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An Analysis of the Air Force Environmental Management System

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AN ANALYSIS OF THE AIR FORCE ENVIRONMENTAL MANAGEMENT SYSTEM

THESIS

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Presented to the faculty of the Graduate School of Engineering and Environmental Management of the Air Force Institute of Technology

Air University

Air Education and Training Command

In Partial Fulfillment of the Requirements for the

Degree of Master of Science in Engineering and Environmental Management

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Abstract

In order to be effective and responsible stewards of the environment, the Air Force needs an environmental management system that is properly constructed, organized, and operated. Unfortunately, the current state of the Air Force's environmental management system is not clear.

This research, utilizing a variety of analytical and quantitative tools, provides a better understanding of the current state of the environmental management system in the Air Force. First, areas of vulnerability within the existing Air Force environmental management system were identified through an analysis of Environmental Compliance Assessment and Management Program (ECAMP) data and a field investigation. Through this analysis, eleven systemic areas of vulnerability were identified. A breakdown of the areas of vulnerability are presented to provide insight and guide Air Force environmental leaders in correction efforts. Additionally, a correlation was made of areas of vulnerability in the current Air Force environmental management system with model environmental management system elements exemplified by International Organization for Standardization (ISO) 14000 standards.

AN ANALYSIS OF THE AIR FORCE ENVIRONMENTAL MANAGEMENT SYSTEM

I. Introduction

Background and General Issues

The United States Air Force, like all federal agencies, is faced with the difficult task of complying with applicable federal, state, and local environmental laws and standards (DAF, 1994b:1). In addition, Executive Order (EO) 12088, dated October 13, 1978, states that all executive branch agencies shall pursue "the best techniques and methods available" to meet applicable environmental standards (United States Congress, 1978:4659). Consequently, the Air Force is continually searching out ways in which to improve compliance, and meet applicable laws and regulations. The Air Force currently utilizes a strict compliance auditing system, entitled the Environmental Compliance Assessment and Management Program (ECAMP), as their primary weapon in the struggle for compliance. The ECAMP focuses on the applicable laws and regulations as a basis to assess the status of environmental compliance (DAF, 1994a:2). Unfortunately, due to the focused scope of the program, it fails to address the fundamental systemic changes that are needed within an organization to achieve long-term compliance.

Although the current ECAMP auditing system provides a means for ensuring that an installation is meeting certain environmental standards, it does not address, nor appropriately recognize, the root causes of the problems which leave the installation

vulnerable. The root causes of these problems can only be corrected through recognizing that they exist and implementing operational systemic changes. It is addressing these systemic problems that will result in an overall healthier and environmentally sound installation.

Consequently, the need for an effective environmental management system is critical. An effective environmental management system controls and regulates installation activities. If properly designed and implemented, the environmental management system provides programs and procedures which will ensure that the installation will meet all applicable laws and regulations. In order to achieve this, the current Air Force environmental management system must be closely analyzed. This analysis will identify areas that require improvement, in an attempt to meet the necessary elements of a model environmental management system.

With the recent advent of the International Organization for Standardization (ISO) 14000 standards, one model of an effective environmental management system has been internationally defined. According to ISO 14000, an environmental management system is defined as "the part of the overall management system that includes organizational structure, planning activities, responsibilities, practices, procedures, processes and resources for developing, implementing, achieving, reviewing and maintaining the environmental policy" (ISO, 1996:7). Establishing and upholding an environmental management system in the Air Force which meets the standards of such a model environmental management system is the next step in the process of achieving a system that addresses and rectifies problems through its normal and routine implementation.

Exercising ISO 14000 standards as a benchmark will ensure that the "best available technology and methods" are used, fulfilling the requirements EO 12088 (United States Congress, 1978:4659).

Importance of Research

The current Air Force environmental management system must be re-focused and re-directed toward solving the systemic problems within the organization. The focus of this effort needs to be clearly defined and isolated to produce the best results. Until weaknesses and areas of enforcement vulnerability within the current environmental management system are identified, operational systemic problems will continue to plague Air Force installations worldwide.

