practice No. 8, Washington, D.C. and New York.

Weedon, Ronald R., and Donna Norton
1982 Final Draft Report on Blowout Pensteron, a Rare Sandhill Endemic. Herbarium, Department of Biology, Chadron State College. Nebraska.

West American Mortgage Corp.
1983 Personal communication with the staff, Cheyenne.

Western Area Power Administration
1983 Personal communication with the staff, Golden, Colorado.

Western Nebraska Observer
1983 Personal communication with the Editor.

Western Research Corp.
1983 Personal communication with the Senior Economist, Laramie.

Wheatland, City of
1983 Personal communication with the City Clerk.

Wilson, Michael
1974 History of the Bison in Wyoming, with Particular Reference to Early Holocene Forms. In Applied Geology and Archaeology: The Holocene History of Wyoming, edited by Michael Wilson. Geological Survey of Wyoming, Report of Investigations 10:91-99.

Wood, John J.
1967 Archaeological Investigations in Northeastern Colorado. Unpublished Ph.D. dissertation, Department of Anthropology, University of Colorado, Boulder.

Wyle Laboratories
1973 Assessment of Noise Environments Around Railroad Operations. Wyle Laboratories Report WCR 73-5, prepared for Southern Pacific Transportation Company, Union Pacific Railroad, the Atchinson, Topeka and Sante Fe Railway Company, and the Association of American Railroads, El Segundo, California.

Wyoming Department of Administration and Fiscal Control
1981 Wyoming Data Hardbook. Cheyenne.

Wyoming Department of Adminstration and Fiscal Control
1982 Wyoming Income and Employment Report. Cheyenne.

Wyoming Department of Adminstration and Fiscal Control
1982 Wyoming Population and Employment Forecasts.

Wyoming Department of Adminstration and Fiscal Control, Division of Research and Statistics
1982 Wyoming Tax Revenue Report.

Wyoming Department of Economic Planning and Development
1977 Future Housing Demand in the State of Wyoming 1977 to 1986. Cheyenne.

Wyoming Department of Economic Planning and Development
1983 Wyoming Housing Monitoring System. Cheyenne.

Wyoming Department of Education
1974-75 Property Valuation by County, by School District, Mill Levies. Cheyenne.

Wyoming Department of Education
1976-1982 Wyoming Public Schools Fund Accounting and Reporting.

Wyoming Department of Education
1977, 1980, 1981 Report of Staff Teachers Pupils/School Enrollments. Cheyenne.

Wyoming Department of Education
1982 The Wyoming School Foundation Program. Cheyenne.

Wyoming Department of Education
1982 A Facility Study-Laramie County District No. 2. 1981 Education Report, Cheyenne.

Wyoming Department of Education
1983 Official Bus Inventory, Cheyenne.

Wyoming Department of Education
1983 Wyoming Education Directory. Cheyenne.

Wyoming Department of Education, Administration and Planning Unit
1982 Average Public School Salaries Wyoming 1982-83. Cheyenne.

Wyoming Department of Environmental Health
1983 Personal communication with the staff.

Wyoming Department of Environmental Quality
1975 Solid Waste Management Rules and Regulations.

Wyoming Department of Environmental Quality
1979 Guideline For Fugitive Dust Emission Factors For Mining Activities. Cheyenne.

Wyoming Department of Environmental Quality
1982 Air Quality Standards and Regulations.

Wyoming Department of Environmental Quality
1982 Cheyenne Meteorological Data (1960-1964), STAR Program Format.

Wyoming Department of Environmental Quality
1982 Wyoming's Air Quality-Ambient Air Monitoring Data: 1981, Air Quality Division, Cheyenne.

Wyoming Department of Environmental Quality
1983 Climatological Dispersion Model, computer tape, includes modifications by Wyoming Department of Environmental Quality.

Wyoming Department of Environmental Quality
1983 Personal communication with the engineer in the Solid Waste Management Program.

Wyoming Department of Environmental Quality
1983 Personal communication with the Oil and Hazardous Substances Supervisor.

Wyoming Department of Environmental Quality
1983 Wyoming Oil and Hazardous Substances Pollultion Contingency Plan.

Wyoming Department of Health and Social Services
1980 Standards and Guidelines for Child Care Certification. Division of Public Assistance and Social Services, Cheyenne.

Wyoming Department of Health and Social Services
1983 State Plan for Social Services in Wyoming. Division of Public Assistance and Social Services, Cheyenne.

Wyoming State Highway Department, Planning Branch
1979 Wyoming Rail Network Milepost Book. Cheyenne.

