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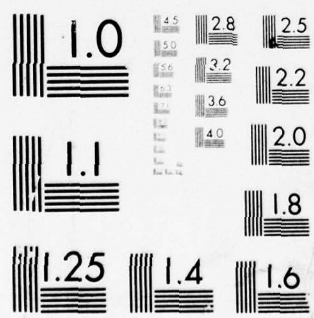

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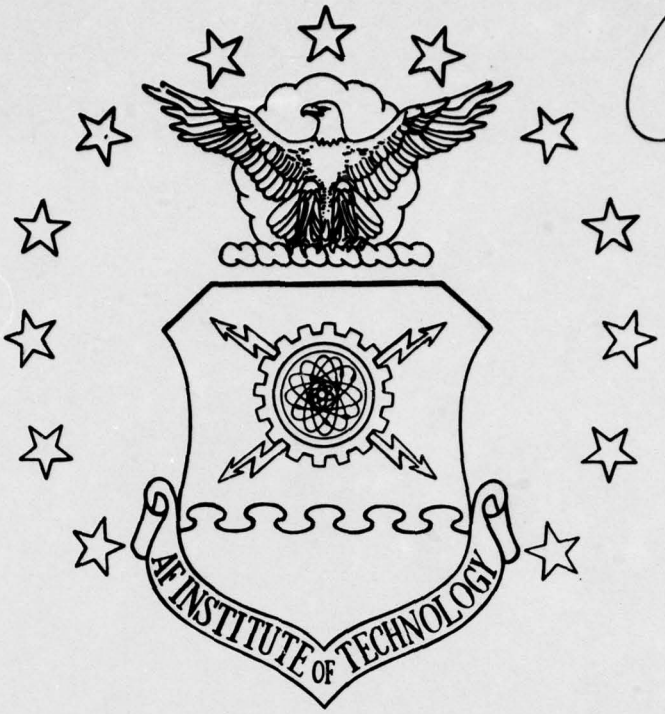

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A STUDY OF THE BASELINE DATA REQUIRED TO CONDUCT AN ENVIRONMENTAL IMPACT ANALYSIS FOR THE HYPOTHETICAL CLOSURE OF AN AIR FORCE BASE

James W. Kahler, Captain, USAF
Daniel E. Paterson, Captain, USAF

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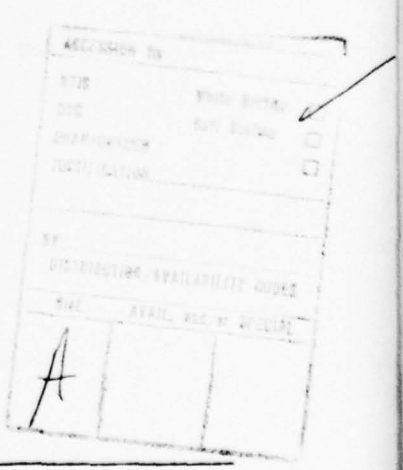

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1. REPORT NUMBER: LSSR 35-77A	2. GOVT ACCESSION NO.
3. RECIPIENT'S CATALOG NUMBER	
4. TITLE (and Subtitle): A STUDY OF THE BASELINE DATA REQUIRED TO CONDUCT AN ENVIRONMENTAL IMPACT ANALYSIS FOR THE HYPOTHETICAL CLOSURE OF AN AIR FORCE BASE.	5. TYPE OF REPORT & PERIOD COVERED: Master's thesis
	6. PERFORMING ORG. REPORT NUMBER
7. AUTHOR(s): James W. Kahler, Captain, USAF Daniel E. Paterson, Captain, USAF	8. CONTRACT OR GRANT NUMBER(s)
9. PERFORMING ORGANIZATION NAME AND ADDRESS: Graduate Education Division School of Systems and Logistics Air Force Institute of Technology, WPAFB, OH	10. PROGRAM ELEMENT, PROJECT, TASK AREA & WORK UNIT NUMBERS
11. CONTROLLING OFFICE NAME AND ADDRESS: Department of Research and Administrative Management (LSGR) AFIT/LSGR, WPAFB, OH 45433	12. REPORT DATE: June 1977 13. NUMBER OF PAGES: 161
14. MONITORING AGENCY NAME & ADDRESS (if different from Controlling Office): 173p.	15. SECURITY CLASS. (of this report): UNCLASSIFIED 15a. DECLASSIFICATION/DOWNGRADING SCHEDULE
16. DISTRIBUTION STATEMENT (of this Report): AFIT-LSSR-35-77A Approved for public release; distribution unlimited	
17. DISTRIBUTION STATEMENT (of the abstract entered in Block 20, if different from Report)	
18. SUPPLEMENTARY NOTES: APPROVED FOR PUBLIC RELEASE AFR 190-17. JERRAL F. GUESS, CAPT, USAF Director of Information	
19. KEY WORDS (Continue on reverse side if necessary and identify by block number): TAB A-1 ENVIRONMENTAL NARRATIVE BASE CLOSURE ENVIRONMENTAL IMPACT STATEMENT ENVIRONMENTAL ATTRIBUTE DESCRIPTORS ENVIRONMENTAL ASSESSMENT	
20. ABSTRACT (Continue on reverse side if necessary and identify by block number): Thesis Chairman: Patrick J. Sweeney, Lieutenant Colonel, USAF	

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This thesis had two main purposes. The first purpose was to develop a list of the Air Force activities that are affected in a base closure and a list of the environmental attributes and descriptors which reflect the impact of a base closure. These lists were developed from the Handbook For Environmental Impact Analysis, an extensive review of Environmental Impact Statements and base closure literature, and interviews with Air Force personnel knowledgeable about base closures. The second purpose was to determine if the Wright-Patterson AFB TAB A-1 Environmental Narrative could be used as the baseline data source for an Environmental Impact Statement for a base closure. This was accomplished by analyzing the TAB A-1 for each of the base closure attributes and descriptors identified in the first portion of the research. The authors' conclusion is that while the TAB A-1 Environmental Narrative does contain the general topic areas required for a base closure analysis, the Wright-Patterson AFB TAB A-1 did not contain sufficiently detailed information to define the base closure impact in terms of the specific attributes and descriptors identified for base closures.

LSSR 35-77A

A STUDY OF THE BASELINE DATA REQUIRED TO CONDUCT AN ENVIRONMENTAL IMPACT ANALYSIS FOR THE HYPOTHETICAL CLOSURE OF AN AIR FORCE BASE

A Thesis

Presented to the Faculty of the School of Systems and Logistics

of the Air Force Institute of Technology

Air University

In Partial Fulfillment of the Requirements for the

Degree of Master of Science in Facilities Management

By

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June 1977

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This thesis, written by

Captain James W. Kahler

and

Captain Daniel E. Paterson

has been accepted by the undersigned on behalf of the faculty of the School of Systems and Logistics in partial fulfillment of the requirements for the degree of

MASTER OF SCIENCE IN FACILITIES MANAGEMENT

DATE: 15 June 1977

COMMITTEE CHAIRMAN

ACKNOWLEDGEMENTS

We wish to thank our thesis advisor, Lieutenant Colonel Patrick J. Sweeney, for his assistance and encouragement in completing this thesis.

We also wish to thank the many people who assisted in providing literature and comments which were helpful to this effort. In particular we would like to thank Captain Dick Woodworth and Mr. Tommy Dunn of AFLC/DEPV for their fine working relationship and the loan of a considerable amount of environmental literature which contributed to a more meaningful thesis.

A special acknowledgement is expressed to our wives, Joyce and Marla. Their participation and help throughout this year has been a boost to us and our work, and has helped us to meet our deadlines. They have sacrificed much in their family and home life so that we could expend our energies on this thesis effort. We therefore dedicate this thesis to them.

We also wish to thank Phyllis Reynolds for typing our thesis.

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CHAPTER I

INTRODUCTION

Overview

One of today's most pressing technical and social problems is the diminishing quality of the nation's environment. This situation has developed over a number of years and has been of increasing concern to the American public in recent years. The United States Air Force responded to this problem by developing regulations and guidelines to comply with the environmental protection requirements imposed by the Federal government. These guidelines are updated as new ideas and events occur which require additional action by the Air Force to meet some environmental need. Unfortunately, the regulation or guideline is often written only after an unfavorable environmental situation occurs that creates a need for further guidance or clarification.

Problem Statement

In 1975, the TAB A-1 Environmental Narrative[1] of each Air Force base was extensively expanded to become a

[1]The TAB A-1 Environmental Narrative is a comprehensive verbal description of the physical and socioeconomic features of an Air Force base and its regional setting. It is an element of the Comprehensive Plan prepared by each Air Force Base (35:11).

broad environmental data source for that base and its surrounding area. Two of the uses of the TAB A-1 Environmental Narrative are: (1) preliminary planning for base mission changes, realignments and closure decisions, and (2) preparation of Environmental Assessments (24:Atch.1:1-2). In June 1976, the Handbook for Environmental Impact Analysis was published as a guideline for identifying the environmental attributes and Air Force activities that should be analyzed during the Environmental Impact Analysis Process (EIAP).

A two-fold problem exists in the EIAP. The first part of the problem is that no determination has been made concerning the adequacy of the handbook as a guideline for identifying the attributes and activities that describe or cause an environmental impact in a base closure. The second part of the problem is that no determination has been made of the sufficiency of the TAB A-1 as a data source for the purpose of preparing an Environmental Impact Statement (EIS) for a base closure.

Background

The National Environmental Policy Act of 1969 (NEPA) established a new direction in which the U.S. Government, its agencies and the public as a whole would take in the future. Signed into law at a time of increasing public concern over the environment, the Act declared there would be ". . . a national policy which will encourage productive

and enjoyable harmony between man and his environment [30:1]." In addition, the Act stated that efforts would be made to prevent or eliminate damage to the environment. Title II of the Act established a Council on Environmental Quality (CEQ) as an advisory body to the Executive Office. The CEQ was charged with developing policies and coordinating activities to insure that all federal activities take environmental considerations into account in decision making (30:4). This was the first time a single organization was made responsible for environmental management. The NEPA further established the legislative basis for Environmental Impact Statements (EIS). An EIS is required whenever any federal action will significantly affect the quality of the human environment or when the action may be considered controversial (18:20550)

The federal environmental program was developed with the full backing of the Executive Branch. Executive Order 11514, "Protection and Enhancement of Environmental Quality," was issued on March 5, 1970. This order stated that "the Federal Government shall provide leadership in protecting and enhancing the quality of the nation's environment to sustain and enrich human life [8:Sec.1]." Department of Defense (DOD) Directive 5100.50 and Air Force Regulation (AFR) 161-22 resulted from this Executive Order. Due to the increased emphasis placed on the care and protection of the environment, the overall

responsibility for the program was placed in the 19-series regulations as a function of commanders at all levels. Thus AFR 19-1, Protection and Enhancement of Environmental Quality, superseded AFR 161-22 on February 18, 1972.

Initial attempts to outline environmental policies were fairly broad and set the stage for additional directives which were more definitive and restrictive. The Office of Management and Budget (OMB) Circular A-95 was incorporated into Air Force policy in August, 1973, when Headquarters Air Force directed Base Civil Engineers to enter into a memorandum of understanding (MOU) with their respective state and area clearinghouses (35:12).[1] The MOU stated under what conditions civilian or military projects would be reviewed. Executive Order 11752, "Prevention, Control, and Abatement of Air and Water Pollution at Federal Facilities," was released December 17, 1973. The purpose of this order was

> . . . to assure that the Federal Government in the design, construction, management, operation, and maintenance of its facilities shall provide leadership in the nationwide effort to protect and enhance the quality of our air, water and land resources . . . [9:34793].

---

[1]A clearinghouse is a group of people who serve as a comprehensive planning agency and represent the governmental function in each state or substate region. They are responsible for the review, coordination, and distribution of proposed plans or projects to any affected governmental agency within the area for comment (45).

DOD Directive 6050.1, Environmental Considerations in DOD Actions, March 19, 1974, stated that the Department of Defense would demonstrate leadership and carry out its mission of national security in a manner consistent with national environmental standards, laws, and policies. The directive established a policy that the environmental consequences of proposed actions would be evaluated at the earliest possible stage in the planning process. The analysis was to be performed prior to the first important decision point concerning a proposed action (31:2). In accordance with NEPA guidance, an interdisciplinary approach was applied to all areas to insure that environmental considerations were included in all actions.

The number of environmental policies and directives became quite extensive. As a result, modifications had to be made in existing Air Force directives to incorporate new or changed policies. Air Force Regulation 19-1 was reissued February 20, 1974, as Pollution Abatement and Environmental Quality. It established a multi-disciplinary environmental protection program which focused on protecting and enhancing the environmental quality and on elements which could adversely affect human health or welfare. It implemented DOD Directires 5100.50, 5030.41 and 6050.1; DOD Instructions 4120.14 and 4170.6; and the National Pollution Discharge Elimination System (36:1-2).

Air Force Regulation 19-2, Environmental Assessments and Impact Statements, was revised on November 22, 1974. This revision added significantly to the January 20, 1972 regulation. The revised regulation was important because it expanded not only the factors to consider when preparing assessments and statements, but also the types of actions requiring or not requiring formal assessments. It provided detailed instructions on holding public hearings and guidance on the processing of an environmental statement. In addition, it expanded the information required in the body of the assessment. The January 20, 1972 regulation had basically listed just the requirements specified by NEPA. The revised regulation included the expanded guidelines for the preparation of the Environmental Impact Statements which were issued by the CEQ, August 1, 1973. Eight basic points were required by the CEQ: (1) statement and purpose of the action, (2) relationship of the action to current plans, (3) probable environmental impact of the action, (4) alternatives to the action, (5) adverse environmental effects which cannot be avoided, (6) short- and long-term effects, (7) irreversible commitment of resources, and (8) considerations that offset the adverse environmental effects (18:20553-4). In addition, the revised regulation added requirements to provide data on the details of any unresolved issues and any bibliographic references (33:10-11).

Prior to 1974 Air Force Base Civil Engineers were required to submit an annual Master Plan[1] to HQ USAF. The TAB A Narrative of this Master Plan included only historical and physical data concerning the base (37:2-7). In 1974 the TAB A portion of the plan was expanded to include some socioeconomic data. In 1975 Air Force undertook a program to improve its planning and decision-making capabilities. The Air Force decided that environmental considerations, including socioeconomic data, must be available early in the decision-making process. In order to accomplish this action, the Master Plan was renamed the Comprehensive Plan and its scope was increased drastically (24:1). The Comprehensive Plan submittal included not only all previously required information, but also incorporated

> . . . in-depth analyses of the interrelationship between: (a) natural and man-made environments; (b) the regional social and economic characteristics; (c) the inter-dependence of air bases and neighboring communities, and (d) the quality of life and facilities [25:1].

The Comprehensive Plan therefore became the major data source for environmental considerations.

The magnitude of the change from the Master Plan to the Comprehensive Plan resulted in the splitting of the 1975 submittal into two phases. Phase I identified and described

---

[1]The Master Plan included a brief historical and physical description of an Air Force base and a Comprehensive set of drawings showing existing and proposed facilities and the location of utilities (37).

the essential parameters which would be required for environmental assessments. This included information on

> . . . the existing and expansion capability of the base facilities/utilities, the availability of community facilities/services and the economic interrelationship between the base and community [25:Atch.2:2].

Phase II expanded on the data collected in Phase I. In as many cases as possible, civilian contracts were awarded to supplement the Base Civil Engineers' collection and preparation of data. The contracts were awarded mainly because of the amount of data required. Contracts also were awarded to investigate the data collected to insure that the data was useful for decision making and to make recommendations if additional information was needed (7:1; 16:1).

In preparation for the 1976 submittal of the Comprehensive Plan, Air Force requested all bases to insure that the TAB A-1 Environmental Narrative data was current and objective. Due to the amount of data required in the previous year and the haste in its collection, many of the installations' narratives included subjective opinions and recommendations. Air Force recommended that narratives reading like "Chamber of Commerce Brochures" be revised. Air Force also requested that information sources and dates be included. In addition, the frequency of the publication or update was to be included to insure the information was relevant. The reason for this review process was the likelihood that the TAB A-1 Environmental Narrative would

have to be released through OMB Circular A-95 clearinghouse channels for public dissemination. A more important reason, however, might be the premature dissemination of a TAB A-1 that was not current and objective due to the Freedom of Information Act (26:1).
the collection of a data base in the Comprehensive Plan is quite clear: higher echelons need valid and current information upon which to base decisions.

Perhaps the most significant impetus toward the development of the Comprehensive Plan was the attempted transfer of the Air Force Communications Service (AFCS) from Richards-Gebaur AFB, Missouri to Scott AFB, Illinois, for realignment under the Military Airlift Command (MAC). The study of the transfer had been performed at the Pentagon. The project was in a "close-hold" status and therefore only currently available information was used to prepare the initial environmental assessment. The sources used were the 1974 TAB A Narratives of both bases and additional census and economic information then available. It is important to realize that this assessment was made prior to the addition of substantial socioeconomic data to the TAB A-1s of both bases. The initial assessment dated November, 1974, did not consider a partial closure nor was an on-site visit made (43:20). Following the completion of the environmental assessment, the decision was made that the

> . . . moves and realignments did not constitute a major federal action significantly affecting the quality of the human environment, and that therefore an environmental impact statement was not required [43:8].

The Air Force then announced on November 27, 1974, the decision to transfer AFCS from Richards-Gebaur AFB, Missouri to Scott AFB, Illinois.

On April 3, 1975, an injunction was filed to restrain the USAF from undertaking the disestablishment of AFCS (42:1). On June 19, 1975, the U.S. District Court ruled against the USAF and prohibited it from effecting the planned action until an environmental impact statement was filed in accordance with the NEPA (43:4). The primary reason for the judgement against the Air Force was the failure to fully comply with all requirements of the NEPA in preparing an environmental impact statement for major actions significantly affecting the quality of the human environment (30:2). In addition to the initial environmental assessment and decision made in November, 1974, updates of the assessment were made in January and March, 1975. These updates showed there would be a significant impact caused by potential unemployment, loss of salary and secondary income, and loss of federal impact-aid funds for the area. The fact that this updated information was not communicated to the persons responsible for the original environmental assessment decision was extremely significant in the court decision (43:23-24).