Problem Statement

Currently, it is unclear where areas of vulnerability lie within the existing Air Force environmental management system because there is no systemic, meaningful analysis of the deficiencies. Thus, in order to obtain the most efficient and effective environmental management system for the Air Force, a better understanding of where environmental management system efforts should be focused is needed. Without this basic understanding, future efforts may be misguided.

Research Objectives

The purpose of this research is to investigate the environmental management systems in the Air Force in an attempt to gain a basic understanding of the current system. This knowledge will then be used to identify where future environmental management efforts should be directed to obtain the best results. With this knowledge, Air Force environmental leaders will be in a position where they can implement changes and thereby achieve increased environmental performance. Specific research objectives are as follows:

1. Analyze ECAMP finding descriptions in order to identify weakness in the current environmental management system.
2. Provide a breakdown of the research findings in an effort to guide Air Force environmental management system correction efforts.
3. Provide a comparison of the current state of the Air Force environmental management system with model environmental management system elements, as exemplified by the globally accepted ISO 14000 standards.

Scope

The scope of this research will include data collected from fourteen Air Force installations. As members of three different major commands (MAJCOMs), the fourteen installations have a variety of missions, and thus represent a cross-section of the entire Air Force. The MAJCOMs studied are Air Education and Training Command (AETC), Pacific Air Command (PACAF), and Air Force Material Command (AFMC).

Data collected were from ECAMP audits performed at the fourteen different installations during the period from 1995 to 1997. The root causes associated with the findings provided by the ECAMP audit team were used to focus the initial efforts of this research. Because the primary objective of this research is to identify and determine weaknesses in the current environmental management system, only negative findings were used in the analysis. Positive findings do not provide the required information needed in this analysis, as they fail to identify areas that are weak but, rather, illustrate areas that are exemplary.

In addition, a field study was performed at Maxwell Air Force Base, Alabama, to validate the root causes from the ECAMP reports, and to act as a mechanism to determine groupings within my analysis. Finally, areas identified as requiring improvement are compared against model environmental management system elements, as exemplified by ISO 14000, giving the Air Force a better understanding of its current state.

Thesis Overview

Chapter II of this study provides an overview of environmental management system theory and its recent evolution. A review of compliance audits and, more specifically, the capacity of the current Air Force ECAMP auditing system is also provided. In addition, environmental management systems, environmental management system audits, and their effect on installation compliance are also addressed. Finally, the importance and specifics of the ISO 14000 standards and philosophy are presented.

Chapter III illustrates the methodology that was utilized in this study. The data used is provided as well as a detailed look at the statistical procedures used in the analysis. The analytical technique used to organize the resulting data is also presented.

Chapter IV provides the analysis and results of this research. Areas of vulnerability within the current Air Force environmental management system, as identified through this research, are provided. A breakdown of the results is given, providing direction for Air Force leaders in their correction efforts. Also a comparison of the current state of the Air Force environmental management system is made with model environmental management system elements as exemplified by the new internationally accepted ISO 14000 standards.

Chapter V provides a summary of the results of this research. Also, general and specific conclusions resulting from the research are provided. Limitations of the research and recommendations for future research are presented.

II. Literature Review

Overview

This literature review will investigate the evolution of environmental management paradigm shifts, and the rationale for these paradigms. A review of model environmental management system elements, according to the new ISO 14000 standards, is provided. Finally, a distinction between compliance and management system audits is illustrated to provide a glimpse of where the current Air Force environmental management systems audits are today.

Environmental Management Theory

Environmental management can be defined as "coordinated control, direction, or influence of all human activities in a defined environmental system to achieve and balance the broadest possible range of short- and long-term objectives" (Cairns, 1991:5). Unfortunately, short- and long-term objectives are not always clearly defined, and the extent to which human activities can be controlled is a function of the current societal values and goals. Therefore, the extent to which environmental management should be implemented is not always clear.

Environmental management is extremely dynamic in nature. It continually changes as society's perceptions and ideals change. Sparked with the advent of environmentalists expressing their views, such as Rachel Carson in the 1960's, and the ever increasing world population, environmental management has taken on a myriad of objectives and goals over

time, to combat the increasing number of global environmental problems (Compton, 1993:13-14).