Wyoming State Highway Department
1983 Telephone interview with the staff of the Planning Division.

Wyoming Department of Revenue and Taxation
1973-82 Annual Reports.

Wyoming Department of Revenue and Taxation
1983 Personal communication with staff.

Wyoming Division of Administrative Services
1975-1982 School District Property Valuations, Mill Levies and Bonded Debt. Cheyenne.

Wyoming Eagle Tribune
1983 Personal communication with the Editor.

Wyoming Engineer's Office
1983 Personal communication with staff.

Wyoming Examiner's Office
1983 Personal communication with staff.

Wyoming Game and Fish Department
1972 Current Status and Inventory Waterfowl for Central and Pacific Flyways. Planning Report No. 96 Wyoming Game and Fish Deparment.

Wyoming Game and Fish Department
1977 Current Status and Inventory of Wildlife in Wyoming. Cheyenne.

Wyoming Game and Fish Department
1978 Map: Seasonal Habitat for Pronphora, Chalk Bluffs. 1:500,000, District 5, Cheyenne.

Wyoming Game and Fish Department
1979 Map: Seasonal Habitat for Mule Deer, Cheyenne. 1:500,000, District 5, Cheyenne.

Wyoming Game and Fish Department
1979a Map: Seasonal Habitat for Mule Deer, Goshen Hole. 1:500,000, District 5, Cheyenne.

Wyoming Game and Fish Department
1980 Map: Seasonal Habitat for Mule Deer from Mountains. 1:500,000, District 5, Cheyenne.

Wyoming Game and Fish Department
1980a Map: Seasonal Habitat for Elk Iron Mountain. 1:500,000, District 5, Cheyenne.

Wyoming Game and Fish Department
1982 Map: Seasonal Habitat for Pronghorn, Iron Mountain. 1:500,000, District 5, Cheyenne.

Wyoming Game and Fish Department
1983 Lake and Stream Survey Reporting and Numbering System. Cheyenne.

Wyoming Game and Fish Department
1983 Wildlife Observation System Printout, Cheyenne.

Wyoming Game and Fish Department
1983 Personal communication with the staff.

Wyoming Game and Fish Department
n.d. A Strategic Plan for the Comprehensive Management of Wildlife 1978-1983, Vol. II. Cheyenne.

Wyoming Game and Fish Department
n.d. Map: Seasonal Habitat for Pronghorn, Hawk Springs. 1:500,000, District 5, Cheyenne.

Wyoming Game and Fish Department
n.d. Map: Seasonal Habitat for White-tailed Deer, Laramie River. 1:500,000, District 5, Cheyenne.

Wyoming Health Planning and Development Agency
1982 Wyoming State Health Plan, 1982. Cheyenne.

Wyoming Health Planning and Development Agency
1982 Wyoming Nursing Manpower Plan 1982-1986. Cheyenne.

Wyoming Industrial Siting Administration
1983 Personal communication with the staff.

Wyoming Legislature Service Office
1982 Selected Revenue Projections. State of Wyoming, Cheyenne.

Wyoming Natural Heritage Program
1983 Computer Listing of Rare and Endangered Species and Natural Areas of Albany, Carbon, Converse, Goshen, Laramie, Niobrara, and Platte Counties, Cheyenne.

Wyoming Natural Heritage Program
1983 Personal communication with the staff.

Wyoming Recreation Commission
1980 Statewide Comprehensive Outdoor Recreation Plan (SCORP).

Wyoming State Bank
1983 Personal communication with the staff.

Wyoming State Bank Examiner
1982 Annual Report.

Wyoming State Library
1982 Public Library Annual Activity Report Form. Report for Fiscal Year Funding June 30, 1982. Cheyenne.

Wyoming State Library Standards Committee
1983 Proposed Wyoming Public Library Standards. Unpublished draft, Cheyenne.

Wyoming State Park Examiner
1983 Personal communication with the staff.

Wyoming State Treasurer
1982 Annual Report.

Wyoming Supreme Court
1980 Wyoming Minor Court System Review. Cheyenne.

Wyoming Supreme Court
1982 1981 Report, Courts of Limited Jurisdiction, State of Wyoming. Cheyenne.

Wyoming Taxpayers Association
1982 Wyoming Tax Summary. Wyoming Taxpayers Association, Cheyenne.

Wyoming Taxpayers Association
1973-82 Wyoming Property Tax Rates. Wyoming Taxpayers Association, Cheyenne.

Wyoming Treasurer
1982 Annual Report. Wyoming Treasurer, Cheyenne.