This was the first time that an Air Force action had been seriously questioned. As a result it was clearly evident that a comprehensive data base was needed for decision making and for planning proposed actions. In view of the problem encountered at Richards-Gebaur AFB in the spring of 1975, it is not surprising that the Comprehensive Plan was established to replace the outmoded Master Plan. The importance of an objective and thorough Comprehensive Plan along with sound environmental considerations was made clear in an ALMAJCOM/DE letter in September, 1975.

> Recent actions involving litigation and adverse public reaction to Air Force basing decisions have pointed out the extent to which the public . . . both individually and collectively . . . has constitutional, legislative and administrative rights to be considered in many Air Force actions. Public law, executive directives and judicial decisions require an environmental (natural resources, socio-economic, etc.) assessment of actions be made available early in the decision-making process. The successful incorporation of environmental considerations in this process requires a multidisciplinary involvement by all Air Force functional elements [25:1].

Thus, the TAB A-1 Environmental Narrative has the following stated uses:

> a. Preparing Environmental Assessments.
> b. Preliminary planning for base mission changes, realignments and closure decisions.
> c. Air Installation Compatible Use Zone (AICUZ) studies.
> d. Preparing, developing, and evaluating Natural Resource Programs.
> e. Preparing, developing, and evaluating pollution, water and air quality programs.
> f. Siting, planning and programming real property facilities [24:Atch.1:1-2].

The Air Force has encountered many difficulties in conducting an environmental impact analysis and in preparing an impact statement that has complied fully with the NEPA. As an example, Brigadier General Gilbert, Deputy Director of Engineering and Service, stated that one of the real problems encountered today is the length of time required for the impact analysis and environmental statement process (12). This process is inclusive from data collection and analysis to the preparation and processing of the Environmental Impact Statement.

The latest management guide to help Air Force Personnel conduct environmental analyses is the Handbook for Environmental Impact Analysis published in June, 1976. The handbook is a result of much ongoing research in the conduct of the environmental impact analysis process. Its aim is to enable Air Force personnel to respond to the provisions of the NEPA in a systematic manner by identifying Air Force activities and the potential environmental attributes which may be affected by those activities. This handbook is still in the development stage and has not been distributed to base level. The handbook is the initial Air Force attempt to provide a comprehensive written guideline for performing an environmental impact analysis. It is not known how adequate the handbook guidelines are for conducting an environmental impact analysis or for preparing an environmental impact statement (35:iv).

Justification and Purpose

The Air Force not only has a legal responsibility, but also a moral responsibility for the protection and safeguarding of the nation's environment. The moral responsibility lies in the fact that while helping to provide for the national defense, the Air Force must use the land, air, water, and many other resources of the nation. Consequently, the Air Force is responsible for its activities that may have an adverse affect upon these resources. The legal responsibility has its base in the National Environmental Policy Act of 1969 which required that environmental considerations be taken into account in decision making in all federal activities (30:4). Department of Defense directives and Air Force regulations have further defined and extended this legal responsibility. Consequently, the Air Force is now required to perform an initial impact assessment for all proposed actions or activities. If the initial impact assessment determines that there is an impact, then an environmental impact analysis is made to determine what the actual impact will be. For proposed actions of major consequence, such as base closures, mission changes, unit realignments or moves, and major construction projects, the entire impact analysis process and environmental impact statement process has to be completed before the proposed action can be taken (33:7-8). This analysis and statement not only must comply with

requirements of the NEPA and Air Force regulations, it also must be an accurate and thorough statement of the expected environmental impact.

There are two very important reasons that justify the Air Force need for a thorough and accurate impact analysis. The first reason is to provide all the necessary information to the appropriate Air Force decision maker to enable him to make a valid and timely decision regarding the proposed action. The second reason is to provide information to the public about the proposed action, the probable impacts of that action, and to give the public an opportunity to raise questions and seek answers concerning the proposed action and probable impacts upon their community. The Air Force needs to conduct the environmental impact analysis process in a timely manner if these objectives are to be achieved. Thus, the TAB A-1 Environmental Narrative was expanded in 1975 to become a large and readily available environmental data base to be used for the conduct of impact analyses and the preparation of Environmental Impact Statements. In addition, the Handbook for Environmental Impact Analysis was published in 1976 to provide an expeditious means to conduct the analyses and to prepare the impact statement.

The aim of the proposed research is to analyze the baseline data which can be utilized in the environmental impact analysis process for a base closure. The proposed

research will endeavor to determine if a thorough and accurate impact analysis and impact statement can be achieved using the handbook guidelines and the TAB A-1 Environmental Narrative as the primary data base. If it can be shown that the TAB A-1 and the handbook can be applied to produce an accurate impact analysis and statement, considerable benefits would be derived. First, extensive outside data collection would not be required, resulting in a savings of both time and money during the analysis process. The result would be an impact analysis that could be prepared earlier, at a lower cost and which would enable a timely decision regarding the proposed action. Second, a thorough and accurate analysis that is available when it is needed would enhance the Air Force planning capability, and subsequently provide the decision makers with a better understanding of the primary and alternative courses of proposed actions (44). Third, the Air Force and the public would have a greater opportunity not only to review the probable impacts and possible adverse effects of the proposed action, but also to plan actions that will either reduce or turn adverse effects into benefits for the surrounding communities. Finally, the overall benefit to the Air Force would be better mission accomplishment at a lower cost of time, money, and manpower in determining the environmental impacts of a proposed action.

Scope

The proposed research will be limited to analyzing the baseline data required for an Environmental Impact Statement. To establish a perspective for the research, it will be hypothetically proposed that Wright-Patterson AFB, Ohio, will be closed. The baseline data to be analyzed will be limited to the current TAB A-1 Environmental Narrative of Wright-Patterson AFB. The Handbook for Environmental Impact Analysis will be the primary information source of guidelines for identifying the factors to be considered in an impact analysis. While the intent of the research is to analyze the initial phase of the environmental impact analysis process for a hypothetical base closure, time and manpower limitations may restrict the analysis.

Objectives

The proposed research has the following objectives:

1. To determine what activities and attributes are required for the preparation of an Environmental Impact Statement for a base closure.

2. To determine if the Handbook for Environmental Impact Analysis identifies the activities and attributes which reflect the impact of a base closure.

3. To determine if the data in the TAB A-1 Environmental Narrative can provide the information which is

required in the preparation of an Environmental Impact Statement for a base closure.

Research Questions

1. Does the Handbook for Environmental Impact Analysis provide a user with the guidelines necessary for the preparation of an Environmental Impact Statement for a base closure?

2. Does the TAB A-1 Environmental Narrative provide the data base necessary for the preparation of an Environmental Impact Statement for a base closure?

CHAPTER II

METHODOLOGY

The research on the environmental impact analysis process was based on the hypothetical closure of an Air Force base. The base selected was Wright-Patterson AFB, a major installation located in the metropolitan area of Dayton, Ohio. Wright-Patterson AFB was selected for the research study for two reasons. First, information concerning the base and the surrounding area was available for the research. Second, updated information for the TAB A-1 Environmental Narrative of the base was readily available during the research effort. The purpose of the hypothetical closure was to establish a perspective from which to analyze the baseline data required for the environmental impact analysis process.

Research Approach

The research was divided into two distinct phases. The first phase of the research included the identification of Air Force activities that directly or indirectly caused environmental impacts. This phase of the research also included the identification of the environmental attributes which described the effect of a particular Air Force activity on the environment. Emphasis was placed on

identifying activities and attributes related to base closure actions.

In the second phase of the proposed research, the Air Force activities and the environmental attributes identified in the first phase were applied to the hypothetical closure of Wright-Patterson AFB. These activities and attributes were analyzed based upon the TAB A-1 Environmental Narrative of Wright-Patterson AFB. The emphasis of this phase was the analysis of the ability of the TAB A-1 to provide data to determine the environmental impact of an activity and to describe the effect on the environmental attributes of that activity.

Definition of Key Terms

A definition of the key terms utilized in the research is necessary in order to provide a basis for understanding the data and the environmental impact analysis process.

Environmental Impact Analysis Process (EIAP). The EIAP quantifies the environmental effects of a proposed action and its alternatives.

> The EIAP is conducted to determine if an action (1) will have or could have a significant environmental impact through comparative quantification of change and (2) involves or is likely to create public controversy [35:9].

The initial objective of the EIAP is ". . . to pinpoint environmental attributes that require further study, or to

ascertain that no additional study is required [35:9]." If the initial study concludes there will be no significant environmental impact or no public controversy due to the proposed action, then a Negative Determination (ND) can be made and no additional study is required. However, if the initial study concludes there will be an environmental impact or public controversy, then the analysis process will continue with the Candidate Environmental Impact Statement, followed by the Draft Environmental Impact Statement, and ending with the Final Environmental Impact Statement. If at any step it can be determined there will be no adverse effects associated with the proposed action, a ND may be made by the decision maker which would halt further study and permit the proposed action to proceed. Overall, ". . . the environmental impact analysis is a process used to discover and quantify portentially significant impacts . . . [35:9]" on the environment.

Attribute. An attribute is a description of a unique portion of the environment. A change in an attribute indicates that a change in the environment has occurred. Table 1 is a list of attributes contained in the Handbook for Environmental Impact Analysis (36:D-2). To specify an attribute the environment is divided into the major categories of the natural environment and the human environment. The two major categories of the environment are further subdivided into a total of ten subcategories called

TABLE 1

ENVIRONMENTAL ATTRIBUTE LISTING (35:18)

Major Category	TAB A-1 AFERN	Subcategory	No.	Attribute
Natural Environment	3.1	Earth Characteristics	1	Erosion
	3.2	Water Characteristics	2	Aquifer Safe Yield
			3	Flow Variation
			4	Oil
			5	Radioactivity
			6	Suspended Solids
			7	Thermal Pollution
			8	Acid and Alkali
			9	Biochemical Oxygen Demand
			10	Dissolved Oxygen (DO)
			11	Dissolved Solids
			12	Nutrients
			13	Toxic Compounds
			14	Aquatic Life
			15	Fecal Coliform
	3.3	Air Characteristics	16	Diffusion Factor
			17	Particulates
			18	Sulphur Oxides
			19	Hydrocarbons
			20	Nitrogen Oxides
			21	Carbon Monoxide
			22	Photochemical Oxidants
			23	Hazardous Toxicants
			24	Odors
	3.4	Biotic Environment (Plants, Animals) Characteristics	25	Natural Land Vegetation
			26	Aquatic Plants
			27	Field Crops
			28	Threatened and Endangered Species
			29	Large Animals
			30	Predatory Birds
			31	Small Game and Song Birds
			32	Fish, Shellfish, and Waterfowl
	3.5	Resources Characteristics	33	Fuel Resources
			34	Nonfuel Resources
	3.7	Natural Hazards Characteristics	35	Natural Hazards
Human Environment	4.1	Demographic Characteristics	36	Psychological Needs
			37	Physiological Systems
	4.2	Economic Characteristics	38	Regional Economic Stability
			39	Public Sector Revenue
			40	Per Capita Consumption
	4.3	Institutional Characteristics	41	Life Styles
			42	Community Needs
	4.4	Activity Systems And Plans	43	Land-Use Patterns
			44	Aesthetics
			45	Physiological Effects (Sound)
			46	Psychological Effects (Sound)
			47	Communications Effects (Sound)
			48	Performance Effects (Sound)
			49	Social Behavior Effects (Sound)

characteristics. Each characteristic is then divided into one or more specific attributes. The Air Force has identified a total of forty-nine environmental attributes. The attributes are described in detail in the Handbook for Environmental Impact Analysis (35:Appendix D).

Activity. An activity is defined as a specific action of the Air Force which is likely to have or cause an environmental impact. Activities may occur on a one-time only basis or they may occur on a continuing basis. The Air Force activities have been grouped into the following functional categories: (1) construction; (2) operation and maintenance; (3) training; (4) mission change; (5) real estate; (6) procurement; (7) industrial activities; (8) research, development, test and evaluation; and (9) administration and support (35:C-1). Appendix A contains a list of the Air Force activities under each functional category.

During the EIAP it may not be possible to isolate the impact of a single activity from one functional category because that activity has an effect upon another activity in a different category. Consequently, each functional category must be reviewed even though the overall planned or proposed action relates primarily to only one functional category. For example, a proposed action in the construction category is very likely to have an effect upon

related activities in the operation and maintenance, and the procurement categories.

Significant Impact. The CEQ "Preparation of Environmental Impact Statements: Guidelines" defines an activity that has a significant impact as an activity

> . . . that significantly affects the quality of the human environment either by directly affecting human beings or by indirectly affecting human beings through adverse affects on the environment [18:20552].

The CEQ states that the term significant is intended to imply a threshold of importance and impact that must be met before an EIS is required (18:20552). The determination that an activity has a significant impact is a subjective judgement based upon the time and place of that activity. In this research, the term significant impact denoted that a particular activity in the literature review was determined to constitute a significant impact by the author(s) of that literature.

Data Collection

The data collection required for the research effort was carried out in two areas. The first area involved identifying the Air Force activities and the environmental attributes that are related to base closures. A literature search was made to identify the activities that have historically caused impacts and to identify the attributes affected by those activities. The literature reviewed was previous Environmental Impact Statements

with associated background studies, base closure theses, interviews with experts in the environmental field, and public hearings and court cases concerning Air Force closure activities. The Handbook for Environmental Impact Analysis was a source for the identification of possible activities and their related attributes which might have an impact.

The second area of data collection was restricted to resources available at Wright-Patterson AFB. The primary source of data was the current copy of the TAB A-1 Environmental Narrative of Wright-Patterson AFB dated December 1, 1976. The remaining sources of data were interviews with Environmental Engineers from the Air Force Logistics Command and the Air Force Institute of Technology School of Civil Engineering.

Data Limitation

A limitation of the research effort was the time and capacity of the research team to investigate all possible sources of information that would indicate or specify which activities caused significant impacts. The cutoff date for literature reviewed was May 7, 1977.

Data Assumptions

The following assumptions were made about the data collected. The first assumption concerns the validity and currency of the Wright-Patterson AFB TAB A-1. The TAB A-1

was assumed to be a valid and reliable data source for the research even though the contained data was not current. The TAB A-1 socioeconomic data was based on information from numerous sources, including the Bureau of the Census, Miami Valley Regional Planning Commission, various departments of the State of Ohio, and government agencies from the counties and communities surrounding the base. The age of the data from these sources ranged from 1970 to 1976 depending upon the particular data source. While some of the data was several years old, it was the data that was used to compile the 1976 TAB A-1.

The second assumption concerns the validity of an activity that was identified as being related to or directly causing a significant environmental impact. If an activity was considered to have a significant impact on an environmental attribute in previous base closure literature, the assumption was made that the activity caused the same effect in this research. Aside from this assumption however, due to the variety of Air Force activities that occur, the wide range of base sizes, and the numerous locations of AF installations, an activity that may have had a significant impact at one base may not have had a significant impact at another base. An attempt was made to identify activities which were not significant in the case of Wright-Patterson AFB.

A third assumption was that all of the significant activities and related environmental attributes contained in the literature reviewed were identified. It is possible, due to time constraints or researcher error that a significant factor may have been overlooked. The available literature was thoroughly reviewed in an effort to insure that this did not occur.

Data Relevance

The relative importance of collected data was determined by the subjective judgement of either the person interviewed or the researchers. This was due to the subject matter under investigation and the volume of data reviewed. In addition, data which may have been relevant to another situation may not have been applicable to the hypothetical closure of Wright-Patterson AFB. It was also possible that while some activities may have had a significant impact that continues to exist in a community, the impact of other activities may have been alleviated or eliminated in a relatively short time span. Certain activities or attributes may have occurred many times in the literature with only a very minor impact, while others may have occurred only once and had a significant impact. The decision of whether or not to include an activity or attribute due to its relative impact in the hypothesized situation was therefore a subjective determination.

Data Analysis

The analysis of the data collected was separated into three phases. Each phase of the analysis was designed to achieve a research objective. The first phase of the analysis involved the development of a list of Air Force activities that have caused significant impacts in proposed or actual base closure actions, or in some cases, base mission changes. The environmental attributes affected by each activity were then identified. If there was no indication except that an activity had an impact, then it was assumed the impact had some significance.

The "Impact Identification Matrix" from the Handbook for Environmental Impact Analysis and the handbook itself was used as a guideline to identify an initial matrix of the activities and attributes for the hypothetical closure of Wright-Patterson AFB. This initial matrix served as a starting point for the research. An effort was made to verify each activity and attribute identified by its occurrence in the research data collected. This initial matrix was used as a basis of what to look for and lists of closure activities and attributes were prepared from items found in the research data. The two lists were updated continually during the data collection process so that they included all the activities and attributes found to be associated with a base closure. When the data collection process was completed, the two lists were representative

of the activities and attributes that should be considered in the preparation of an EIS for a base closure.

The second phase of the analysis consisted of a comparison of the closure lists of activities and attributes developed from the research data and the activities and attributes found in the "Impact Identification Matrix" of the handbook. If the closure activity list and the closure attribute list contained the same items as the "Impact Identification Matrix," then the guidelines in the handbook would have been considered to identify the appropriate activities and attributes that needed to be considered in an EIS for a base closure. If the "Impact Identification Matrix" was not as complete as the closure activity and closure attribute lists, then the handbook guidelines would not be considered to identify all the necessary activities and attributes for the preparation of an EIS for a base closure.

The final phase of the analysis consisted of applying the lists of closure activities and attributes to the impact analysis process of the hypothetical closure of Wright-Patterson AFB. The Wright-Patterson TAB A-1 Environmental Narrative was utilized as the data source for this impact analysis. The TAB A-1 was reviewed to determine if it contained data related to each activity and attribute identified in the two closure lists. The TAB A-1 data also was investigated to ascertain if the data was in a

useful form for the preparation of an EIS for a base closure. Data was considered to be in a useful form if it enabled a quantitative or qualitative description of the change in an attribute as a result of the base closure. If the TAB A-1 contained the data required and was in a useful form, then the TAB A-1 could be considered to be a data base from which a user could prepare an EIS for a base closure. Therefore, the TAB A-1 would be a satisfactory data base for Environmental Impact Statements. Conversely, if the data was not present or was not in a useful form, then the TAB A-1 could not be considered to provide the data necessary for the preparation of an EIS for a base closure. Thus, the TAB A-1 would not be a satisfactory data base for Environmental Impact Statements.