Over time, various paradigms have been developed with regard to how society views the role environmental management should play, and how it should be carried out. Each of these paradigms contain their own ideals and mechanisms to achieve a healthier environment. The paradigms range in themes from the anthropocentric view, where there is open exploitation of natural resources, to sustaincentrism, where sustainable development is the underlying theme (Colby, 1991:196; Gladwin, Kennely, and Krause, 1995:894). A progression of paradigm shifts has occurred during the development of such views, introducing concepts such as environmental protection, resource management, eco-development, and deep ecology (Colby, 1991:195).

The major over-riding theme of the anthropocentric paradigm is the full exploitation of infinite natural resources (Colby, 1991:196). Under this paradigm, people are unaware of the reliance on, and need for, ecological balance (Colby, 1991:196). Human desires are "central and unlimited", and "individuals behave in self-interested and consistent manner to maximize their utility" (Gladwin, Kennely, and Krause, 1995:884). This view does not adequately deal with "intergenerational, intragenerational and interspecies equity" (Gladwin, Kennely, and Krause, 1995:886). Thus, the environment is pillaged of its resources without regard for the long-term damaging consequences. This view of "shallow environmentalists" depicts humans as the supreme entity dominating nature (Gladden, Kennely, and Krause, 1995:881). As a result, a responsible relationship

between the environment and humans is never developed, "placing an extremely large and risky wager on the future" (Gladden, Kennely, and Krause, 1995:886).

The environmental protection paradigm operates in more of an environmental protection capacity, where a remedial or defensive type of posture is accepted (Colby, 1991:200). This paradigm includes an "end-of-pipe" mentality, where concern is not given to the handling of the waste until after it has been generated (Colby, 1991:197). Under this paradigm, governmental laws and regulations are set up to reduce the amounts of waste that are generated by enforcing limits on the amounts of constituents that can be produced and released into the environment. However, this process fails to offer the generators incentive for reducing the amount of waste that is generated below the allowable levels. In addition, a management system is not established and implemented which continually seeks out and finds ways to reduce the wastes that are generated. The polluter has no incentive to reduce waste, leaving little room for improving the overall health of the environment. Due to this defensive type of posture, the establishment of an effective environmental management system is not emphasized. Thus, long-term systemic corrections cannot be accomplished, and environmental performance is not properly handled.

The resource management paradigm focuses more on continual improvement and global efficiency (Colby, 1991:196). This paradigm operates on the "polluter pays principle," where the corporations are held responsible for the waste that they generate (Colby, 1991:204). The shift to a resource management approach forces organizations to look at their processes and systems prior to the generation of waste. The act of placing

monetary value on pollution will force organizations to take pollution into account when making economic decisions (Compton, 1993:23). Consequently, an interdependence between success in the business world and protection of the environment is created. This encourages corporations to implement a strong environmental management system, seek out and discover ways to reduce waste generation, and thus in-turn, increase their market shares. Consequently, "sound resource management and careful protection of the environment are necessary to American society and the value of the economy" (Adams, 1985:6). However, the possible downfall of the "polluter pays principle" is that it could possibly limit organizational entry into the marketplace due to the extra costs involved (Colby, 1991:204). Also, the government maintains an authoritative role where by it sets the allowable quantities and locations of pollution.

Another perspective on environmental management is presented by the eco-development paradigm. In this paradigm, environmental protection and the economy are viewed as co-developed entities (Colby, 1991:196). It emphasizes the need for environmental protection and the economy, to be developed and created together. This leads to a "pollution prevention pays" mentality, where proper planning and the implementation of management systems allow for greater growth and a healthier environment (Colby, 1991:205). The implementation of this paradigm requires that ecological concerns be embedded into economic modeling and decision making (Colby, 1991:204-205). This principle requires that a great deal of research, planning, and follow-up be accomplished in order to be effective and beneficial.