Wyoming, University of
1982 Draft Vegetation Maps. Wyoming Cooperative Research Unit 1982, 1:500,000 Prepared for the U.S. Fish and Wildlife Service, Laramie.

Wyoming, University of
1983 1982-84 Wyoming Crop Recommendations. Agricultural Extension Service, Bulletin B-478R.

Zimmerman, John R.
1971 Some Preliminary Results of Modeling from the Air Pollution Study of Ankara, Turkey. Proceedings of the 2nd Meeting of the Expert Panel on Air Pollution Modeling. NATO Committee on the Challenges of Modern Society, Paris.

Zimmerman, John R.
1972 The NATO/CCMS Air Pollution Study of St. Louis, Missouri. Paper presented at 3rd Meeting of the Expert Panel on Air Pollution Modeling, NATO Committee on the Challenges on Modern Society, Paris.

Zweizig, Douglas,and E.J. Rodger
1982 Output Measures for Public Libraries. American Library Association, Chicago.

APPENDIX F

AUTHORIZING ACTIONS

APPENDIX F

AUTHORIZING ACTIONS

The following list inc des permits, consultations or other authorizing actions which must be . pleted before or during construction of the Peacekeeper in Minuteman Silos Project.

FEDERAL AUTHORIZING ACTIONS

AUTHORIZING ACTION	PROJECT ACTIVITY OR FACILITY REQUIRING THE ACTION	AUTHORIZING AGENCY	AUTHORITY
WATER			
Section 404 (Dredge and Fill) Permit, Consultation	Discharge of dredged or fill material into waters of the United States at specified disposal sites, especially for impoundments and bridge crossing improvements on Crow and Diamond creeks on F.E. Warren AFB and where cable corridors traverse streams and wetlands.	Army Corps of Engineers, in Consultation With U.S. Fish and Wildlife Service	Federal Water Pollution Control Act of 1972, as amended, (FWPCA); § 404; 33 U.S.C. 1344; 33 C.F.R. 320-330; 40 C.F.R. 230. Executive Orders 11988 and 11990. Fish and Wildlife Coordination Act, 16 U.S.C. 661-666c.
Section 10 Permit	Construction of structures such as impoundments, bridge improvements, and cable components over any navigable water (e.g., Crow and Diamond creeks), the excavation from or depositing of material in such waters or any other work affecting the course, location, condition, or capacity of such waters.	Army Corps of Engineers, in consultation with U.S. Fish and Wildlife Service	Rivers and Harbors Act of 1899, § 10; 33 U.S.C. 403; 33 C.F.R. 320-330; 40 C.F.R. 230. Fish and Wildlife Coordination Act, 16 U.S.C. 661-666c.
Approval of Spill Prevention Control and Counter-Measures Plan	Storage or transportation of oil (i.e., in the form of gasoline and diesel fuel or in any other form) at construction sites on and off F.E. Warren AFB and staging areas.	Environmental Protection Agency	FWPCA, 33 U.S.C. 1251 et seq. at § 1321 (j)(1)(c); 40 C.F.R. 112.

FEDERAL AUTHORIZING ACTIONS (continued)

AUTHORIZING ACTION	PROJECT ACTIVITY OR FACILITY REQUIRING THE ACTION	AUTHORIZING AGENCY	AUTHORITY
AIR/NOISE			
Consultation/Abatement	Construction activities which generate noise must not be at such a level as to constitute a public nuisance.	Environmental Protection Agency	Noise Pollution and Abatement Act of 1970 (Title IV, Clean Air Act, as amended); §§ 401-403; Noise Control Act of 1972, 42 U.S.C. 4901 et seq.
SOLID AND HAZARDOUS WASTE			
Authority for short-term storage of small quantities of hazardous waste, hazardous waste I.D. number.	Generation during construction and temporary storage of small quantities of hazardous waste including: expended or unusable oils and lubricants; machining fluids; cleaning agents and adhesives.	Environmental Protection Agency	Resource Conservation and Recovery Act of 1976, 42 U.S.C. 6901 et seq., at § 6921; 40 C.F.R. 261.5 (f), 262.34.
Registration, Packaging, and Manifest Requirements	Transportation of hazardous waste generated during construction from generation site to temporary storage site; transportation of propellants.	U.S. Department of Transportation	Hazardous Materials Transportation Act, 49 U.S.C. 1801 et seq.; Resource Conservation and Recovery Act of 1976, § 3003, 42 U.S.C. 6901 et seq.; 49 C.F.R 170-179; 40 C.F.R. 262.30 - 262.33; 45 Fed. Reg. 51645.