CHAPTER III

DATA COLLECTION AND ANALYSIS

The first area of data collection included the identification of Air Force activities and environmental attributes related to base closures. This data will be presented first, along with the first and second data analysis phases specified in Chapter II, Methodology. Following this, the data collected from the analysis of the Wright-Patterson AFB TAB A-1 Environmental Narrative will be presented and discussed.

Activities and Environmental Attributes

Initial Impact Identification Matrix

A starting point was established by applying the Handbook for Environmental Impact Analysis to identify the possible Air Force activities that would occur in a base closure. The activities listed in Appendix A were reviewed and those believed to be applicable to the base closure action were selected. An activity was applicable if it would either cease to be performed or begin to be performed because of the base closure action. The initial list of activities was fairly extensive and composed of activities from throughout seven of the nine major functional categories defined by the handbook. The majority of the

activities were from the four categories of Operation and Maintenance, Mission Change, Procurement, and Administration and Support.

The next step in applying the handbook was the identification of the possible environmental attributes that would be affected by an activity already identified. This was accomplished through the use of the "Environmental Attribute Descriptor Package," Appendix D of the Handbook (35:Appendix D). This appendix defined each attribute and identified the activities that affect that attribute. The appropriate square was blackened on the Impact Identification Matrix when an activity already selected to cause an impact was found to affect an attribute (35:Appendix E). The end result of applying the handbook was the development of an Initial Impact Identification Matrix. This matrix is presented in Appendix B.

Activities and Attributes Identified in the Literature Review

The next step accomplished in the data collection process was the review of literature concerning base closures. The emphasis in this review process was to determine the activities that have historically caused impacts and to identify the attributes affected by those activities. Comments related to each data source of the literature reviewed are in Appendix C. The literature reviewed occurred in two general categories, those data

sources pertaining to Environmental Impact Statements on base closure actions and those pertaining to general environmental studies on base closures. In addition, personal and telephone interviews were conducted with Air Force personnel involved with environmental analyses and statements. The result of the literature review was a list of closure activities and attributes compiled from those data sources.

Activities. The literature sources did not indicate or refer to specific activities that would be carried out by the Air Force in a base closure. Rather, the activities were addressed in broad terms such as the reduction in personnel strength, reduction in procurements, and cessation of aircraft flying at the base. As a result, the activities were classified into seven broad categories. These categories of activities were Facilities, Utilities, Procurement, Aircraft Numbers, Transportation, Personnel Strength, and Services. The activities occurred primarily in terms of a change in use of the major activity category. For example, a base closure would result in a change of use of facilities such as buildings and housing, land use, and other structures (such as telephone poles). Likewise, a change in personnel strength would be a change in military, civilian (civil service) and nonappropriated fund employees. As a result, it was possible to identify under each major

activity category, other more specific activities that occurred. The end result of the literature review and interviews was the development of the list of closure activities presented in Table 2.

Attributes. The literature sources primarily commented on or made reference to what the base closure impacts would be or where they would occur in the environment. In the natural environment, base closures impacted on the earth, water, air, and other major subcategories as listed in Table 1. In almost all instances the literature sources, as summarized in Appendix C, referred to the impacts on the natural environment as being beneficial or positive. For example, the Final Environmental Impact Statement on Kincheloe AFB, Michigan, stated the ". . . natural environment should improve as a result of the termination of airport operations [34:iii]." Also, only short-term adverse impacts on the natural environment would result from the non-routine activities during the relocation of HQ AFCS (39:85-91).

The literature sources reference to impacts on the human environment was quite extensive. The specific references, however, were essentially all part of the socioeconomic factors of the environment. The overall attributes such as regional economic stability, public sector revenue, community needs and life styles were

TABLE 2

CLOSURE ACTIVITIES[1]

Activity Category	Activities
1. Facilities, Change in Use of	Buildings and Housing Land Use Structures (i.e., telephone poles)
2. Utilities, Change in Production, Procurement or Disposition of	Electric Water Sewage Natural Gas, Fuel Oil, Coal Refuse - residential business manufacturing
3. Procurement, Change in	Construction Contracts Supplies Services
4. Aircraft, Change in Numbers of	Traffic Control Airspace Flight Path (Air Installation Compatible Use Zone) Emissions
5. Transportation, Change in	Modes Carriers

[1]Compiled from the literature in Appendix C.

TABLE 2--Continued

Activity Category	Activities
6. Personnel Strength, Change in	Military Civilian (Civil Service) Non-Appropriated Fund
7. Services, Change in	Hospital Legal Commissary Base Exchange Outdoor and Indoor Recreation Police Protection Fire Protection Library Veterinarian Historical Religious Snow Removal Communication (Postal Service, Newspaper, Telephone, Radio/TV)

identified from the total socioeconomic impacts presented in each data source. The individual descriptors stated most often were education, unemployment, housing, and local revenues. These descriptors by themselves did not describe the impact of a particular activity, but together they formed an overall or composite picture of the impact. As a result, the descriptors were very important in determining the environmental attributes that reflected the impact of a base closure. The closure attributes and descriptors are presented in Table 3.

The descriptors were part of the socioeconomic factors of the environment. As such, information on a descriptor helped to explain the impact of a base closure on an attribute. Likewise, each descriptor was composed of a number of factors that explained or clarified that descriptor. The human environment descriptors identified in the literature are presented in Table 4. An explanation of each of the descriptors and its factors is in Appendix D.

The distinction between the closure activities and closure attributes was difficult to assess as the activities and attributes seemed to be intertwined in the literature. In order to get a good perspective it was necessary to use the idea of cause and effect. Activities were associated with causes and attributes were associated with effects. Very often in the literature, the effects on a specific attribute were discussed but were not tied back

TABLE 3

CLOSURE ATTRIBUTES AND DESCRIPTORS[1]

Major Category	Subcategory	Attribute	Descriptor
Natural Environment	Earth	See Table 1, Attribute 1	Erosion; Susceptibility of Soil
			Solid Waste Disposal
	Water	See Table 1, Attributes 2 thru 15	Quantity and Source of Water Used
			Quantity of Sewage and Industrial Waste Generated
			Storm Drainage Characteristics
			Effluent Disposal Method and Capacity
			Effluent Quality if Treated
			Plans for New or Expansion Facilities
	Air	See Table 1 Attributes 16 thru 24	Air Pollutant Sources
			Type and Quantity of Base Generated Pollutants
			Type and Quantity of Local Area Generated Pollutants
			Area Meteorological Conditions

[1]Compiled from the literature in Appendix C.

TABLE 3--Continued

Major Category	Subcategory	Attribute	Descriptor
Natural Environment (continued)	Biotic	See Table 1 Attributes 25 thru 32	Base Land Use
	Noise	See Table 1 Attributes 45 thru 49	Aircraft Types
			Aircraft Operations
			Aircraft Noise Levels and Noise Contours
			Noise Levels in Housing and Business Areas Around the Base
			Motor Vehicle Noise Level
			Construction Noise Level
Human Environment	Economic	Regional Economic Stability	Population
			Unemployment
			Housing Market
			Education
			Retail Sales
			Local Transportation

TABLE 3--Continued

Major Category	Subcategory	Attribute	Descriptor
Human Environment (continued)	Economic (continued)	Regional Economic Stability (continued)	Financial Institutions
			Utilities
		Public Sector Revenues	Public Facility Revenues
			Public Utility Revenues
			Tax Revenues
			Miscellaneous Revenues
	Activity Systems and Plans	Land Use Patterns	Zoning Restrictions
			Airport Facilities
			Transportation
	Institutional	Community Needs and Life Styles	Community Services and Facilities
			Government Structure
			Base Facilities

TABLE 4

HUMAN ENVIRONMENT DESCRIPTOR FACTORS

Attribute	Descriptor	Factors
Regional Economic Stability	Population	Number of military personnel
		Number of civilian employees
		Number of nonappropriated employees
		Employee age and years of service
		Employee family size
		Population breakdown by village, township, community, or defined areas of large cities
	Unemployment	Number of employees
		Other federal job opportunities
		Employee education level, skills, and prior occupation
		Prevailing local economy and labor market
		Unemployment rate

TABLE 4--Continued

Attribute	Descriptor	Factors
Regional Economic Stability (continued)	Housing Market	Number of personnel who own and who rent
		Vacancy rate of owned and rental units
		Number of personnel in on-base quarters
		Average home value and land value
		Construction activity, both owner and rental units
		Mortgage foreclosure rate
		Real Estate business volume
	Education	Enrollment in school district, by school, both public and private
		Air Force (military and civilian) dependent enrollment, number and percent of total enrollment
		Capacity of schools
		School system revenues from PL81-874 funds, amount and percent of total

TABLE 4--Continued

Attribute	Descriptor	Factors
Regional Economic Stability (continued)	Retail Sales	Total income of personnel
		Local establishments such as motels, automobile dealers, tailors, laundries, restaurants, and others
		Number of common carriers
		Base exchange concessions such as barber shop, florist, laundry and dry cleaners, shoe repair shop and others
		Procurements in the local community for supplies, services, equipment and contracts for construction and other activities
	Local Transportation	Mass (rapid) transit system
		Private automobiles
		Transportation network
	Financial Institutions	Banks, savings deposits and other accounts
		Savings and loan companies, home and other type loans
		Mortgage companies
		Credit Unions

TABLE 4--Continued

Attribute	Descriptor	Factors
Regional Economic Stability (continued)	Utilities	Water service
		Sewage service
		Refuse collection service
		Telephone service
		Energy services of natural gas, electricity, coal and liquid fuel/fuel oil
Public Sector Revenue	Public Facility Revenues	Community owned and operated recreational facilities
		Museums, historical sites, or other possible facilities
	Public Utility Revenues	Community owned and operated services such as under the utilities descriptor
	Tax Revenues	State and Local income taxes
		State and Local sales taxes
		Personal property taxes
		Gasoline tax reimbursements
		Real Estate/Property taxes

TABLE 4--Continued

Attribute	Descriptor	Factors
Public Sector Revenue (continued)	Miscellaneous Revenues	Revenue sharing funds
		State and Federal subventions
		Licenses, permits and fines
Land Use Patterns	Zoning Restrictions	Residential land use
		Commercial/Industrial land use
		Agricultural land use
	Airport Facilities	Zoning restrictions
		Noise
	Transportation	Transportation networks affect on land use patterns
Community Needs and Life Styles	Community Services and Facilities	Medical care by hospitals, clinics, and local health agencies
		Charity support by the base
		Mutual aid agreements
		Recreational facilities
		Quality and quantity of utility services

TABLE 4--Continued

Attributes	Descriptor	Factors
Community Needs and Life Styles (continued)	Government Structure	Local government bodies and political relationships
	Base Facilities	Base lands
		Description of facilities
		Number, types, uses and condition of buildings

to an activity. For example, unemployment would be addressed without stating its cause or causes. In addition, activities such as change in personnel strength could affect each of the human or socioeconomic environmental attributes. This meant that a direct correlation could not be made in most cases between activities and their attributes, or vice versa.

In spite of the problems mentioned above, the seven activity categories were considered representative of the activities performed by the Air Force in a base closure action. Likewise, the attributes and descriptors were considered to portray or describe a unique portion of the environment. Therefore, the combined result of the changes in the descriptors of an attribute will reflect the change in the environmental attribute that was caused by all the activities or the base closure action as a whole.

Comparison of the Closure Activities with the Initial Impact Identification Matrix

The comparison of the closure activities and attributes with the Initial Impact Identification Matrix provided a basis for evaluating the handbook guidelines. This comparison was done first for the activities and then for the attributes.

Activities. The Air Force activities list was much more detailed and specific than the closure activities list

developed from the literature data sources. Of the specific activities on the closure list, all were contained in one form or another on the handbook list. The difference in the closure list and the handbook list was due to the point-of-view or orientation of the lists. The handbook list was oriented toward the types of activities that are currently performed or carried out by the Air Force. The closure list on the other hand, was orientated toward the major types of activities that occurred in a base closure. In this regard, the handbook provided a more complete list of identified activities than did the literature data sources. However, the closure list was built from data on past experience while the handbook list was developed from the handbook and based upon researcher judgement and experience.

Attributes. The closure attribute list developed from the literature data sources compared both favorably and unfavorably with the identified handbook attributes. The closure list and the handbook list of attributes were very nearly the same for the natural environment. The difference occurred in that the literature discussed the impact in terms of the overall affect on a subcategory such as water, air and biotic, rather than on specific attributes of that subcategory. In the base closure environmental impact statements for example, the individual water,

air and biotic attributes were discussed fully. However, the impact of the closure was still presented relative to the subcategory and not the individual attributes. Overall, the handbook and closure list of attributes for the natural environment agreed with each other.

The human environment attributes identified in the literature compared unfavorably with the handbook attributes. Only six socioeconomic attributes were identified in the literature compared to fourteen in the handbook. The closure list was believed to be more comprehensive, however, in describing a base closure. A number of descriptors were found for each of the attributes in the literature. The literature, in most cases, described the base closure impacts in terms of those descriptors, rather than the attributes. For example, an impact was more meaningful when described in terms such as population and unemployment than if it had been described in terms of the regional economic stability. The descriptors thus associated with each attribute provided the clarity and understanding of the impact of a base closure on an attribute. The handbook attributes in the Initial Impact Identification Matrix were all identified as being affected. However, the factors that contributed to establishing the meaning of the attributes were not readily discernible. For example, the attribute of regional economic stability was very complex and involved. It required that a number of factors and

other attributes be taken into consideration in determining the impact of a closure on this one attribute. This same statement could be made about each of the other attributes. As a result, the closure attributes list for the human environment was better than that obtained from the handbook.

TAB A-1 Environmental Narrative Analysis

The third phase of the data collection and analysis centered on the Wright-Patterson AFB TAB A-1 Environmental Narrative. In this phase, the TAB A-1 was analyzed only in terms of the attribute descriptors previously established. This was done for two reasons. First, since no direct correlation between activities and specific attributes could be established in the literature, it was considered to be impractical to analyze the TAB A-1 in terms of activities. Second, and most important, the intent of the TAB A-1 analysis was only to determine if the TAB A-1 contained the data necessary to describe and provide information for a base closure. The analysis was conducted for each attribute by looking at its descriptors. The table of contents of the Wright-Patterson AFB TAB A-1 Environmental Narrative is Appendix E. This table of contents includes the Air Force Environmental Reference Numbers (AFERN) for each subject item.

Analysis of Natural Environment

Earth. The TAB A-1 provided information on the productivity of the soil, a description of the soil on the base, resistance to erosion, and vegetation cover. The base operates a sanitary land fill with a life expectancy through 1977 and also contracts for solid waste disposal off base. Although the amount of solid waste disposed of on base was specified, the amount disposed of off base by a contractor and its method of disposal were not specified (38:272). Therefore, the total solid waste generated by all areas of the base or the effect on the off base site or contractor could not be ascertained if the disposal via the contractor were discontinued due to a base closure.

Water. The TAB A-1 discussed the source and quantity of water used by the base. Six percent of the water utilized was said to be purchased off base, but no source of the purchase was provided (38:263).

The amount of sewage generated by the base was specified, but a breakdown of the split between the two different processors only stated that one processor handled less than ten percent (38:3,264). The capacity or volume of effluent treated at the two treatment facilities was not specified. Therefore it wouldn't be possible to determine an impact on the facilities if the flow were curtailed.

A study to investigate diverting sewage from one system to another was mentioned but no details were provided. Therefore, possible planned capital expenditures could not be ascertained.

Air. The TAB A-1 identified the major contributors to air pollution and the types and quantities of pollutants generated on base and in the local area. Although the base and area emissions were specified, they were provided in different measurement scales (i.e., 103 kg/year versus tons/year). The data periods were also different, the area data was for 1970-72 and the Wright-Patterson data for 1974 (38:26-27). It is not known if the dated data would affect a closure analysis.

Biotic. The TAB A-1 adequately identified the use of base lands.

Noise. The TAB A-1 provided information on the number and type of aircraft as of 30 September 1976 (38:13). This did not agree with the number and type of aircraft in the Air Installation Compatible Use Zone (AICUZ) Study, TAB A-1, Attachment 3, dated May 1975. Consequently, the percent of operations by aircraft type and the noise contours in the AICUZ Study were not accurate, and noise levels due to aircraft operations could not be determined (38: AICUZ:III-4). Highway traffic volumes were specified but

noise levels were not. Construction projects were listed in the AICUZ Study, but their relevancy is questionable since the material is two years old. However, current construction projects were listed in the TAB A-1 (38:201-204).

Analysis of Human Environment

Population. The TAB A-1 contained fairly extensive data regarding the base and region of influence (ROI) population. The ROI data was based upon 1970 census data from the U.S. Bureau of the Census. To be useful, this ROI population data should be updated with information from the Miami Valley Regional Planning Commission (MVRPC) or the counties or cities to provide a more current picture of the ROI's population. Various discrepancies in the total number of military and civilian employees occurred in the data as shown below.

AFERN	NUMBER OF MILITARY	NUMBER OF CIVILIANS	SOURCE AND DATE OF DATA
4.1.1.2	17,042 (including dependents)	16,255 (excluding overhires)	PCN N114007 June 30, 1976
4.1.2	7,594	16,280	1970 Census
4.1.5	5,911	16,374	Military: PCN N130050WE, October 1976 Civilian: BLIS PCN114007, November 1976

AFERN	NUMBER OF MILITARY	NUMBER OF CIVILIANS	SOURCE AND DATE OF DATA
4.1.6	6,836	15,711	Military: PCN N13005OWE, October 1976
4.2.2.2.1	8,153	16,786	PCN N114007, November 3, 1976

The difference in the data was likely due to the different dates and sources of the data. The median family size was given by county and community and was based on the 1970 census. There was no reference to the medium size of the military family. In addition, the population distribution by age and sex included dependents in the military totals but not in the civilian totals. Then, in the ethnic/racial distribution data, the column for civilians read ". . . and their families [38:70]," but the total number in the column was based upon employees only. There was no data on the number of years of service for either the military or civilian employees (38:67-73,76).