Another paradigm, referred to as deep ecology, examines biospecies equality where there is a conservation of cultural and biological diversity (Colby, 1991:199). Under this paradigm, the earth is viewed as "the nurturing mother of life" and that "nonhuman nature should be used by humans only to satisfy vital needs of sustenance" (Gladwin, Kennely, and Krause, 1995:886). Under this concept, symbiosis is reached through the development of human "harmony with nature" (Colby, 1991:196). Deep ecology offers "a worldview that is more holistic, integrative, and less arrogantly anthropocentric" (Gladwin, Kennely, and Krause, 1995:888). Within this system, the value of all living things is recognized, and humans are simply viewed as but one strand in the web of life (Gladwin, Kennely, and Krause, 1995:886). Thus, human value and the value of nature are intimately intertwined.

A new "integrative" paradigm referred to as "sustaincentrism" has recently been developed (Gladwin, Kennely, and Krause, 1995:876). This paradigm is composed of a combination of the various views already presented. Sustaincentrism "offers a vision of development which is both people centered (concentrating on improvement in the human condition) and conservation based (maintaining the variety and integrity of nonhuman nature)" (Gladwin, Kennely, and Krause, 1995:894). Gladwin et al., view sustaincentrism as the "perspective which is most congruent with the requirements of sustainable development" (1995:894). Sustainable development is defined as "development that meets the needs of the present without compromising the ability of future generations to meet their own needs" (Lang, 1993:20). Sustainable development is additionally viewed as "a process of achieving human development in an inclusive, connected, equitable,

prudent, and secure manner" (Gladwin, Kennely, and Krause, 1995:878). Overall, the marriage of the concepts of sustainable development and environmental management is "concerned with the sorts of general strategies that might be followed in the interests of preventing further environmental deterioration" (Compton, 1993:23). Although society is beginning to understand the concept and benefits of sustainable development, it is not in agreement on the role environmental management systems should play in order to achieve it. The proper development and implementation of effective environmental management systems could rectify this situation, and be used as mechanisms to make the idea of sustainable development a reality.

The paradigms presented illustrate the changing ideas and concepts that have been, and are currently associated with environmental protection. Through these changing perspectives, the notion of the environmental management system has emerged. A properly constructed and operated environmental management system is a tool that can aid organizations in meeting environmental obligations and concerns. Consequently, as society has moved through the range of paradigms from the anthropocentric view, toward the idea of sustainable development, the need for a strong environmental management system within the organization has become increasingly critical.

Environmental Management Systems

Environmental management systems are becoming the focus of attention in the market place as organizations continue to seek out better ways to ensure and achieve compliance. The fundamental environmental management system design and

implementation is critical to its success. Typically, environmental management systems are composed of adequate environmental policies and administrative procedures (Marguglio, 1991:6). Here, adequacy refers to "the state of containing nothing more and nothing less than is necessary to get the job done" (Marguglio, 1991:6). Each of these elements of an environmental management system is essential and must be properly designed and implemented in order for the system to be effective and successful.

Marguglio argues that the underlying goal of environmental management systems is to emphasize elements necessary to prevent noncompliance and to detect and correct noncompliance issues before they become a significant problem (1991:6). Environmental management systems are designed and implemented to allow an organization to become proactive in the environmental arena, identify areas of concern, and correct the problem systemically to prevent future occurrence. The systemic change is made to assure that the proper root cause of the problem is addressed, and that the problem will not resurface later. A root cause of a problem is defined by Marguglio as "a cause which when eliminated will result in the avoidance of a repetition of the noncompliance at hand, as well as the avoidance of a similar noncompliance in the process which was audited or in any other process" (1991:116). Thus, a properly established environmental management system becomes a mechanism by which the systemic root cause is addressed and permanently corrected. As a result, it is evident that the implementation of an environmental management system within the organization is critical in the quest to identify, systemically correct, and prevent future re-occurrence of vulnerability issues.