FEDERAL AUTHORIZING ACTIONS (continued)

AUTHORIZING ACTION	PROJECT ACTIVITY OR FACILITY REQUIRING THE ACTION	AUTHORIZING AGENCY	AUTHORITY
Approval of Safety Plan Generally and Facility-Specific Safety Plans	Storage and processing of explosives and propellants in the missile stage processing facility, stage IV storage facility, and munitions supply storage facility which are near inhabited buildings, public traffic routes, recreational facilities, utilities, petroleum storage facilities, or processing facilities for other explosives.	Department of Defense Explosive Safety Board	DoD Ammunition and Explosive Safety Standards Directive 5154.45; Air Force Regulation 127-100.
BIOLOGICAL RESOURCES PROTECTION			
Consultation on Threatened and Endangered Species	Activities and facilities on F.E. Warren AFB and near existing silos which may affect the critical habitat of threatened or endangered species, e.g., the onbase improvements to stream crossings over Crow and Diamond creeks which may affect newly identified Colorado butterfly plant habitats and potential black-footed ferret habitat near silos and cables.	U.S. Fish and Wildlife Service	Endangered Species Act, 16 U.S.C. 1531 et seq.; 50 C.F.R. 402; Proposed Rules in 48 Fed. Reg. 29990.

FEDERAL AUTHORIZING ACTIONS (continued)

AUTHORIZING ACTION	PROJECT ACTIVITY OR FACILITY REQUIRING THE ACTION	AUTHORIZING AGENCY	AUTHORITY
CULTURAL RESOURCE PROTECTION			
Consultation and Comment	Project activities such as onbase construction and cable installation which affect property with historic, architectural, archaeological or cultural value that is listed or eligible for listing in the National Register of Historic Places, e.g., reuse and modifications of listed or eligible structures located on F.E. Warren AFB and within the safety Quantity Distance.	Advisory Council on Historic Preservation	National Historic Preservation Act of 1966, as amended, 16 U.S.C. 470 et seq.; Executive Order 11593 "Protection and Enhancement of the Cultural Environment"; 36 C.F.R. 800; 36 C.F.R. 63; Proposed Programmatic Memorandum of Agreement between the Advisory Council and the U.S. Air Force.

WYOMING AUTHORIZING ACTIONS

AUTHORIZING ACTION	PROJECT ACTIVITY OR FACILITY REQUIRING THE ACTION	AUTHORIZING AGENCY	AUTHORITY
AIR			
Air Quality Permit	Project activities such as construction of new facilities onbase, Defense Access Road upgrade, cable installation, and such project facilities as standby power generation units which cause emission of or an increase in the emissions of air contaminants, especially fugitive dust.	Wyoming Department of Environmental Quality	Clean Air Act Amendments of 1977, 42 U.S.C. 7403 et seq.; W.S. 35-11-101 et seq.; and at 201-202; Wyoming Air Quality Standards and Regulations.
WATER			
National Pollution Discharge Elimination System Permit	Sump pump discharges at Launch Facilities, wastewater discharges at Launch Control Facilities, and any other discharge which may occur during construction or operation of the project.	Wyoming Department of Environmental Quality	FWPCA § 402, 33 U.S.C. 1251 et seq., at § 1342; W.S. 35-11-101 et seq. at §§ 301-305; Wyoming Water Quality Rules and Regulations, Ch. II Discharge Permit Regulations.

WYOMING AUTHORIZING ACTIONS (continued)

AUTHORIZING ACTION	PROJECT ACTIVITY OR FACILITY REQUIRING THE ACTION	AUTHORIZING AGENCY	AUTHORITY
401 Certification	Activities and facilities requiring Section 404 or Section 10 permits must obtain state certification that the discharge will comply with applicable effluent limitation and water quality standards.	Wyoming Department of Environmental Quality	FWPCA § 401, 33 U.S.C. 1341; 33 C.F.R. 320-330; W.S. 35-11-101 at §§ 301-305; Wyoming Water Quality Rules and Regulations.
Permit, Certificate of Appropriation, State Engineer Approval	Water rights acquisition; construction of wells, diversion structures and reservoirs.	Wyoming State Engineer and Board of Control	W.S. §§ 41-1-101 et seq.
SOLID AND HAZARDOUS WASTE			
Spill Prevention Control Plan Approval	Storage or transportation of oil (i.e., in the form of gasoline and diesel fuel or in any other form) at construction sites on and off F.E. Warren AFB and staging areas near navigable waters.	Wyoming Department of Environmental Quality	FWPCA 33 U.S.C. 1251 et seq. at § 1321 (j)(a)(c); 40 C.F.R. 112; W.S. 35-11-101 et seq.; Wyoming Spill Prevention Control Rules and Regulations.