The breakdown of employees according to their residence was by county and zip code first and by community name second (38:181-184). No distinction was made between which of the communities were cities, townships, or geographical areas of the county located outside of the City of Dayton. A prime example is zip code 45433, Wright-Patterson AFB, which was listed under the community column as Dayton. Wright-Patterson is not in the City of Dayton. Likewise, zip code 45431 is predominantly in

Greene County even though it has a Dayton postal area zip code. A third example is the geographical area of Huber Heights and zip code 45424. Huber Heights is an area in Wayne Township which is only a portion of zip code 45424. Mad River Township is also in the 45424 zip code. A more definitive breakdown of where people live is needed, including a map that shows the cities, townships, and other community areas as well as the present zip code map.

The final category of employee information was the organizational breakdown which provided the number and payroll for each grade/rank level of each base organization. This category essentially only provided the total number of employees and total payroll of an organization (38:79-41). For this information to be useful, it should include a breakdown by residence.

Unemployment. The TAB A-1 contained information about the unemployment rate for each county, the state of Ohio and the nation as of August, 1976. Trend information was provided by the unemployment rates for 1970, 1974 and 1975 (October). The employment potential was also discussed for two counties, but the information was based on 1970 data. The education level and occupations of employees were identified, but particular skills were not (38:71-75). Federal civilian employment by agency in the ROI was given for 1971 thru 1973; this was three or more

years old. Employment was part of the payroll revenues and establishments data. This data presented the number of establishments or firms, number of employees and payroll for each type of industry group based on the Standard Industry Codes (SIC). The data was primarily from 1972 sources, with some data based on 1973-74 and 1975 sources (38:185-192).

The information in the TAB A-1 regarding the unemployment descriptor was generally out-of-date with the exception of the unemployment rate, number of base employees and their education levels.

Housing Market. The TAB A-1 contained information on the number of military and civilian personnel who lived in off-base housing. The value of owner occupied housing was in increments of $5,000 and the number of military and civilian personnel in each increment was provided. This data was based on the 1976 Military Base Housing Survey. Also, the off-base housing information table included only those people who owned their own home. The number of military and civilian persons who rent and the value of the rent was in a separate table. Data on the above categories for the community/county in the ROI was based on the 1970 census. Vacancy trend information provided for the ROI by community/county was from the 1960 and 1970 census data on housing. There was no updated information in this area (38:205-209).

The summary of the community housing market appears current, however the summary by each county only contains data through 1973. The low and moderate income housing inventory was 1973 Department of Housing and Urban Development data compiled by the MVRPC. The housing summary stated that construction activity was still in the 1974-1975 building slump (38:210-214). Information on the real estate business was given as a type of industry in the payroll revenues and establishments section (38:186,189-191). No information was provided on the mortgage foreclosure rate in the ROI.

Military on-base housing occupancy was based on the 1976 Military Base Housing Survey. There was no breakdown of the base housing into the four main housing areas of Page Manor, Woodland Hills, Area A, and Kittyhawk Center (38:215).

The only current housing information was that from the 1976 Military Base Housing Survey. The civilian employee data was rounded to the nearest hundred and the rent data was estimated. The information on the overall housing market in the ROI was somewhat out-of-date, but the right kind of information was basically present.

Education. The TAB A-1 contained October 1976 data on public and private school enrollments. The public school data was by school district and the private school

data was by individual school. The number of dependent students of military and civilian personnel who attended school were obtained from the School District's application form for the school year. The number of civilian dependent students was based upon their parent(s) employment at Wright-Patterson AFB. The number of military dependent students was based upon the term "Uniformed Services," not upon the place of employment. Thus, the military dependent student count included those dependents remaining in the ROI while the military member was stationed elsewhere, such as on a remote tour. The rate of payment per student was given for each school district. The source of this data was a Department of HEW letter, October 29, 1976. There was no data provided on the number of dependent students in private schools. The capacity of the school districts was not given; however, enrollment declined for the Fairborn City system and the City of Dayton system from 1967 thru 1976. Consequently, the school systems are below full capacity. Information was also provided on the vocational schools, colleges, universities, and on-base education programs. There was no data on the percent of total school system funds provided by HEW through PL 81-874 or PL 81-815 (38:231-239).

The data on education was current and can be classified as good, useful information for a base closure.

Exceptions were the number of dependents in private schools was not given, and school district funding was not given.

Retail Sales. The TAB A-1 information on the total income of personnel was contained in the sections on population and employment. Income level data showed the number of military and civilian personnel in each income bracket, starting at the $5,000 to $10,000 bracket and incrementing by $5,000 until reaching $29,999. Income was also presented by total military payroll, total civilian payroll and by totals for each rank/grade of base employees (38:71-72, 76-78). This was October 1976 data.

Retail sales earnings was contained in the payroll revenues and establishments section. The amount of retail trade was given by the region in 1974; by the Springfield and Dayton Standard Metropolitan Statistical Areas in 1972, and by each county in 1972. The retail trade included Standard Industry Codes 52-59 for this data (38:186-191).

Base procurement information was provided for a number of categories, including supplies, utilities, food and various contracts. A dollar amount was not available for categories such as travel by personnel, transportation of things, communication and research. These figures were for Fiscal Year 1975. The $50 million that was purchased or awarded in the ROI out of the $79 million total for FY 1975 was an estimated figure. Locally awarded contracts for food, supplies and equipment, services and construction

totaled $67.6 million in FY 1976. The dollar value of construction projects in progress was included along with a list of in-progress and approved projects. The total of the base exchange and commissary purchases for resale was also included (38:200-204, 360).

Overall, the information on the retail sales descriptor was good as far as the total amounts by ROI, but the ROI data was for 1972 which is five years old. Although base procurement information was given, only half of the procurement categories had data and the total amount spent in the ROI was estimated for FY 1975 and 1976.

Local Transportation. The TAB A-1 contained data on the local transportation facilities and uses. A planned rapid transit system was discussed, including the proposed route and the progress made through 1975. The highway system serving the community was discussed. The peak traffic loads, number of vehicle trips by the base workforce, and total daily traffic count was specified (38:251). Daily traffic counts at the base gates and the total number of vehicles used by employees to get to work was specified. The various transportation methods by which employees traveled to work was broken out by military and civilian totals (38:250-253,255).

The transportation network and trends for the future were discussed. Major highway use in the surrounding area

and around the base was specified along with solutions used to control peak volumes of traffic and future highway plans. Bus, taxi and moving van services used by employees and base personnel was not specified. Truck traffic entering the base was not specicied. Airports were listed and the total amount of base-generated personnel traffic was specified. However, no mention was made of the total volume of aircraft passenger traffic handled or the amount of base-generated freight airlifted. The rail line serving the base was specified as were future expansion plans. The amount of rail business generated by the base was not specified (38:247-256).

Financial Institutions. The TAB A-1 contained very minimal information about financial institutions. The information was based on estimates from local banks, savings and loans, and credit unions in the ROI in October 1975. The payroll revenues and establishments section included 1974 and 1972 data on financial institutions as part of a group of related industries, SIC 60-67. The data gave the number of firms, the number of employees and the payroll for the SIC group. Specific data on financial institutions was not available. There was no information about mortgage companies. As a result, the data was basically too incomplete to provide good, useful information for a base closure study (38:186,189-191,199).

Utilities. The TAB A-1 contained fairly extensive data on the base utilities but none on community utilities. The following types of utilities were discussed.

1. Water Service. The TAB A-1 specified the water sources, treatment facilities, amount of water utilized, and the capacity of the system. The source and cost of water purchased off-base (approximately 6 percent) was not mentioned (38:257-263). This would prevent an analysis of the impact on the water supplier.

2. Sewage Service. The TAB A-1 stated that two sewage treatment facilities were utilized by the base, both of which were said to have reserve capacity. The total quantity of sewage treated was specified, however the quantities treated by each facility, cost of treatment, and the treatment facilities total volume/revenue were not specified (38:264-265). This would prevent an analysis of the impact on the treatment facilities as a result of a closure.

3. Refuse Services. The TAB A-1 specified the amount of solid waste disposed of on base in a sanitary land fill. The amount, method, and cost of the quantity disposed of off base was not specified (38:23,272). Therefore, the effect of discontinuing the service by the contractor could not be determined.

4. Telephone Service. Information on telephone service for the base was limited to a description of the

service provided by the 2046th Communications Group (38:11,272).

5. Natural Gas. The TAB A-1 provided information on the supplier, cost, consumption and planned use of natural gas. The percentage of the suppliers' total volume of business provided to the base was not specified (38:270).

6. Electric. The TAB A-1 provided information on the bases' annual maximum demand and consumption of electrical energy. No rate structure or percent of the sources capacity or business volume was found. The supplier was said to have ample reserve capacity (28:265-269).

7. Coal. The TAB A-1 stated that coal used to provide steam for heating was delivered by rail from Kentucky and West Virginia. The total quantity consumed was specified, but the supplier and his business volume was not (38:269-270). An assessment of the impact on the supplier in a base closure would therefore not be possible.

8. Fuel Oil. The consumption, source and volume of business were not specified. Although storage capacities for JP-4 and aviation gas were specified, the source and quantities were not specified. Centrally procured supplies could be purchased from the surrounding area, thereby affecting revenues (38:269-270).

Public Facility Revenues. The TAB A-1 contained very little data on revenues from public facilities. The

basic revenue sources for the region were identified as property taxes, shared taxes, charges for services, licenses, permits and sales taxes. The types of facilities from which revenues could possibly be generated were identified in the section on community services and facilities. These were cultural and recreational facilities; however, no information was provided about any revenues from these facilities (38:193-195,241-246).

Public Utility Revenues. The TAB A-1 contained very minimal data on revenues from public utilities. The only identified source was charges for public services by the cities of Dayton, Fairborn and Xenia for 1972. The specific services that generated the revenues were not identified. The TAB A-1 contained no information on civilian community utilities, although the on-base utilities specified the use of City of Dayton and Fairborn sewage services. The supplier of six percent of the base's water was not identified. The total amount the base spent for utilities in Fiscal Year 1975 was presented with the base procurement data. There was no breakout by the type of utility for which the expenses were incurred (38:193-195, 200,257).

Tax Revenues. The TAB A-1 contained data on state and local taxation. Included was information on income, sales, property, personal property and recordation and

transfer taxes. This information was on the tax rates for the various tax categories. The section on revenue sources included 1974 total receipts by county for real estate and sales taxes. City receipts for 1972 included property taxes, shared taxes, intergovernmental revenues, and other revenues (38:193-195).

The data on tax revenues did not provide very current or consistent information about the revenues generated by taxation in the ROI. The rates of taxation were of value only for comparison purposes. The data provided somewhat of an overall picture of taxation in the ROI.

Miscellaneous Revenues. Information on revenue sharing and subventions was contained in the section on revenue sources. Total 1974 receipts by county was presented for revenue sharing, state aid and school fund aid. Data on shared taxes and intergovernmental revenues for 1972 city receipts was also presented. There was no information on the makeup of intergovernmental revenues. Additional revenues were generated by vehicle licenses, permits and fines. As in the other public revenue descriptors, the data is inconsistent in terms of the age and categories of the data (38:195).

Zoning Restrictions. The TAB A-1 discussed the residential, commercial/industrial, and agricultural land use in the three county area surrounding the base.

Residential development has been discouraged in the aircraft approach zones and in the flood plain areas surrounding the base. Urban pressure on the base has increased as the amount of agricultural land converted to residential or commercial use increased. The TAB A-1 has a good discussion on land use, however there are no maps that show the actual zoning areas around the base (38:220-224,273,288,308-315).

Airport Facilities. An airport zoning regulation for the three county area surrounding the base permits the county commissioner to adopt, administer and enforce restrictions on land use in the approach zone area. AICUZ efforts in zoning have tended to place restrictions on urban development. Future plans were also discussed in the TAB A-1 (38:220-224,315,327,AICUZ).

Transportation. The TAB A-1 discussed local industries and business trends. Future developments such as a mass transit system and expressways were also discussed as were the current transportation networks affecting the area (38:74,216,253).

Community Services and Facilities. The TAB A-1 contained current data on the community services and facilities. The hospitals in the ROI and their capacity in terms of number of beds was presented as of October 1976. No information was provided on medical clinics in the ROI.

Local health agencies were included in the list of social service agencies of each county. This list was based on the community telephone directory and may not be totally accurate. Information about on-base medical care was extensive, including usage rates by the number of out-patient visits per month for both retired and activity duty military and dependents. Charity support by the base and base organizations was presented for the years 1972 thru 1976. Mutual aid agreements for police and fire protection were identified. The TAB A-1 included a general discussion of the cultural, social and service clubs and recreational facilities provided by the base and by the civilian communities. There was no information on the quality or quantity of the utility services provided to the community. Information on the quantity of the services provided the base was contained in the utilities descriptor and the natural environment subcategory descriptors (38:198,240-246).

Government Structure. The TAB A-1 contained a fairly extensive discussion of the local governments contiguous to the base. Included in the discussion was the relationship between the various local governments and the planning functions performed by those governments. Also presented was state and local land-use legislation and regulations. In addition, mayors and managers of the cities, special interest groups and the U.S., State and County politicians

were identified by their political office. The list was based upon the persons who received an Air Installation Compatible Use Zone orientation in May, 1975 (38:218-230).

The discussion on the local governments would be enhanced by a map of the area showing the relationship of the base to the various communities. Also, more information should be provided on the role and function of the Miami Valley Regional Planning Commission.

Base Facilities. The TAB A-1 contained a good description of the on-base facilities. Information was presented on the primary installation which included the acreage and gross square foot area of all buildings. The facilities were discussed in terms of mission, personnel and special use facilities. The specific number, types, use and condition of the facilities or buildings was not presented. The reference for this kind of information was presented, but it was hidden with the other reference sources for this TAB A-1 section. A specific reference needs to be included, showing what and where this information can be obtained. The base utility system was discussed fully under the utilities descriptor. Overall, the TAB A-1 data on the base facilities was good (38:316-324).

CHAPTER IV

CONCLUSIONS AND RECOMMENDATIONS

Research Question Number One

The first research question was whether or not the Handbook for Environmental Impact Analysis could provide a user with the guidelines necessary for the preparation of an EIS for a base closure. To answer this question there were two objectives: to determine what activities and attributes were required for an EIS for a base closure and then to determine if the handbook identified those activities and attributes.

A comparison of the activities developed from the literature search (Table 2) and the activities found in the handbook (Appendices A and B) indicated that the handbook activities were quite extensive and related to the activities developed. A comparison of the attributes developed from the literature and those in the handbook resulted in a different conclusion. The attributes in the handbook were quite extensive in the natural environment category and related to those found in the literature. However, there was no attribute under the subcategory earth which covered solid waste disposal by sanitary land fill. Also, the attributes were mostly concerned with the measurement

of the quality and quantity of the attribute itself, rather than the identification of the sources contributing to the quality and quantity of the attribute.

In the human environment category, the handbook did not break down the attributes into sufficient detail to provide guidance in determining the impact of a closure on the socioeconomic area (Table 1 versus Table 3). Several additional areas were found in the literature for a base closure that were not readily apparent in the handbook. For instance, under Regional Economic Stability the recurring areas of unemployment, housing, education and retail sales should be described separately in order to fully explain their effect on Regional Economic Stability. As a result of the "Impact Identification Matrix" not being as complete as the closure attribute and descriptor list, the handbook guidelines were not considered to identify all the necessary activities and attributes for the preparation of an EIS for a base closure. Therefore, the handbook does not provide a user with the guidelines necessary for the preparation of an EIS for a base closure.

Research Question Number Two

The second research question was whether or not the TAB A-1 Environmental Narrative provides the data base necessary for the preparation of an EIS for a base closure. This was tested by applying the closure

attributes and descriptors which were developed to the data provided in the TAB A-1 for Wright-Patterson AFB, Ohio. In general, the TAB A-1 itself contains the topic or subject areas which need to be covered in a base closure analysis. A review of the actual contents of the TAB A-1 for Wright-Patterson AFB, however, revealed discrepancies in the amount of data presented. For instance, looking at the quantitative area of economic impact, there are many facts which have to be known. As an example, assume that water service for the base is being analyzed. The following data would be needed for a proper analysis:

1. How much water is used by the base.
2. The capacity of the base system (average, maximum, minimum).
3. The capacity of the supplier's system (average, maximum).
4. The cost of water services purchased.
5. The volume or percent of the supplier's business represented by the base.
6. Past water service trends.
7. Future plans or projects, both on and off base.

Data should also be presented for the same time period and it should be as current as possible. The TAB A-1 did not contain information concerning the capacity of the supplier's system, the cost of the water service, the

percent of the supplier's business represented by the base or any information or trends on future plans.

Another example is found in the educational area. In order to analyze the effects of a base closure on the surrounding communities' school systems, the following data is required:

1. The total number of students enrolled in each school district in the region of influence (ROI).

2. The total number of students of military personnel living off base enrolled in each school district in the ROI.

3. The total number of students of base civilian employees enrolled in each school district in the ROI.

4. The total number of students of military personnel living on base enrolled in each school district in the ROI.

5. The PL 81-874/81-815 payment per student to the school districts for each category of student above.

6. The total school funding per year for each school district.

7. Historical enrollment figures to identify trends.

8. A breakdown of students by school in the districts immediately surrounding the base and for any district in which there is a large population of military dependent students.

9. Similar information for private school enrollment.

The TAB A-1 did contain data on the total enrollment by district, the number of students of military and civilian employees who live off base, the number of military dependent students living on base and the payment per student. However, the school funding by district was not given, the total number of military dependent students was not obtainable, and no information was given on dependent students in private schools. Without this information, the impact of a base closure on education cannot be determined.

Discrepancies in the amount of data presented in the TAB A-1 means that additional information would have to be obtained elsewhere. Discrepancies were found in the TAB A-1 data for many of the descriptors in the analysis of the TAB A-1 in Chapter III. Although the Wright-Patterson AFB TAB A-1 Environmental Narrative contained the data topic areas required for a base closure, the TAB A-1 had not provided enough data for many of the descriptors. Thus, the second research question can be answered by stating that the TAB A-1 does not provide the data base necessary for the preparation of an EIS for a base closure.

Conclusions

In reviewing the TAB A-1 for Wright-Patterson AFB, many instances were noted where only an additional number or percent figure would have provided the needed information. It should be realized, however, that the total number of additional figures required will consume a considerable amount of time and effort on the part of the compiler. This data collection will be required, however, if the TAB A-1 is to serve as a comprehensive data source for a base closure analysis. The TAB A-1 for Wright-Patterson was believed to be a very thorough, well-written and comprehensive document. The research effort and critique performed on this single document was aimed at a particular subject area, a base closure. This topic is not usually thought about by a writer and compiler of data, therefore it seems natural that many factors would be overlooked. Although an in-depth review was only accomplished on the Wright-Patterson TAB A-1, it is believed that this TAB A-1 probably contains as much or more data than the TAB A-1 of an average base.