Environmental Management Systems Audits

Over the past few years, there has been a shift from traditional audits used to determine an organization's compliance with laws and regulations, to the concept of environmental management audits where areas of vulnerability are identified (Schomer, 1995:11). Environmental management system audits do not primarily focus on compliance issues, but rather on the existence and adequacy of policies, requirement-type documents, and procedures (Marguglio, 1991:110). The objective of the environmental management system audit is to examine, and ensure that the proper mechanisms are in place to eliminate the occurrence of noncompliance issues. Overall, environmental management system audits attempt to identify problem areas, and permanently correct them through systemic changes within the organization. The audit verifies whether an appropriate management system has been established that will reduce noncompliance by the organization. Verification of the existence of this type of system is needed on a continual basis due to rapidly changing environmental laws and regulations, changes in organizational operations, and changes in technology and management systems (Marguglio, 1991:111).

ISO 14000 Approach. The International Organization for Standardization has developed a new global philosophy which will aid organizations in managing their environmental obligations (von Zharen, 1996:15). The new ISO 14000 approach to environmental auditing is defined as:

> the systematic, documented verification process of objectively obtaining and evaluating evidence to determine whether specified environmental activities, events, conditions, management systems, or information about these matters

> conform with the audit criteria, and communicating the results of this approach to the client (von Zharen, 1996:68).

The ISO 14000 auditing approach attempts to identify problem areas and permanently correct them through systemic changes within the organization. If environmental management is "deeply integrated" into the operations of an organization, "it will be able to make more meaningful and long-term positive changes" (Kuhre, 1995:7).

ISO 14000 provides a proactive approach to environmental auditing. It was designed not only to help organizations manage their environmental obligations, such as compliance with legal requirements, but to also define management processes that should be followed in order to control the organization's impact on the environment (von Zharen, 1996:15). The ISO 14000 environmental auditing approach focuses on the root causes of the problem, such as a lack of procedures or insufficient training, in an effort to strengthen the organization's position (Willig, 1995:32). Thus, this approach provides compliance assurance and takes the environmental audit to the next step, where continual improvement becomes the focus. In a recent report analyzing the Army's Notice of Violations (NOVs) versus their root causes, systemic problems within the organization were identified as playing a major role in their lack of compliance (Baxter, 1993:3-6). Systemic areas of vulnerability identified in this report include lack of knowledge on the part of the installation staffs about their programs, lack of forward funding for capital projects for aging plants or in response to regulatory changes, and lack of maintenance for aging mechanical systems (Baxter, 1993:3-6). The findings of this report clearly illustrate the need within an organization to address systemic problems during the environmental audit process.

The ISO 14000 series of standards are a internationally accepted series for environmental management systems (Kuhre, 1995:8). ISO 14000 standards that specifically deal with auditing are broken down by the following three general documents (von Zharen, 1996:67):

> ISO 14010: Guidelines for Environmental Auditing - General Principles
>
> ISO 14011: Guidelines for Environmental Auditing - Audit Procedures: Auditing of Environmental Management Systems
>
> ISO 14012: Guidelines for Environmental Auditing - Qualification Criteria for Environmental Auditors.

These three documents provide guidelines for which the environmental audit is to be carried out.

According to these documents, the client defines the objectives of the audit; the scope of the audit is determined by both the client and the auditor (von Zharen, 1996:69). Once the basic structure of the audit has been established using the ISO 14000 document guidelines, the audit is then carried out. Environmental management audits will usually last a bit longer than the traditional compliance audits due to the extra time necessary to investigate the organization's management controls (Willig, 1995:33).

In preparation for the environmental management audit, the following specific areas are typically investigated:

> organization annual reports (present and prior three years), organization sales literature, regulatory violation reports, training/educational records, summaries of regulations, industry standards, permits, and Better Business Bureau and media reports (von Zharen, 1996:101-102).

During the actual audit, certain elements of a corporation's existing environmental management system are examined. These elements are given in ISO 14001, and are

presented in Figure 1. Within each of the elements, specific areas under investigation include: risk assessment, communication, procedures, responsibilities, training, record keeping, and self-assessments (Willig, 1995:34-35). Thus, it becomes evident that the environmental (or systemic) audit, as set forth by the new ISO 14000 standards, investigates and addresses a broader range of variables than the traditional compliance audit. The environmental (or systemic) audit will yield results which are effective in reducing future compliance problems.