WYOMING AUTHORIZING ACTIONS (continued)

AUTHORIZING ACTIONS	PROJECT ACTIVITY OR FACILITY REQUIRING THE ACTION	AUTHORIZING AGENCY	AUTHORITY
Waste Site Permit	Establishing sites at staging areas, Launch Facilities, and Launch Control Facilities for the disposal of solid construction waste.	Wyoming Department of Environmental Quality	W.S. §§ 35-11-101 et seq.; Wyoming Solid Waste Rules and Regulations.
CULTURAL RESOURCES PROTECTION			
Cultural Resource Clearance Permit	Construction of cable and Defense Access Road upgrade which will affect cultural and archaeological resources on state lands.	State Historic Preservation Office, Wyoming State Board of Land Commissioners	W.S. §§ 36-1-114-116; 36-4-101; 36-4-106 (d).
OTHER			
Oversized and Overweight Vehicle Permit	Transporter erector vehicle operation on state highways.	Wyoming Department of Transportation	W.S. 31-5-1001 et seq., as amended; Wyoming Overweight and Oversized Vehicle Regulations.

NEBRASKA AUTHORIZING ACTIONS

AUTHORIZING ACTION	PROJECT ACTIVITY OR FACILITY REQUIRING THE ACTION	AUTHORIZING AGENCY	AUTHORITY
AIR			
Air Quality Permit	Project activities such as construction of Defense Access Road upgrades and cable installation which cause emission of or an increase in emissions of air contaminants.	Nebraska Department of Environmental Control	Clean Air Act, as amended, 42 U.S.C. 7403 et seq.; N.R.S. § 81-1506; Nebraska Air Pollution Control Rules and Regulations; NDEC Rules of Practice and Procedure.
WATER			
National Pollution Discharge Elimination System Permit	Sump pump discharges at Launch Facilities, wastewater discharges at Launch Control Facilities, and any other discharge which may occur during construction or operation of the project.	Nebraska Department of Environmental Control	FWPCA § 402, 33 U.S.C. 1251 et seq., at § 1342; 40 C.F.R 52.21, 124; N.R.S. § 81-1506; Nebraska NPDES Regulations.
401 Certification	Activities and facilities requiring Section 404 or Section 10 permits must obtain state certification that the discharge will comply with applicable effluent limitations and water quality standards.	Nebraska Department of Environmental Control	FWPCA § 401, 33 U.S.C. 1341; 33 C.F.R 320-330; N.R.S. § 81-1506; Nebraska Water Quality Standards.

NEBRASKA AUTHORIZING ACTIONS (continued)

AUTHORIZING ACTION	PROJECT ACTIVITY OR FACILITY REQUIRING THE ACTION	AUTHORIZING AGENCY	AUTHORITY
Permit, Notification	Water rights acquisition for project construction and operation.	Nebraska Department of Water Resources	Nebraska Ground Water Management Act, N.R.S. §§ 46-201 et seq.; §§ 46-656 et seq.
SOLID AND HAZARDOUS WASTE			
Waste Site Permit	Establishing sites at staging areas, Launch Facilities, and Launch Control Facilities for the disposal of solid construction waste.	Nebraska Department of Environmental Control	Nebraska Litter Reduction and Recycling Act, N.R.S. §§ 81-1534-1566; Nebraska Solid Waste Management Rules.
CULTURAL RESOURCES PROTECTION			
Consultation	Construction of Defense Access Road Upgrades and cable installation which may affect cultural resources.	Nebraska State Historic Preservation Office, State Historical Society	N.R.S. §§ 82-118 et seq.

NEBRASKA AUTHORIZING ACTIONS (continued)

AUTHORIZING ACTION	PROJECT ACTIVITY OR FACILITY REQUIRING THE ACTION	AUTHORIZING AGENCY	AUTHORITY
OTHER			
Overweight and Overdimensional Vehicles Permit	Transporter erector vehicle operation on state highways.	Nebraska Department of Roads	N.R.S. §§ 39-6177 et seq.; § 84-907; Rules and Regulations of the State of Nebraska Department of Roads pertaining to Permits for the Movement of Overweight and Overdimensional Vehicles or Loads.

APPENDIX G

LIST OF PREPARERS

APPENDIX G

LIST OF PREPARERS

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