There are several areas which could be improved in the TAB A-1. One is the adoption of a personnel cross-reference capability to relate organization, grade, address, own, rent, number in family, age, occupation, years in service, others in family working, second job, etc. This might be accomplished utilizing the

socioeconomic survey and a computer scan sheet. The purpose of this capability would be to permit cross-referencing of data. Each of the listed items is needed to provide information in some section of the TAB A-1, but there is no way to relate these items outside of that TAB A-1 section. For instance, organization, grade and salary might be located in the personnel section of the TAB A-1, but the number of people by zip code in another section. There is no way to find out how a mission change involving an organization would affect the community in terms of housing. Whether the affect would be spread evenly in the ROI or concentrated in a few specific locales cannot be determined.

Another area in which the TAB A-1 could be improved would be to specify what information should be found in each section. The reason for this is that many times, items of information needed were contained or listed in different sections which made it difficult to find them. For instance, a percent breakout of the sewage going to different treatment facilities was in AFERN 1.3, but the quantities were presented in AFERN 4.4.2.2.2.

The attributes and descriptors developed in this thesis effort (Table 3) identified the factors which would have impacts in a base closure action. In many instances there will be secondary effects on these attributes and descriptors. The calculation of these secondary effects

is quite complex. It is believed, however, that by using the primary data identified by the attribute descriptors an estimate of a secondary impact is possible by applying some multiplier factor to the primary data. This can be accomplished at the time of the impact analysis. Much work is being performed by contractors and research teams at the present time to identify these factors. As the factors are developed they can be integrated into the system to provide valuable information on the total impact on an attribute.

Recommendations for Additional Research

1. Additional research should be undertaken to analyze the step-by-step procedure which is used in the preparation of an Environmental Impact Statement. The information should be presented in such a manner that it could be used by a novice at base level to develop the impact statement. The suggested reference or source in which to present the material would be Chapter 3 of the Handbook for Environmental Impact Analysis.

2. Additional research should be conducted to develop a list of actions where Environmental Impact Assessments and/or Statements have been written and for which a Negative Determination was made. There is a considerable amount of time and effort expended in the upkeep of records and the preparation of assessments which

eventually result in a Negative Determination. If the actions in which an EIS were not required were known, it would be possible to make a Negative Determination at an early stage in the development of a project, mission change, etc. A listing of actions which have resulted in a Negative Determination could be developed, approved and used as a basis for determining if future actions would require an assessment. This information would provide for a more efficient use of both time and money in the environmental impact analysis process.

3. Additional research should be done to develop a comprehensive socioeconomic questionnaire which can be used to provide more and better data concerning base personnel. If the information were placed on a computer scan sheet, considerable cross-referencing of valuable information could be performed and the printout could be inserted in the TAB A-1.

Recommendations

This thesis effort indicated that there still needs to be a considerable amount of work done in the identification of factors which influence or cause an impact in a base closure situation. It will take an inordinate amount of time and effort to identify all of these factors, compile a data base and maintain that data base in a current status. Perhaps a better solution would

be a concerted effort to eliminate the need for an Environmental Impact Statement for a base closure situation. This may be possible (1) through the courts, by a determination that socioeconomic impacts do not fall under the auspices of the NEPA or (2) by extending the time period taken for the closure and an effort on the part of the government and the surrounding community to develop replacement activities for the lost base resources. If it is not possible to eliminate the requirement for an EIS for a base closure, then a simplified data collection and statement preparation methodology should be developed.

APPENDICES

APPENDIX A

AIR FORCE ACTIVITIES

Air Force Activities are those actions that are likely to cause an environmental impact. The Handbook for Environmental Impact Analysis listed the following nine major functional categories of Air Force Activities in the impact identification matrix (35:C-1):

Operation and Maintenance

Construction

Mission Change

Real Estate

Procurement

Training

Research, Development, Test and Evaluation

Administration and Support

Industrial

A detailed listing of these major categories is presented in this appendix.

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AIR FORCE ACTIVITIES (35:Appendix C)

OPERATION AND MAINTENANCE
Building Repair
Woodworking
Roofing
Concrete and masonry
Electrical system
HVAC
Road Repairs
Soil and material handling
Resurfacing
Building Demolition
Channel Dredging
Metal Working
Aircraft Maintenance
Ordnance
Aircraft
Missiles
Communications equipment
Base Support O&M Functions
Automotive equipment
Construction equipment
Electronic and communication equipment
Weapons
General equipment
Commodity groups
Plant equipment
Radio and television facilities
Newspapers
Personal equipment
Bakeries
Dining facilities
Commissary stores
Laundry and dry cleaning services
Hospital and medical facilities
Communication services
Photographic services
Administrative rail services
Water service
Water treatment system
Sewage services
Industrial waste treatment facilities
Electrical service
Boiler and heating plants
Cold storage and air conditioning plants
Buildings
Grounds maintenance
Maintenance other than improved grounds
Surfaced areas
Marine facilities
Special equipment maintenance
Inactive facilities maintenance
Fire prevention and protection
Refuse handling
Pest control services
Custodial support
Snow removal and ice alleviation
Dependents schools
Data processing centers
Family housing
Utility operations and maintenance
Refuse collection and disposal
Maintenance of exteriors
Maintenance of interiors
Transportation Services O&M
Material storage
Transfer facilities
Traffic
Flying Operations
Aircraft
Airspace
Air traffic control
Forestry and Wildlife Management
Timber harvesting
Forest management
Pest Control
Hunting and fishing
Wildlife support
Outdoor recreation
Off-road vehicle usage

CONSTRUCTION
Site Access/Delivery
Railroad
Road
Water
Air
Pipeline
Support Facilities Operation
Asphalt plant
Aggregate production
Concrete operations
Foundry and metal shop
Material storage and on-site hauling
Personnel support
Utilities provision
Solid waste disposal
Sewage disposal
Site Preparation
Clearing and grubbing
Tree removal
Existing structure removal
Demolition debris disposal
Site drainage
Utilities
Excavation
Topsoil stripping and stockpiling
Excavation
Backfill
Channeling and dredging
Hauling
Quarrying and Subsurface Excavation
Cutting and drilling
Loosening, blasting
Hauling
Drainage
Foundations (Buildings and Roads)
Base course
Footings
Compaction
Piling
Mat foundation
Groundwater control
Insect control
Bituminous Construction
Placing and spreading
Compaction
Curing and sealing
Concrete Construction
Placing
Finishing
Masonry Construction
Forming
Mortar mixing
Placing
Finishing
Steel Construction
Erecting
Finishing
Timber Construction
Pest/insect protection
Cutting and shaping
Erecting
Finishing
Other Trades
HVAC (heating, ventilating and air conditioning)
Electrical
Plumbing
Plastering and drywall
Painting
Finishing—General
Cleanup operations
Landscaping

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MISSION CHANGE

- Change in aircraft numbers
- Change in aircraft type
- Change in flying mission or role
- Change in base mission
- Change in range use
- Change in personnel strength
- Change in grade structure or rank
- Alteration of job
- Alteration of job qualifications
- Alteration of physiological constraint (age, sex, health)
- Change in a function or task

REAL ESTATE

- Real Estate Acquisition
  - By purchase, lease, easement, license, or permit
  - By donation, exchange of land, or transfer from other govt. agencies
  - By executive land order or notations on land records for Public Donation
- Real Estate Dispositions
  - To governmental agencies
  - To the public (by GSA)
- Real Estate Outgrants
  - For grazing use by lease or license
  - For agriculture use by lease or permit
  - For fish and wildlife use by license or permit
  - For balancing facilities by lease
  - For right-of-way by lease, easement, license, or permit
  - Others (not included above)
- Sale of Timber
  - Overstory removal
  - Sanitation cut
  - Thinning
  - Clear cutting
  - Reforestation

PROCUREMENT

- Principal Items
  - Aircraft
    - Fighter
    - Bomber
    - Transport
    - Trainer
    - Utility
    - Helicopter
    - Other
  - Weapons
    - Crew-served
    - Individual
    - Artillery
    - Tracked combat vehicles
  - Missiles
    - Land launched
    - Air launched
    - Other
  - Ammunition
  - Other procurement
- Secondary Items
  - Procurement, Air Force-secondary items
  - Stock fund items
    - From other government agencies (GSA, etc.)
    - Local procurement
- Procurement of Utilities and Services from Civilian Sector
  - Utilities
  - Services
- Nonappropriated Fund Activities
  - Personnel support
    - Food oriented
    - Non-food oriented
  - Post exchange

TRAINING

- Support Activities Program
  - Quartering in Government facilities
    - Bare base
    - Water supply
    - Waste disposal
    - Heating
  - Quartering in commercial facilities
  - Feeding personnel at Government facilities
    - Field mess
    - Dining hall
  - Feeding personnel at commercial establishments
  - Movement of personnel and/or equipment
    - Established routes
    - Cross country
    - Commercial carriers
    - Watercraft
    - Rotary-wing aircraft
    - Fixed-wing aircraft
    - Air drops
  - Assembly area maintenance
- Academic Training Program
  - Mechanical orientation and nomenclature training
  - Electrical (electronic) orientation and nomenclature training
  - NCO Academy
  - Administrative and support training
  - Medical training
  - Safety orientation and nomenclature training
  - Security training
- Practical Training Program
  - Flying training
    - Pilot
    - Navigator
    - Radar
    - EWO
    - Flight engineer
    - Loadmaster
    - Medic
    - Other
  - Weapons training
    - Small arms
    - Missiles
    - Bombs
    - Rockets
    - Explosives
    - Other weapons
  - Vehicle operation and maintenance
  - Technical training (communications, etc.)
  - Physical training
  - Tactical training
    - Escape and evasion
    - Camouflage
    - Defense emplacement
    - Urban warfare
    - Infiltration course
    - Assault
    - Riot control

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RESEARCH, DEVELOPMENT, TEST AND EVALUATION (RDTE)

- Chemical and Biological Research
  - Basic laboratory research
    - Material disposal
    - Waste disposal
    - Laundry
  - Semiworks—pilot plant development
    - Operate semiworks
    - Waste disposal
  - Proving ground
    - Agent disposal
    - Waste disposal
    - Site contamination
- Testing Programs
  - Abrasion tests
  - Acceleration tests
  - Chemical tests
  - Core tests
  - Corrosion tests
  - Crash tests
  - Cross-country tests
  - Destructive tests
  - Firing test (ordnance)
  - Flight tests
  - Full-scale tests
  - Impact tests
  - Mechanical tests
  - Missile tests
  - Nondestructive tests
  - Performance tests
  - Physiological tests
  - Propellant tests
  - Psychological tests
  - Radiation tests
  - Shock tests
  - Soil tests
  - Static tests
  - Ultrasonic tests
  - Vibration tests
  - X-Ray inspection

ADMINISTRATION AND SUPPORT

- Executive Office Actions
  - Issuance of orders and guidance
  - Personnel actions
  - Public communications
- Personnel Services
- Information Manipulation
- Services
  - Legal
  - Library
  - Mail
  - Veterinarian

INDUSTRIAL

- Depot Supply Activities
  - Aircraft overhaul
  - Missile overhaul
  - Transportation activities
  - Utilities usage
  - Storage and warehousing
  - Cleaning (acids, alkalines, solvents, abrasives, etc.)
  - Drying (draining, ovens, etc.)
  - Preservation (paint, corrosion inhibitors, etc.)
  - Packing and issue
- Aircraft and Missile Maintenance
  - Transportation activities
  - Disassembling operations
  - Disposal of waste petroleum products
  - Retread tires
  - Plating operations
  - Machining operations
  - Repair items
  - Test repaired items
- Nuclear Storage
  - Transportation activities
  - Utilities usage
  - Material storage
- Manufacture Weapons
  - Foundry operations
  - Machine shop operations
  - Heat treating
  - Metal finishing
- Demilitarize Weapons
  - Conventional ammunition/explosives
  - Chemical munitions
  - Other demil operations
- Ammunition Plants—General
  - Transportation activities
  - Utilities usage
  - Material storage
- Ammunition Plant Activities
  - Quality control
  - Manufacture detonating agents
  - Manufacture priming compositions
  - Manufacture noninitiating high explosives
  - Manufacture propellants
  - Manufacture bomb casings
  - Manufacture bombs
  - Manufacture rockets
  - Load, assemble, and pack explosive munitions
- Manufacture Chemicals for Use in Rocket Propulsion
- Disposal of Spent and Off-Specification Material

AD-A044 171 AIR FORCE INST OF TECH WRIGHT-PATTERSON AFB OHIO SCHO--ETC F/G 5/1
A STUDY OF THE BASELINE DATA REQUIRED TO CONDUCT AN ENVIRONMENT--ETC(U)
JUN 77 J W KAHLER, D E PATERSON

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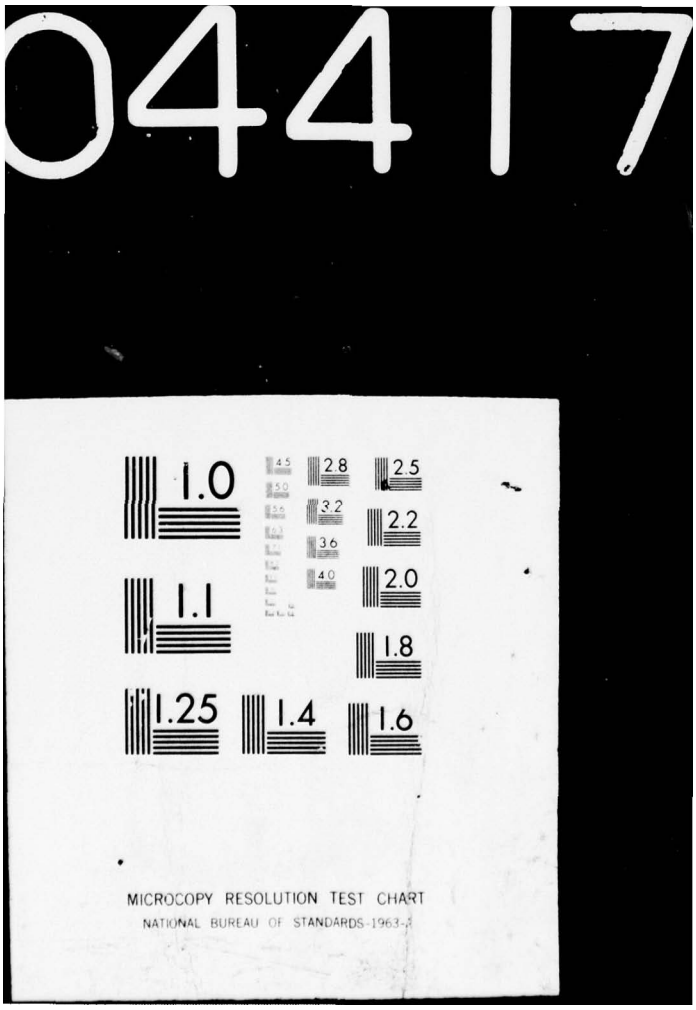
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APPENDIX B

INITIAL IMPACT IDENTIFICATION MATRIX

This appendix contains a portion of the Impact Identification Matrix found in the Handbook for Environmental Impact Analysis (35:Appendix E). The activities believed to be applicable to the base closure action were selected. The environmental attributes that would be affected by an activity already selected were then identified and the respective blocks were blackened. This appendix therefore represents the Air Force Activities and the Environmental Attributes that are believed to be affected in a base closure action.