1. **Environmental Policy**

2. **Planning**
   - 2.1 Environmental aspects
   - 2.2 Legal and other requirements
   - 2.3 Objectives and targets
   - 2.4 Environmental management program(s)

3. **Implementation and Operation**
   - 3.1 Structure and Responsibility
   - 3.2 Training, awareness and competence
   - 3.3 Communication
   - 3.4 Environmental management system documentation
   - 3.5 Document control
   - 3.6 Operational control
   - 3.7 Emergency preparedness and response

4. **Checking and corrective action**
   - 4.1 Monitoring and measurement
   - 4.2 Non-conformance and corrective and preventive action
   - 4.3 Records
   - 4.4 Environmental management system audit

5. **Management review**

Figure 1. ISO 14001 Environmental Management System Elements (Fredericks, 1995:3)

At the conclusion of the audit, a formal presentation of the results is given by the auditors to the client. During this presentation, a written non-conformance report, and a general idea of whether the organization meets the standards, are presented (von Zharen, 1996:103). At this point, the organization will have a better understanding of their current position with respect to having established the necessary elements of a model environmental management system. It is then up to the individual organization to follow through and correct the findings identified by the environmental management audit. The organization must consider costs of setting up and maintaining new programs, and the potential liabilities for not executing a quality program.

Organizations, both service and manufacturing, may chose to internally pursue the development of a model environmental management system because of the many benefits that it offers. Some of the major benefits include: protection of the environment, equal competitive basis, demonstrated compliance with regulations, establishment of effective management systems, reduced costs in environmental control and cleanup, reduced injuries, improved community relations, improved customer trust and satisfaction, and improved upper management attention (Kuhre, 1995:11-18). Organizations may chose to utilize ISO 14000 standards for any one of the following reasons: as a model for an environmental management system, as a format to audit an existing environmental management system against, as a method to demonstrate an environmental management system compliance, as a process for third party and/or customer recognition, and/or as a platform for public recognition of their environmental management system (Fredericks, 1995:2).

Compliance Audits

The traditional compliance auditing approach, unlike environmental management system audits, is a reactive system which provides results that meet one or more of the following objectives:

> assurance of compliance, definition of liabilities, protection against liabilities for company officials, fact-finding in acquisitions and divestitures, tracking and reporting of compliance costs, information transfer among operating units, increase environmental awareness, or track the accountability of managers (Cahill, 1994:I-15).

The results of such an audit provide an organization with a collective advantage over organizations who choose not to perform one. However, these results force the organization to react immediately to the problems that have been identified, usually ignoring the need to systemically and methodically analyze the root causes of the problems in order to prevent future findings in the same area.

The compliance auditing approach is good for determining whether a particular organization is in compliance. However, due to the audit's basic structure, it does have some weaknesses. Specifically, compliance audits are not effective in determining and addressing the root causes of violations or findings. The compliance auditing approach needs to be taken to the next level, where these root causes are addressed and proactive programs are implemented to prevent future findings under the same heading. Compliance audits merely identify possible regulatory violations and look for an immediate solution to the problem.

ECAMP. The Air Force's current environmental auditing system, the Environmental Compliance Assessment and Management Program (ECAMP), is best

characterized as a traditional compliance audit. The ECAMP seeks to identify where installations are in violation of current federal, state, and local laws and regulations. The primary objectives of the ECAMP are presented in Figure 2. When a non-compliance finding is observed, it is documented and the installation is required to rectify the situation. However, a limitation of the ECAMP audit approach is that it does not adequately address the systemic problems of the environmental management system which are responsible for the violations. Systemic problems need to be identified and corrected if the installation is going to prevent future violations in the same areas.

1. Improve Air Force Environmental Compliance and Management
   a) Identify and prioritize areas of risk to human health and the environment
   b) Identify and prioritize areas of regulatory vulnerability
   c) Increase base-wide awareness of environmental requirements

2. Build supporting financial programs and budgets for environmental requirements
   a) Validate compliance requirements
   b) Determine funding source

Figure 2. Primary Objectives Of ECAMP (DAF, 1994a:2; Radian International, 1997:1)

Root Causes. During the ECAMP audit, individual auditors from outside the installation observe and assign a root cause code to each finding. The code is assigned in an effort to capture the finding's essence. The ECAMP operates using the root cause codes presented in Figure 3 to justify and reflect the basis for noncompliance.