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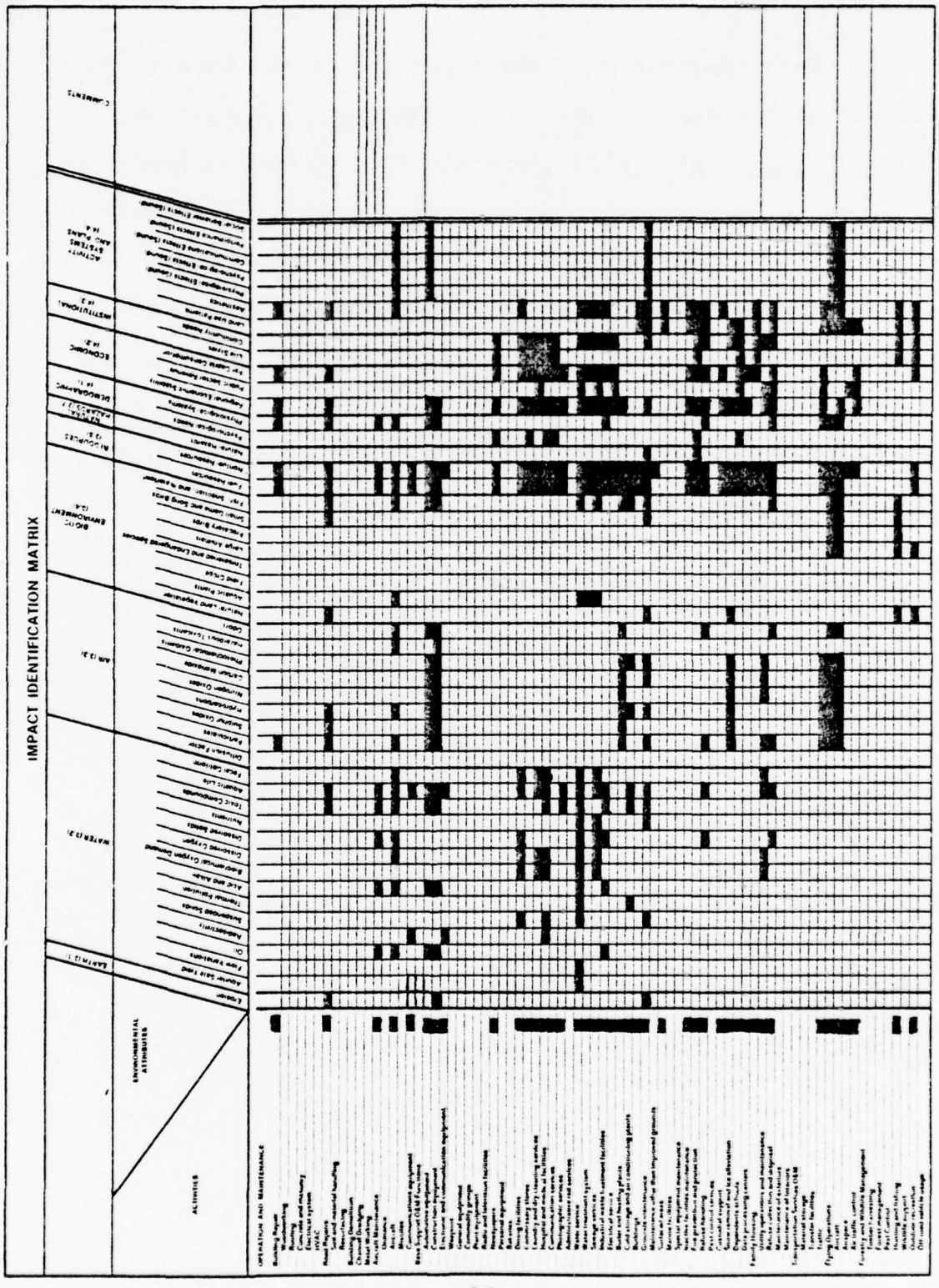

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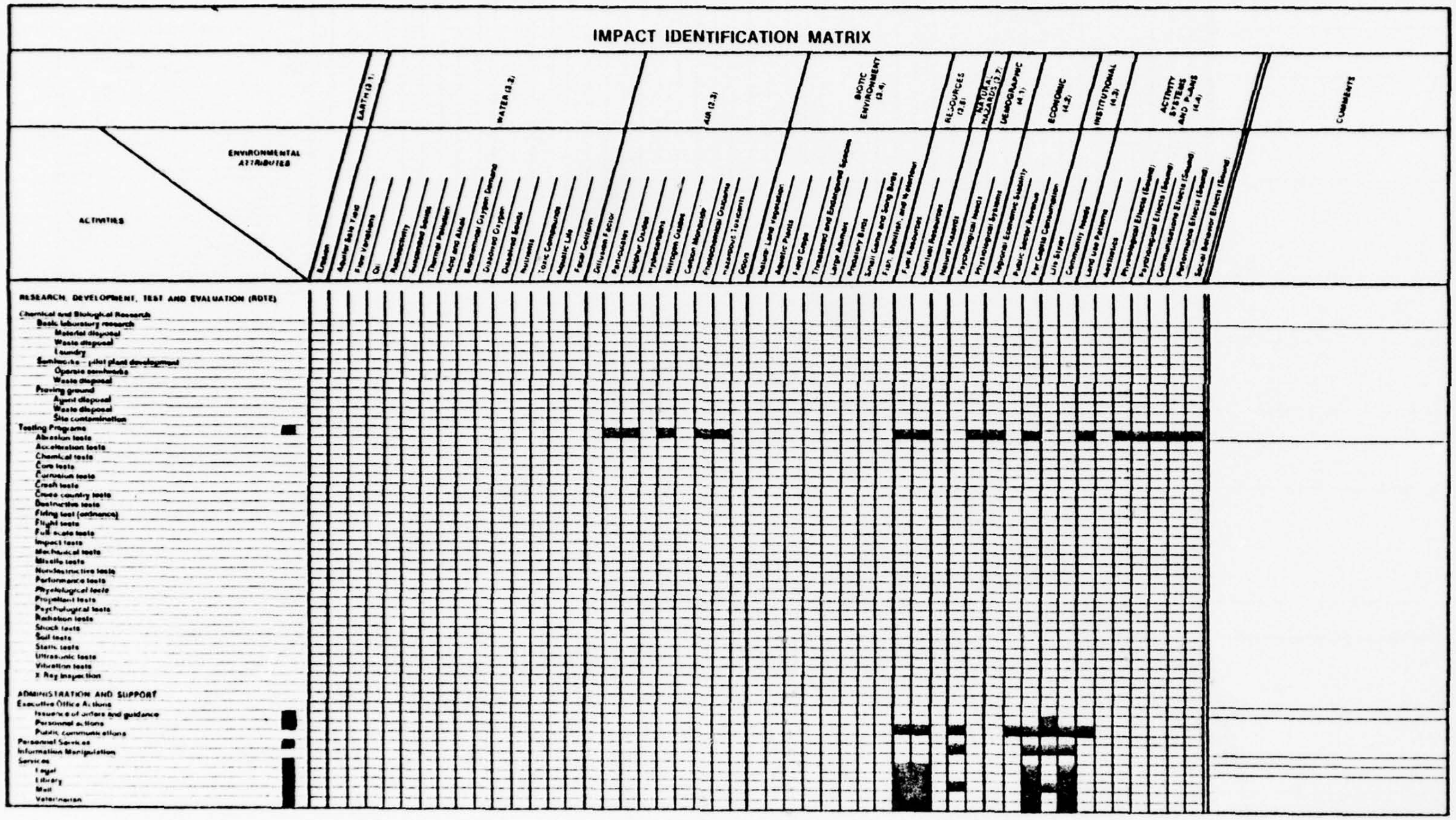

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IMPACT IDENTIFICATION MATRIX

ENVIRONMENTAL ATTRIBUTES

- EARTH (2.1): Erosion; Aquifer Safe Yield
- WATER (2.2): Flow Variations; Oil; Radioactivity; Suspended Solids; Thermal Pollution; Acid and Alkali; Biochemical Oxygen Demand; Dissolved Oxygen; Dissolved Solids; Nutrients; Toxic Compounds; Aquatic Life; Fecal Coliform
- AIR (2.3): Diffusion Factor; Particulates; Sulphur Oxides; Hydrocarbons; Nitrogen Oxides; Carbon Monoxide; Photochemical Oxidants; Hazardous Toxicants; Odors
- BIOTIC ENVIRONMENT (2.4): Natural Land Vegetation; Aquatic Plants; Field Crops; Threatened and Endangered Species; Large Animals; Predatory Birds; Small Game and Song Birds; Fish, Shellfish, and Waterfowl
- RESOURCES (2.5): Fuel Resources; Nonfuel Resources
- NATURAL HAZARDS (2.7): Natural Hazards
- DEMOGRAPHIC (4.1): Psychological Needs; Physiological Systems
- ECONOMIC (4.2): Regional Economic Stability; Public Sector Revenue; Per Capita Consumption
- INSTITUTIONAL (4.3): Life Styles; Community Needs
- ACTIVITY SYSTEMS AND PLANS (4.4): Land Use Patterns; Aesthetics; Physiological Effects (Sound); Psychological Effects (Sound); Communications Effects (Sound); Performance Effects (Sound); Social behavior Effects (Sound)
- COMMENTS

ACTIVITIES

TRAINING

- Support Activities Program
  - Quartering in Government facilities ■
    - Bare base
    - Water supply
    - Waste disposal
    - Heating
  - Quartering in commercial facilities ■
  - Feeding personnel at Government facilities
    - Field mess
    - Dining hall
  - Feeding personnel at commercial establishments ■
  - Movement of personnel and/or equipment
    - Established routes
    - Cross country
    - Commercial carriers ■
    - Watercraft
    - Rotary wing aircraft
    - Fixed wing aircraft
    - Air drops
  - Assembly area maintenance
- Academic Training Program ■
  - Mechanical orientation and nomenclature training
  - Electrical (electronic) orientation and nomenclature training
  - NCO Academy
  - Administrative and support training
  - Medical training
  - Safety orientation and nomenclature training
  - Security training
- Practical Training Program
  - Flying training
    - Pilot
    - Navigator
    - Radar
    - EWO
    - Flight engineer
    - Loadmaster
    - Medic
    - Other
  - Weapons training
    - Small arms
    - Missiles
    - Bombs
    - Rockets
    - Explosives
    - Other weapons
  - Vehicle operation and maintenance
  - Technical training (communications, etc.)
  - Physical training
  - Tactical training
    - Escape and evasion
    - Camouflage
    - Defense emplacement
    - Urban warfare
    - Infiltration course
    - Assault
    - Riot control

APPENDIX C

DATA SOURCES COMMENTS CONCERNING ATTRIBUTES AND ACTIVITIES

Physical Impacts of Base Closures (Bellefontaine) (1)

In a thesis concerning the physical impacts of base closures Barker and Ray state that ". . . all of the people believed the overall environmental impact on the community of Bellefontaine [Bellefontaine AFS, Ohio] was minor [1: 55]." Barker and Ray believed that there was a high degree of interaction among all of the physical environmental factors. They did extensive research (factor analysis) into sources and effects of physical environmental factors. Although their listing is not totally comprehensive, it does provide the major physical factors that relate to a base closure. The announcement to close Bellefontaine AFS was made on April 24, 1969. After Federal and State Governments agreed, the city utilized the installation land and facilities for a vocational school which was opened in September 1975 (1:47). A limiting factor in the thesis was the time lag between the closure and the study, and the resulting lack of followup data after the initial actions. Initial information was obtained from newspaper and other articles at the time of the closure. Followup data consisted of interviews with residents of Bellefontaine.

The following is a listing of positive and negative effects which Barker and Ray noted:

1. Facilities (1:49-53):

A. Pro or positive effects of the closure were:

Telephone service improved, radio and TV interference complaints reduced, existing community facilities were more available (medical), eliminated chronic shortage of housing, dilapidated apartments rented by lower grade airmen were torn down, community banned together to attempt to attract new industrial concerns, reduced student load on educational facilities, reduced waste at solid waste dump, reduced load on water treatment/distribution facilities, reduced smoke from coal burning heating plant.

B. Con or negative effects of the closure were:

No close access to military medical treatment for retirees, eliminated emergency backup medical facility, recreational facilities no longer available (softball, NCO Club), loss of backup power generators, possible closure of commercial facilities, too much "red tape" to obtain land, facilities and equipment, inadequate time to determine a use for facilities and land, maintenance of facilities was not provided until new ownership occurred resulting in additional funds for refurbishment.

2. Transportation (1:53-54)

A. Pro:

Decreased car and truck traffic, aircraft noise eliminated.

B. Con:

At least one bus line ceased service.

3. Land Use (1:54)

A. Pro:

Use of cities' public parks lessened, rundown residential property was converted to commercial property.

4. Ecology (1:54-55)

A. Pro:

Decrease in the number of hunters.

B. Con:

Loss of moon-lighting military in the farm labor market.

The Social Impact on a Community Resulting From a Military Base Closure (15)

". . . No social indicators were found which could be associated with the closure of Bellefontaine Air Station [15:93]."

The Social Impact on a Community Resulting From a Military Base Mission Change (11)

> . . . The literature cited no specific criteria for what quantity of a certain QOL [Quality of Life] factor constitutes a significant social impact. The researcher could not assign quantitative measures of significance to the QOL factors as indicators of social impact [11:67].

The Economic Impact of a Military Installation Closure on a Nearby Community: A Case Study of Available Data (2)

This thesis on the closure of Bellefontaine Air Force Station, Bellefontaine, Ohio, looked at the official data available in an attempt to estimate the economic impact of the closure of Bellefontaine AFS. Historical economic data was collected on construction, employment, Federal Assistance to Public Schools, personal income, real estate, retail sales, and utility usage (2:25). The researchers found that data was available at the state and county level, but very little at the local community level. The researchers concluded that ". . . the most valuable data for the purpose of any local impact analysis would be that which specifically addresses the community in question [2:52]."

An Overview of Studies of the Impact of Military Installations and their Closings on Nearby Communities (4)

Buckley presents a multitude of impacts on nearby communities due to installation closures. These include employment losses of government employees and non-appropriated fund activities, and military personnel and their dependents in the local job market. Also included as a cause of impacts or an impact are installation procurement and construction activities, and retail and service expenditures. A change in the number of personnel affects housing in both the sales and rental markets, local

transportation (buses and taxi), and utilities to support the base and personnel. Government workers provide local payroll and sales taxes. Property values are supported or increased by the presence of military personnel. Funds are provided to the local educational system. Police and fire fighting forces may be affected (4:5-6).

Buckley also presents factors which may modify or complicate the assessment of the impact on a community. "The impact of an installation may vary with its size and the size of the community in which it is located [4:7]." Additional factors are the civilian to military ratio, the average DOD employee pay level and the installation's mission. The length of time the installation has been in operation and the extent and diversity of the local economy base are also important factors (4:7-8). The number and extent of each of these variables makes the assessment of a base closure impact a difficult chore.

Local business and industry affected are:

Railroad

Motor freight and warehousing

Wholesale and retail trade

Food and kindred products

New construction, residential

Finance and insurance

Real Estate and rental (4:24)

United States Air Force Logistics Command Socioeconomic Impact Analysis System (SEIAS) (17)

This Stanford Research Institute (SRI) study detailed a Socioeconomic Impact Analysis System (SEIAS) in which the areas of impact were:

1. Housing--Owner and renter occupied
2. Education system
3. Unemployment
4. Local Retail Sales
5. Social Structure (17:2)

The primary indicators of social structure impact are age, marital status, family size, and income. These are deemed important if a community ". . . experiences a substantial influx of persons possessing differing socioeconomic characteristics as manifested by differing wants and needs than the resident citizens [17:44]." SRI states that "Normally, however, a realignment should not result in significant social impacts [17:44]."

Also included in the SRI impacts were local government finances. The SRI study stated

> . . . a decrease in population due to a realignment will likely result in less demand for services and also a decrease in city revenues. Whether these effects will balance each other depends on how the community generates income, the area of expenditure, how closely expenditure and revenue systems are tied to population changes, timing of population change incurred impacts, which government entities provide services, and other factors [17:49].

SRI also states that ". . . potential impacts will be minimized by incrementalizing the change and extending the time period of implementation. . . [17:3]."

System/Item Management Organization Study (28)

This Environmental Assessment was performed in August, 1975, and involved seven AFLC bases. The study was to determine the feasibility of reducing the cost of the material management function through consolidation, reductions and centralization of functions. An internal realignment and reduction of force was proposed at five Air Logistics Centers (ALC). The other two locations would have an increase in personnel (28:1-2). The study indicated that:

> There would be no significant change in the amount of air or water pollutants generated at any of the seven locations involved. Pollutants will be slightly decreased at five locations and slightly increased at two locations [28:22].

The study also concluded that there appeared to be minor economic effects from implementation of the study. This was based on the relatively small number of authorizations to be relocated compared to the base population and the standard metropolitan statistical areas (SMSA). The largest reduction was at Kelly AFB, Texas, which had a decrease of 585 positions amounting to 2.71 percent of the base workforce and .182 percent of the area workforce. The largest reduction in area workforce was at Robins AFB,

Georgia, which had a decrease of 422 positions accounting for 1.99 percent of the base workforce and .39 percent of the area workforce. The study also indicated that due to the loss of personnel, there would be a decrease in funds for schools (28:22-23).

Economic Recovery: Community Responses to Defense Decisions to Close Bases (19)

This pamphlet describes the socioeconomic effects on 22 communities affected by base closures. It states that a base closure:

> . . . can threaten the well being of a community . . . Jobs disappear. Houses and apartments are vacated. Business suffers as a portion of the buying public moves on. School districts can no longer budget with an eye to federal school impact aid. . . . There is also a cultural and social loss. Military families usually become an integral part of the community. They participate in church and school activities, are active in civic affairs and generally are part of every aspect of community life. . . [19:4].

To counter the exodus of military and civilian employees, the pamphlet cites the respective communities' unmet social and economic needs. Base facilities can fill education voids, offer industrial expansion and can provide a solid base for future economic growth. A list of uses found for closed bases is as follows (19:51):

Industry and Commerce

Education

Aviation

Housing

Recreation Facilities and Parks

Government (retained facilities)

Agriculture

Health (hospital)

Historic Site Preservation

Research and Development

One of the main themes of the pamphlet is that the closure's economic impact is affected by the area's business stability as measured by the size of the reduced base work force in relation to the surrounding community. Also affecting the impact of a closure is the time period over which the closure is enacted. The longer the time period the less the impact.

Environmental Assessment for Joint Surveillance System (27)

This Environmental Assessment affected a total of 49 Air Defense Command units. Of this number, 33 small radar sites and 6 SAGE centers were to be closed.

The Assessment considered that the probable impacts in the ecological environment would be beneficial, while the greatest adverse impact on the human environment would be in the socioeconomic area. A result of personnel reductions at the Air Division Headquarters and the radar sites would be corresponding reductions in support personnel. This would thus lead to reduced community employment, population and income (27:4-6).

Final Environmental Impact Statement for the Proposed Closure of Kincheloe Air Force Base, Michigan (34)

The Final EIS for the proposed closure of Kincheloe AFB, Michigan, followed the guidelines in AFR 19-2 and utilized the TAB A-1 topics and Air Force Environmental Reference Numbers (AFERN). The EIS states the ". . . natural environment should improve as a result of the termination of airport operations [34:iii]" and that "the Environmental Protection Agency expects the impacts on the natural environment to be minor [34:80]." There will be a decrease on the demand for water and sewage facilities, and a short term negative impact on the biota but a long term beneficial impact on the biotic environment.

A severe impact was anticipated in the socioeconomic areas however. Impacts were expected in the area of employment losses, decreased real estate values, increased housing vacancies, school enrollment funding losses, and local business revenues (34:iii and iv). The housing market will be severely affected as shown by cancelled housing projects, reluctance of financial installations to initiate mortgages and the reluctance of residents to purchase a home (34:95). Public finance would be affected in the areas of public school revenue, income and sales taxes, federal revenue sharing and local ad valorem real property taxes (34:90).

The loss of 2500 base personnel is a loss of 75 percent of Kinross Township's population (34:83). Local activities affected would be restaurants, retail establishments, supermarkets, utility companies, public schools and local government. The cessation of base procurement and construction awards will also affect local activities. There will be secondary employment losses (34:85).

The population loss will decrease the demand for public services. An increased tax burden may result on the remaining households as certain operating costs are fixed and cannot readily adjust to the changes in population levels (34:93). Planned capital projects may no longer be possible or the cost may now be prohibitive due to the decreased tax base. Significant impacts would occur in utilities serving the base, notibly sewer, water, telephone, and coal sales (34:106-109). Highway maintenance and improvement funds would be decreased as a result of the population loss (34:105).

Community services and facilities affected would be mutual aid agreements for police, fire, and air traffic control, and the loss of medical treatment for civilian emergency patients. Also affected would be religious, civil and charitable organizations and the loss of demand and savings desposits in financial institutions (34:103). Moving and storage companies would be severely affected once the base closure is completed (34:105).

Draft Environmental Impact Statement for the Proposed Closure of Craig AFB, Alabama and Webb AFB, Texas (32)

This Draft Environmental Impact Statement studied all Air Training Command bases. The statement identified no adverse impacts on the natural environment of the bases to be closed. In the human environment however, "the socio-economic impact caused by population reductions could be severe in the areas of unemployment, housing vacancies, school enrollment and loss of revenue sources [32:ii]." The loss in revenue sources would be in retail sales, State income and State and local sales taxes, PL 81-874 school funds, and public facilities and utilities that generate revenue from user charges (32:V-2--V-3).

The specific impacts on the human environment were identified and estimated as follows:

HUMAN ENVIRONMENT IMPACT (32:V-2--V-3)

	Craig AFB	Webb AFB
Demographic (AFERN 4.1)		
Population (4.1.1)--percent loss of regions population	9.5%	15.5%
Economic Characteristics (4.2)		
Employment (4.2.2) unemployment rate expected	19.8%	12.9%
Economic Activity (4.2.2.3) regional output decrease expected	13.7%	11.2%

	Craig AFB	Webb AFB
Public Finance (4.2.3)		
State & Local Taxation (4.2.3.6)		
local retail sales tax decrease expected	17.5%	30.0%
Contributions to Charity (4.2.3.6)		
decrease expected	6.0%	27.0%
Financial (4.2.3.7)		
regional banking & savings deposits decrease expected	14.8%	16.9%
Housing (4.2.5)		
Percent of vacant homes for sale	8.7% (incr. of 5.3%)	12.0% (incr. of 8.9%)
Percent of vacant rental units	18.0% (incr. of 12%)	25.0% (incr. of 14%)
Institutional Characteristics (4.3)		
Education (4.3.3)		
reduction of enrollment expected	5.7 to 5.8%	16.9%
reduction of PL 81-874 funds	$181,014	$317,580
private schools reduced enrollment		43.8%
Medical (4.3.4)		
undetermined but significant loss of revenue at: Craig AFB, Webb AFB		
Community Service and Facilities (4.3.5)		
unquantified affects on military retirees use of medical and other base services		
cultural activities of community and schools		
Activity Systems and Plans (4.4)		
Utilities (4.4.2)		
A decrease in demand will result in decreased revenues		
At Craig AFB there will be a significant impact on the Selma Transit System (STS), resulting in a reduction of equipment and personnel.		
Land Use (4.4.3)		
At Webb AFB a major impact would occur in residential and commercial land use		

Background Studies on the Proposed Relocation of HQ Air Force Communications Service, Richards-Gebaur AFB, MO

Background Study No. 2--Environmental Report, Proposed Realignment of Air Force Communications Service and Related Missions (39)

The impacts of the physical environment at Richards-Gebaur AFB, Missouri, due to the relocation of AFCS should all be positive, resulting in improved air quality and decreased demands on the water and sewage systems. An unavoidable adverse impact would be a short term impact on the biotic environment due to increased and non-routine activities required during relocation (39:85-91).

Backround Study #10/11--Analysis of Land Use and Governmental Structure (23)

The probable adverse impact on land use which cannot be avoided will be the residential and commerical vacancies created by the reduction in population and spending power (23:40-41,56). The probable impact on local community governments is greatest in Belton, Missouri, where the relocation would affect 25 percent of the city's population. Belton's tax base and commercial community are very dependent on the base. The relocation will affect only 7.5 percent of the population of Grandview, Missouri. The impact on Grandview will thus mainly be on housing (23:29-31).

Background Study No. 6--Socio-Economic Background and Potential Impacts Related to the Proposed Relocation of Headquarters Air Force Communications Service (3)

Battelle accomplished this socioeconomic background study in April, 1976. Their evaluation of the impacts of the proposed relocation of HQ AFCS included as follows (3:III-1 thru III-10):

1. Population changes
2. Employment losses, including direct, military dependent and secondary service sector such as financial and insurance
3. Local economic activities such as wholesale and retail sales and procurements by the base
4. Public finance including income, sales and property taxes
5. Planned capital improvements such as municipal sewer improvement
6. Contributions to charity by the base personnel
7. Financial, including bank deposits and other accounts
8. Real estate and housing, both owned and rental
9. Education
10. Medical services
11. Community services and facilities such as churches, mutual fire fighting agreements and services for military retirees

Background Study No. 17--U.S. Department of Housing and Urban Development, Analysis of Scott AFB, Illinois and Richards-Gebaur AFB, Missouri Housing Markets (40)

The report states:

> . . . the proposed action or any of the alternatives will not greatly impact the entire Kansas City SMSA, but will have a profound impact on the housing market of southern Jackson County and northern Cass County [40:21].

The report indicates that the number of vacant home units for sale will increase by a factor of eight and by a factor of four for vacant renter units. The excess housing will only be absorbed prior to 1980 as a result of reduced sales prices and concession rents.

Background Study No. 18--The Impact of Defense Cutbacks on American Communities (20)

This report presents information on the economic adjustment assistance to communities impacted by Defense realignments announced in April, 1973. The impacts on the community will occur in the following areas (20:38-41):

1. Personal Expenditures--Spending by base military and civilian personnel are an indirect impact on banking, transportation, real estate, automobile sales, utilities, motels, retail sales, restaurants, and local government.

2. Local Procurement--The amount of impact will vary depending on the size of the base and community.

3. Housing--Residential housing has the most significant impact on the local community.

4. Education--The impact will occur in the areas of Public Law 81-874 federal assistance funds for school operations and also in the number of students enrolled.

5. Retail Sales--This is difficult to measure unless the base work force exceeds the regional employment base by 15 percent. However, the impact on certain small businesses and merchants that cater to the military client will be severe. These would be automobile dealers, tailor shops, laundries and restaurants.

Impact on Housing (41)

The final report prepared by the Kansas Area Office of HUD identified the impact on housing in the Richards-Gebaur AFB area as a result of the proposed relocation of AFCS. The impacts on housing would be residential construction, rental unit vacancies, the cost to the Department of Defense for the Homeowners Assistance Program, FHA and VA costs, loss in re-sale of homes, and loss in revenues to local government (41:12-14). Appendix XVI, Testimony of Mr. Donald H. Ong before the Senate Armed Services Sub-Committee on Military Construction Authorization on September 15, 1976, concerned the economic impact of housing on the U.S. Treasury and Local Community. The totals of the estimated dollar losses because of the AFCS relocation are as follows:

Net Dollar Losses to U.S. Treasury

Home Owners Assistance Program	$42,852,240
Department of Housing and Urban Devl.	17,910,788
Veterans Administration	2,636,244
Total	$63,399,272

Total Best Expressed as: Probable 65 million dollars (with possible range from 55 to 80 million dollars).

Net Dollar Losses to Local Community

Resale Home Market	$69,804,000
Rental Market	39,523,200
Total	$109,327,200

Best Expressed as: 110 million dollars (with range of 100 to 125 million dollars).

The above figures result in a total of 175 million dollars in (probable) losses as the economic impact of housing on the U.S. Treasury and the local community. The inclusion of Gross Product Losses of 225 million due to the non-construction of new homes and rental units brings the total loss to 400 million dollars. This figure is arrived at by considering the economic impact over a seven-year period before the housing market would return to the pre-relocation announcement level (41:Appendix XVI).

The figures above are based on what could happen and not what will happen if AFCS is relocated. The important factor is that the housing market will definitely be impacted, but the severity of it will depend on what happens in the local communities following relocation.

Personal Interview--Dwight B. Cavender, Major, USAF, and others (5; 6)

The impacts of a base closure in the socioeconomic area are most often felt in the community or communities adjacent to the base. When the base is located in a fairly large metropolitan region, the impact on the region may be minimal while the impact on a particular community may be severe. While the impacts on the physical environment are nearly always positive, an economic impact may cause a secondary physical impact at a later point in time because of an economic reason. The design of a water supply or sewage system may be such that it requires a certain range of flows to be economical or to properly process or treat the water or sewage. A decrease in flow would be detrimental to a large trickling filter if adjustments couldn't be made. Another physical effect is caused by economics. Reduced revenues resulting from reduced quantities of trash or solids might not permit the economic operation of a sanitary landfill or incinerator plant.

Physical impacts can also occur. For instance, the situation at Travis AFB with their sewage treatment plant. The outflow of the plant feeds into a stream which is used by farmers downstream for irrigation. Due to environmental restrictions a proposed shutting-off of this outflow in June 1977 by putting the effluent into a holding pond would lower the amount of water in the stream and thus

the amount available for irrigation. Consequently, a definite physical impact on this particular watershed would occur. A secondary economic impact on the farmers could possibly result from the diminished irrigation capability. It is important to realize that the long term impacts are very difficult, if not impossible, to determine.

Land use patterns will change as a result of a closure. Commercial establishments such as restaurants, laundries, bars, etc. along the roads leading to the base will be severely affected. Transportation patterns and routes will change.

Reduced purchases of gasoline will reduce the amount of federal gas taxes and therefore the amount of highway money coming back to the municipality.

Personal Interview--George H. Franklin, Captain, USAF (10)

The purpose of this interview was to determine the impact of the proposed move of AFCS from Richards-Gebaur AFB, Missouri to Scott AFB, Illinois. The general impact of the relocation would be in the socioeconomic area, with very minor, if any, impact on the physical environment. The impacts would likely be in local procurements, loss of revenue to the communities of Belton and Grandview, Missouri, increased demand on police and fire protection services, school enrollments, and housing. The most serious impact would be in housing and the resulting economic losses to the homeowners.

Telephone Interview--Larry Ingals, Captain, USAF and Mr. Tracy Smith, ATC/DEPV (13; 22)

The purpose of the interview was to determine the possible impact that would occur in closing two ATC pilot training bases.

The impact of the closures would primarily be in the socioeconomic area. At Craig AFB, Alabama, a physical impact could possibly exist because the Air Force is under contract to provide sewage treatment for a local community of public housing. In addition to the usual socioeconomic impacts in unemployment, housing, schools, and revenues (taxes, retail sales, and grants), it is possible that a secondary impact in the physical or human environment could occur because of the aggregate of overall reductions. To illustrate, the primary impacts of a population reduction on a community may be sufficient to put the community in another category and thus cause a reduction in the dollar amount of a federal or state grant. Consequently, the community might end up with insufficient funds for construction of necessary sanitary/sewer system improvements. The effect and likelihood of secondary impacts was undetermined due to their complexity and unknown, probabilistic nature.

Also discussed during the interview was the usefulness and accuracy of the TAB A-1 Environmental Narratives of the ATC bases in the study. There were two common problems. First, all the data in a TAB A-1 was not on the

same baseline. For example, the number of people employed on the base was different, depending if the data came from the personnel office, finance office, or organization totals. Second, the data was not necessarily suited for direct use in the Candidate Environmental Statement as it had to be modified.

Telephone Interview--Mr. Lloyd Jones, HQ USAF/PREVP (14)

The impacts of closing Kincheloe AFB, Michigan and of reducing Loring AFB, Maine to 70 percent are all in the socioeconomic area. The impacts are related to population and job changes and are reflected in the areas of unemployment, housing, retail trade, schools, and community tax base. There appear to be no negative impacts on the physical environment.

Telephone Interview--William R. Sims, Lieutenant Colonel, USAF (21)

The environmental impact of base closings or major reductions are in the human environment and related to socioeconomic factors. These factors generally are housing, schools, local revenues (taxes and retail trade), and unemployment. Although there generally are no physical environmental impacts, it is possible that a secondary impact could be generated in the physical environment.

Personal Interview--Richard Woodworth, Captain, USAF (45)

When considering the total reduction and effect of a base closure on a city or region, you have to consider

the actual number of people leaving the area as opposed to those staying to find other employment. The secondary impact on factors is influenced by a circle effect. In unemployment, for example, initially people are layed off as a result of the base closure. Due to people leaving the area, there is less people and therefore less revenue generated. Consequently, there is less money to pay people still working so they are layed off their jobs. This cycle continues until an equilibrium is reached. This cycle is the reason multiplier factors are applied to a primary impact such as the number of people originally losing their job in a base closure.

The TAB A-1 generally reflects enough information to assess the impact of a base closure. It may not provide the exact figures needed in some cases, but it will give a general feel for an impact. Specific problems are encountered in gathering the data for the TAB A-1. In collecting housing data, there is a problem with vacant housing rates due to the methods available to obtain the data. The most current air pollution data is three years old (1973). This may be accurate enough for our needs in most cases. Different school districts have different rules for determining their capacity; for instance, teacher-pupil ratio, or the size of the rooms or the number of rooms. In general, it is difficult to get good data. It might be better if a historical pattern of school enrollment were maintained.

The occupation of military dependents is important when considering off-base employment and tax revenues. There is no cross-reference capability in the current TAB A-1 such as comparing organization members, their incomes, and where they live. It may be possible to key zip codes/address by grades. This may provide information on life styles and community needs by pinpointing the housing, schools and retail areas affected. Under the current system you cannot "zero in" on specific reductions, only the broad community aspects of a closure.

Economic Impact of Military Base Closings, Vol. II (29)

This report was a consolidation of impact studies of the discontinuance, reduction or consolidation of defense activities at seven different communities. The socio-economic impacts reported in the communities ranged from none to severe. The impacts occurred in the areas of housing, unemployment, loss of retail sales, business closures, and loss of educational aid. Some communities, notably Mobile, Alabama, recovered very quickly from the closure actions and hardly noticed any impact except in one area, that of housing (29:49-51). Other communities, notably Moses Lake, Washington, a rural, agricultural community, suffered heavily and had not recovered fully when the report was written in 1970 (29:256-260).

APPENDIX D

EXPLANATION OF THE DESCRIPTORS

The purpose of the descriptors is to identify the information that will help explain the impact of a base closure on an environmental attribute. The factors that help explain or clarify the descriptors relate, as much as possible, to a base closure situation. These descriptors were developed from the literature data sources in Appendix C.

Natural Environment

In most cases the effects of a base closure on the natural environment were found to have positive rather than negative impacts. The exodus of people generally has a beneficial impact by decreasing the volume of solid wastes, sewage, and transportation. Descriptors identified for the various subcategories usually show a reduction in the quantity of an item resulting from the closure. Attributes 1 through 35 and 45 through 49 listed in Table 1, Environmental Attribute Listing, indicate the factors to consider in the various natural environment subcategories.

Earth

The subcategory earth helps to describe the natural environment. The following should be reviewed when evaluating this subcategory.

a. Description of the base area, a description of the earth or vegetation cover and its susceptibility to erosion.

b. Method of disposal and quantity of solid waste if accomplished by (sanitary) land fill.

Water

The subcategory water helps to describe the natural environment. The following should be reviewed when evaluating this subcategory.

a. Quantity and source of water used by the base.

b. Storm drainage characteristics such as on-base pollutants affecting water quality.

c. Quantity of sewage and industrial waste which is generated by the base.

d. Method used for the disposal of effluent and its capacity.

e. Quality of effluent treated.

f. Proposed construction of new or additions to treatment facilities.

Air

The subcategory air assists in describing the natural environment. The following information should be obtained in order to review this subcategory.

a. Description of base activities generating air pollutants, such as aircraft, motor vehicles, heating plants, etc.

b. Type and quantity of pollutants generated by the base and base-related activities.

c. Type and quantity of pollutants generated by the sources in the surrounding communities.

d. Local weather patterns affecting air pollution.

Biotic

The subcategory biotic assists in describing the natural environment. The following information should be obtained in order to review this subcategory.

a. Base land use including vegetation, lakes, streams, hunting and fishing activities.

Noise

The subcategory noise helps to define the major category natural environment and relates to the major category human environment. The following information should be reviewed to help describe this subcategory.

a. Number of aircraft operations, including take-offs, landings, and touch-and-go landings, by aircraft type.

b. Proximity of local housing and business to the flight path and the respective noise levels at various distances.

c. Noise levels due to base-generated motor vehicle traffic including the traffic corridors to the base.

d. Base construction activities and their noise level.

Human Environment

The effects of a base closure on the human environment are the result of a number of interrelated factors, conditions and unknowns. The following descriptors help to explain and identify the impact on the human environment attributes.

Population

This descriptor will help define the attributes of regional economic stability and community needs and life styles. In a base closure situation it is important to know the number of people that will be leaving the affected area as opposed to those staying in the area. People electing to stay can retire and/or endeavor to find another job in the area. To provide a basis for an analysis the following information should be known.

a. Total number of military, civilian, and non-appropriated fund employees.

b. Age and number of years of service of the personnel will give an approximation of the number of personnel that may retire. It may be possible to make an approximation

of the number of personnel that may retire using a percent of the total employees based on past experience in closure actions.

c. Family size will provide information on the total number of people leaving the area. Knowledge of the area's total population will provide a comparison of percent leaving versus total population. This will give an indication of the impact of the population loss.

d. Breakout of the base personnel by as small a subsection of the region of influence as possible. For example, in terms of the village or township rather than just the county. The reason for this is that large groups of personnel may move out of specific areas. Their move may not be significant when compared to the total population, but when compared to the subsection from which they left, it could be a severe impact. For this reason, it is also necessary to know the population of respective subsections identified.

Unemployment

This descriptor is related to all the socioeconomic attributes, but has the most affect on regional economic stability. This descriptor is affected by the following factors in a base closure situation.

a. Number of employees who elect to stay, but do not find employment in the area.

b. Number of other Federal job opportunities in the area.

c. The individuals' education level, skills, or prior occupation.

d. Prevailing labor market in the area, including the types of industries and commercial establishments.

e. Current and past unemployment rates at the local and state levels. A possible indicator is the number of people receiving welfare payments or unemployment compensation currently as compared to the average annual number.

Housing

The descriptor of housing helps define the attributes of regional economic stability and to some extent community needs and life styles. The following types of information will help describe this descriptor.

a. Number of personnel who own homes and the number who rent a residence that will be leaving the community. Also, the locations of their residences in the area.

b. Current vacancy rates of both owner and rental units and the average annual vacancy rate at the local, state and national level.

c. Number of personnel in military quarters and the number of units.

d. Average home values and land values in the different areas of the community.

e. Construction activity in both the home owner and rental unit markets. The number of building permits issued and the average annual revenues generated by construction in the housing industry.

f. Current rate of mortgage foreclosures and the expected rate after the base closure.

g. Average annual real estate business volume, both in dollars and total number of sales.

Education

The descriptor of education helps define the attributes of regional economic stability and public sector revenue. The following factors should be reviewed when evaluating this descriptor.

a. Enrollment in the school districts, by school, for both public and private schools.

b. Capacity of schools based on historical information.

c. Number of Air Force (military and civilian) dependents enrolled in each school and the percent of total enrollment they represent.

d. Amount and percent of school system revenue provided by PL 81-874,-815 funding.

Retail Sales

This descriptor helps define the attribures of regional economic stability and to some extent land use patterns. This factor is very difficult to determine exactly, but a good estimate will provide some information to help define the attributes. The Socioeconomic Impact Analysis System developed by Stanford Research Institute estimates that retail sales losses (excluding on-base sales) in the region of influence is 7 percent (military) and 12 percent (civilian) of the total income of the persons leaving the region of influence (17:35). The following additional information should be reviewed to help evaluate this descriptor.

a. Number of motels, the percent of base-related business and their average vacancy rate.

b. Number of common carriers serving the base and the percent of their business that is base-related.

c. Automobile dealers, both new and used, and their volume of business that is due to base personnel.

d. Number of tailors and laundries whose primary business is due to base personnel, and their business volume.

e. Number of restaurants in the area and percent of business due to base personnel.

f. Dollar amount of retail business in base exchange concessions such as the laundry, florist, shoe repair shop and others.

g. Dollar amount of local procurements for construction and other type contracts and for supplies, services, equipment and food.

Local Transportation

This descriptor helps define the attributes of regional economic stability, land use patterns and to some extent public sector revenue. The following information should be reviewed when evaluating this descriptor.

a. The extent of a private or public mass (rapid) transit system and its percent of business due to base personnel.

b. Private automobile use and the degree of car pooling by employees for to and from work transportation.

c. The transportation network that is used by personnel in traveling to and from work, including traffic corridors in communities, main throughfares, highways, and expressways. The number of personnel using the commercial airport on business trips and the total cost of this transportation. The amount of business or quantities shipped or received and the cost for railroad transportation. The businesses along the primary routes of travel

will be affected by a decrease in potential or actual customers because of the base closure.

Financial Institutions

This descriptor helps define the attribute of regional economic stability. The following information should be reviewed when evaluating this descriptor.

a. Amount or percent of deposits and other accounts that will be withdrawn from local banks by base personnel leaving the area.

b. Amount of business that will be lost by savings and loan, mortgage and credit union companies.

Utilities

This descriptor helps define the attributes of regional economic stability and public sector revenue. The following types of utilities, both public and private, should be reviewed.

a. Water services provided to the base and percent of business due to the base and base personnel.

b. Natural gas services provided to the base and percent of business due to the base and base personnel.

c. Electric services provided to the base and percent of business due to the base and base personnel.

e. Coal service provided to the base and percent of business due to the base and base personnel.

f. Sewage and sanitation services provided to the base and percent of business due to the base and base personnel.

g. Refuse collection services provided to the base and percent of business due to the base and base personnel.

Public Facility Revenue

This descriptor helps define the attribute of public sector revenue. The following types of facilities may provide revenues for the local governments.

a. Recreational facilities such as golf courses, rented park shelters, boat dock facilities on lakes or rivers and others.

b. Indoor meeting or recreational facilities such as an arena, fairgrounds or coliseum.

c. Museums, historical sites and other similar types of possible revenue-producing facilities.

Public Utility Revenue

This descriptor helps define the attribute of public sector revenue. The same type of utilities should be considered for this descriptor as were identified under the Utilities descriptor, but limited to those utilities that are owned and operated by the public or local government organization such as the city, county or township.

Taxes

This descriptor helps define the attribute of public sector revenue. The following types of taxes should be considered in evaluating this descriptor.

a. State income taxes. This is based upon the employee's salary and supplemental incomes earned by the employee and other family members. Only the military pay of nonresident military personnel is exempt. Taxes paid by resident military personnel depends on the particular state laws.

b. Local income taxes should be based upon the same factors as in paragraph a.

c. State and local sales taxes. This is related to the change in retail sales that will occur with the base closure.

d. Personal property taxes. This is related to the change in population that will occur with the base closure.

e. Gasoline tax reimbursements.

f. Real estate or property taxes.

Miscellaneous Revenues

This descriptor helps define the attributes of public sector revenue and to an extent regional economic stability. The following types of revenue should be considered.

a. Revenue sharing funds from the Federal and State governments.

b. Federal and State subventions.

c. Revenues from vehicle licenses, permits and court fines.

Zoning Restrictions

This descriptor helps define the attribute of land use patterns. The types of zoning in the community and around the base may be affected as a result of a base closure and population losses. The following types of land uses should be considered.

a. Residential, both single and multiple family residences, including apartment and condominium complexes.

b. Commercial and industrial land uses.

c. Agricultural land uses.

Airport Facilities

This descriptor helps define the attribute of land use patterns. The use of the base for airport facilities will affect the use of the land in the same manner that the base did prior to closure. The affects will be in terms of zoning restrictions and noise.

Transportation

This descriptor is described by the Local Transportation descriptor. However, it also includes the

proposed highways, expressways and main throughfares planned that affect the land use patterns of the community. It also includes the proposals for mass (rapid) transit systems and their relationship to the land use patterns.

Community Services and Facilities

This descriptor helps define the attributes of community needs and life styles. The following types of services and facilities should be considered in evaluating this descriptor.

a. Medical care, including hospitals, clinics and other local health agencies.

b. Charity support for the community provided by the base personnel and various base organizations.

c. Mutual aid agreements between the base and the local community, such as for fire protection.

d. Indoor and outdoor recreation facilities.

e. Quality and quantity of the utility services provided the local community.

Government Structure

This descriptor helps define the attributes of community needs and life styles. The following factor should be considered in evaluating this descriptor.

a. Local governmental bodies surrounding the base, including townships, cities, counties and even states.

Base Facilities

This descriptor helps define the attributes of community needs and life styles and land use patterns. Information about the descriptor will enable a better analysis of possible future uses of the base in the event of a base closure. The following factors should be considered in evaluating this descriptor.

a. Base lands, including acreage and general use categories.

b. The number, types, use and condition of the buildings on the base or a reference source where this information may be obtained.

c. A description of the mission, personnel and special use facilities on the base.

APPENDIX E

TAB A-1 ENVIRONMENTAL NARRATIVE TABLE OF CONTENTS

WRIGHT-PATTERSON AFB
TAB A-1 ENVIRONMENTAL NARRATIVE

1 December 1976

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APPENDIX F

TAB A-1 DESCRIPTOR REFERENCES

Part I: Natural Environment
Part II: Human Environment

This appendix relates the Air Force Environmental Reference Numbers (AFERN) from the Wright-Patterson AFB TAB A-1 to the descriptors used in the TAB A-1 analysis in Chapter III. Information about a descriptor can be obtained from the Wright-Patterson AFB TAB A-1 by reference to the appropriate AFERN.

PART I: NATURAL ENVIRONMENT

Subcategory	Descriptor	TAB A-1 AFERN
Earth	Erosion	3.1.2.2; 3.1.3; 3.1.3.3
	Solid Waste Disposal	3.1.4.1; 4.4.2.2.8; 4.4.3.7.1
Water	Quantity and Source	3.2.1.1.1; 4.4.2.2.1
	Quantity of Sewage and Industrial Waste	4.4.2.2.2
	Storm Drainage Characteristics	3.2.3.3; 4.4.2.2.7
	Effluents, Disposal and Capacity	1.3; 1.6; 3.2.3.1
	Quality of Treated Effluent	
	Facilities, Plans for New or Expansion	1.3; 4.4.2.2.2
Air	Air Pollutant Sources	1.3; 1.6; 2.2.3; 3.3.2.2; 3.3.2.3.1
	Type and Quantity of Pollutants Generated on Base	3.3.2.2; 3.3.2.3.1
	Type and Quantity of Pollutants Generated in Local Area	3.3.2.1
	Area Meteorological Conditions	3.3.1; 3.3.3.4

Subcategory	Descriptor	TAB A-1 AFERN
Biotic	Base Land Use	3.1.2.1 thru 3.1.2.5; 3.4.1.1 thru 3.4.1.5; 3.4.1.1.1; 4.3.5.6.2
Noise	Aircraft Types	2.2.3; 5.2.5
	Aircraft Operations	4.5.4.1; 5.2.5
	Aircraft Noise Levels and Noise Contours	4.3.1.2.3; 4.5.7.2; 4.5.8; 5.2.5
	Noise Level in Housing and Business Areas Surrounding Base	1.7; 4.4.1.2.3; 4.4.3.4.1; 5.2.5
	Motor Vehicle Noise Level	4.4.1.2.3; 4.4.1.3.1; 4.4.1.3.2; 4.4.3.1.1
	Construction Noise Level	4.2.4.4; 5.2.5

PART II: HUMAN ENVIRONMENT

Descriptor	Factors	TAB A-1 AFERN
Population		1.11; 4.1.1; 4.1.2; 4.1.3
	Number of Military Personnel	4.1.1.2; 4.2.2.2.1
	Number of Civilian Employees	4.1.1.2; 4.2.2.2.1

Descriptor	Factors	TAB-A-1 AFERN
Population (continued)	Number of Nonappropriated Employees	4.2.2.2.1
	Employee Age and Years of Service	4.1.1.2
	Employee Family Size	4.1.4
	Population Breakdown by Residence	4.1.1; 4.2.2.2.4
Unemployment		1.11; 4.2.2; 4.2.2.1.1
	Number of Employees	4.1.1; 4.2.2.2.1
	Other Federal Job Opportunities	4.2.2.2.5
	Employee Education Level, Skills and Prior Occupation	4.1.5; 4.1.7
	Prevailing Local Economy and Labor Market	4.2.2.1.2; 4.2.2.4.1; thru 4.2.2.4.4; 4.2.6
	Unemployment Rate	4.2.2.1.1
Housing Market		1.1; 4.2.5; 4.2.5.3
	Number of Personnel Who Own and Who Rent	4.2.5.1.1; 4.2.5.1.2; 4.2.5.1.3
	Vacancy Rate of Owned and Rental Units	4.2.5.2
	Number of Personnel in Military Quarters	4.2.5.4
	Average Home and Land Value	4.2.5.1.2; 4.4.3.2

Descriptor	Factors	TAB A-1 AFERN
	Construction Activity	4.2.5.3
	Mortgage Foreclosure Rate	
	Real Estate Business Volume	4.2.2.4.3
Education		1.12; 4.3.3
	Enrollment in School District, by School, Public and Private	4.3.3.1; 4.3.3.2
	Air Force Dependent Enrollment	4.3.3.3; 4.3.3.1
	School Capacities	4.3.3.6
	School System Revenues *from PL 81-874* Funds	*4.2.3.3; 4.3.3.3*
Retail Sales		1.12; 4.2.2.4; 4.2.4
	Total Income of Personnel	4.1.6; 4.2; 4.2.2.2.1 thru 4.2.2.2.3
	Local Retail Establishments	4.2.2.4.1; 4.2.2.4.2; 4.2.2.4.3
	Number of Common Carriers	4.2.2.4.3; 4.2.4.2
	Base Exchange and Concessions	4.2.4.5; 5.2.1
	Base Procurements in Local Community	4.2.4; 4.2.4.1 thru 4.2.4.5; 5.2.1

Descriptor	Factors	TAB A-1 FERN
Local Transportation	Mass (rapid) Transit System	4.4.1.2.4
	Private Automobile	4.4.1.2.3; 4.4.1.3.1; 4.4.1.3.2
	Transportation Network	1.8; 4.2.4.2; 4.4.1.1; 4.4.1.2.1 thru 4.4.1.2.5; 4.5.4.2
Financial Institutions		4.2.3.7
	Banks, Deposits and Other Accounts	4.2.2.4.1; 4.2.2.4.3
	Savings and Loan Companies, Home Loans	4.2.2.4.1; 4.2.2.4.3
	Mortgage Companies	
	Credit Unions	4.2.2.4.1; 4.2.2.4.3
Utilities		1.3; 4.4.2
	Water Service	1.3; 3.1.3.1; 3.2.1.1.1; 3.2.1.1.2; 4.4.2.1; 4.4.2.2.1
	Sewage Service	1.3; 3.1.4.1; 3.2.3.1
	Refuse Collection Service	3.1.4.1; 4.4.2.2.8
	Telephone Service	2.2.2; 4.4.2.2.9
	Energy Services:	
	Natural Gas	1.3; 4.4.2.2.6

Descriptor	Factors	TAB A-1 AFERN
	Electric	1.3; 4.4.2.2.3
	Coal	1.3; 4.4.2.2.5
	Liquid Fuel/Fuel Oil	4.4.2.2.4; 4.4.2.2.5
Public Facility Revenues		1.1; 4.2.3; 4.2.3.2; 4.2.3.3
	Community Owned and Operated Recreation Facilities	4.3.5.6.1
	Museums, Historical Sites and Other Facilities	4.3.5.4.1
Public Utility Revenues		1.12; 1.3; 4.2.3.3
	Community Owned and Operated Utilities	4.2.3.3; 4.4.2.1
Tax Revenues		1.12; 4.2.3.1
	State and Local Income	4.2.3.1.1
	State and Local Sales	4.2.3.1.3; 4.2.3.3
	Personal Property	4.2.3.1.4
	Real Estate/Property	4.2.3.1.2; 4.2.3.3
	Gasoline Reimbursement	4.2.3.3

Descriptor	Factors	TAB A-1 AFERN
Miscellaneous Revenues		1.12; 4.2.3.3
	Revenue Sharing Funds	4.2.3.3
	Federal and State Subventions	4.2.3.3
	Licenses, Permits, Fines	4.2.3.3
Zoning Restrictions		1.4; 4.3.1.2; 4.3.1.2.1; 4.3.1.2.2; 4.3.1.2.2.1; 4.3.1.2.2.2; 4.3.1.2.3
	Residential Land Use	4.4.3.1; 4.4.3.1.1; 4.4.3.1.2; 4.4.3.3
	Commercial/Industrial Land Use	4.4.3.1; 4.4.3.1.1; 4.4.3.1.2; 4.4.3.3
	Agricultural Land Use	4.4.3.1; 4.4.3.1.1; 4.4.3.1.2; 4.4.3.3
Airport Facilities		1.0; 1.7; 4.4.3.4; 5.2.5
	Zoning Restrictions	4.3.1.2.2.1; 4.3.1.2.2.2; 4.4.3.4.1; 4.4.3.4.2; 4.5.4.2; 5.2.5
	Noise	4.3.1.2.2.1; 4.3.1.2.2.2; 4.4.3.4.1; 4.4.3.4.2; 4.5.4.2; 5.2.5
Transportation		4.2.1; 4.2.6; 4.4.1

Descriptor	Factors	TAB A-1 AFERN
Transportation (continued)	Transportation Network and Land Use	4.4.1; 4.4.1.2.5
Community Services and Facilities		4.3.4; 4.3.5
	Medical Care by Hospitals, Clinics and Local Health Agencies	4.3.4; 4.3.4.1; 4.3.4.2; 4.3.5.3.1; 4.3.5.3.2
	Charity Support by the Base	4.2.3.6
	Mutual Aid Agreements	4.3.5.1; 4.3.5.2
	Recreational Facilities	4.3.5.6.1; 4.3.5.6.2
	Quality and Quantity of Utility Services	
Government Structure		2.1.2; 4.3.1; 4.3.2
	Local Governments and Political Relationships	4.3.1.1; 4.3.1.1.1 thru 4.3.1.1.5; 4.3.1.2; 5.1
Base Facilities		1.0; 1.1; 4.4.3.5
	Base Lands	1.0; 4.4.3.5.1; 4.4.3.5.2
	Description of Facilities	1.1; 4.4.3.6; 4.4.3.6.1; 4.4.3.6.2; 4.4.3.7; 4.4.3.8; 5.2.5
	Number, Types, Uses and Conditions of Buildings	4.4.3.5; 4.4.3.6

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BIOGRAPHICAL SKETCH OF THE AUTHORS

Captain Kahler graduated with a Bachelor of Science Degree in Industrial Engineering from the University of Wisconsin at Madison in June, 1969. He entered Undergraduate Pilot Training at Randolph AFB, Texas and received his Pilot Wings in September, 1970. He was assigned to the 38th and 48th Tactical Airlift Squadrons, 313th Tactical Airlift Wing (TAC) at Forbes AFB, Kansas where he flew the C-130E "Hercules." In August of 1973, Captain Kahler was reassigned to the 21st TASq of the 374th TAWg (PACAF) at Ching Chaun Kang AB, Republic of China. In November, 1973, he moved to Clark AB, Republic of the Philippines, when the 374th TAWg and 21st TASq were relocated to Clark AB. From November 1973 until April 1976, Captain Kahler served as an Aircraft Commander, Instructor Pilot, and as a Standardization/Evaluation Pilot. In April, 1976, he was assigned to the School of Systems and Logistics, Air Force Institute of Technology, Wright-Patterson AFB, Ohio, to obtain a Master's Degree in Facilities Management. His next assignment in June, 1977, is as an Industrial Engineer with the 56th Civil Engineering Squadron (TAC), MacDill AFB, Florida.

Captain Paterson graduated from the State University of New York at Buffalo in May, 1966, with a Bachelor of Science Degree in Civil Engineering. He is a registered Professional Engineer. He entered active duty with the

Air Force in June, 1966, with an initial assignment to the 821st Civil Engineering Squadron at Ellsworth AFB, South Dakota. This was followed by tours in the 820th Civil Engineering Squadron (Heavy Repair) DaNang AB, RVN, the 443rd Civil Engineering Squadron, Altus AFB, Oklahoma, at Headquarters USAF Southern Command, Albrook AFS, Canal Zone, and the 24th Civil Engineering Squadron, Howard AFB, Canal Zone. Captain Paterson has held positions in the Engineering, Operation and Maintenance, and Programming Branches of Civil Engineering. In May, 1976, he was assigned to the Air Force Institute of Technology at Wright-Patterson AFB, Ohio to obtain a Master's degree in Facilities Management. Captain Paterson's next assignment will be with the Aeronautical Systems Division, Civil Engineering, Wright-Patterson AFB, Ohio.