According to a memorandum from Curtis Bowling, the Acting Assistant Deputy Under Secretary of Defense (Environmental Security), dated 23 April 1997, the proper assignment of root causes to findings is a means to identify the basic causes of compliance

deficiencies or notices of violation (NOVs) (Bowling, 1997). The memorandum goes on to say that root cause corrections will enable an organization to prevent re-occurrence of a violation in the future (Bowling, 1997).

Materials:
M1 Supply
M2 Poor Quality

Personnel:
P1 Awareness of Requirement
P2 Understanding
P3 Not Conscientious (Deals with attitude of personnel)
P4 Result vs. Action (The result did not equal the action taken. Procedures were followed which should have produced favorable result but did not.)
P5 Accountability not assigned
P6 Action vs. Procedure (Correct procedure(s) in place but incorrect action taken)
P7 Insufficient Skills
P8 Inexperience (Not an attitude of personnel)

Equipment:
E1 Controls Failure
E2 Inadequate Facility Design
E3 Monitoring Equipment Failure
E4 Poor Maintenance

Techniques:
T1 Time to do the job
T2 No procedures in place
T3 Priority conflict
T4 Inadequate Procedures
T5 Procedures not available

Figure 3. ECAMP Root Cause Codes (Radian International, 1997:4)

Unfortunately, a weakness of this method for assigning root cause codes to the findings is that, in order for it to be done effectively and accurately, the individual auditors

need to have received proper training. Without proper training, improper assessments can easily be made, and the wrong root cause code is assigned to the finding. Also, the current root cause codes utilized by the ECAMP system fail to adequately address the root systemic causes of the problems which installations are experiencing. The vague terminology and definitions of the root cause codes make it difficult to distinguish the area requiring improvement. Consequently, the improper identification of the systemic root cause of the problem can result. This in turn will prohibit the proper systemic correction of the problem, allowing for reoccurrence.

III. Methodology

Overview

This chapter details the methodology that was utilized in this research. It covers the collection of ECAMP evaluation data, and the statistics employed to identify the most significant root causes from this data. Also, the analytical tool used to analyze the resulting data is presented.

Data Sources

This research utilizes ECAMP findings and their associated root cause data. The root cause data were taken from ECAMP databases, from three different major commands (MAJCOMs), representing a cross-section of the Air Force. These commands include: Air Education and Training Command (AETC), Pacific Air Command (PACAF), and Air Force Material Command (AFMC). The data were collected from a total of fourteen installation audits performed from 1995 through 1997. The actual names of the installations included in the analysis will not be used in order to maintain their anonymity.

Data Analysis

The ECAMP data were initially collected, and the root cause data were extracted for further analysis. The data that were extracted included a description of the root cause for each finding, and the corresponding root cause code. A Pareto Diagram was then

developed from each installation's raw data, as presented in Appendix A, Figures A-2 through A-15.

Kruskal-Wallis One-Way Nonparametric AOV. The root cause data that were collected were analyzed to identify the most significant systemic flaws in the current environmental management system. This analysis consisted of performing a Kruskal-Wallis one-way nonparametric analysis of variance (AOV) on the root cause data. The results of this analysis are presented in Table 1. The Kruskal-Wallis technique was used to provide a measure of the various root cause categories, and in doing so, determine which of the root causes were the most significant. The analysis assumes that the frequency of occurrences are independent, and that the data is not normally distributed. The Kruskal-Wallis technique uses a frequency rank ordering system where by the effects of outliers, within the data, are greatly reduced providing a more accurate analysis. In running the analysis, the root cause codes (P1 through T5) were used as the treatments.

Once the analysis was performed, a comparison of mean ranks was generated to compare the individual rankings of the different root cause codes. The results of the Mean Rank Analysis are shown in Table 2. The mean rank is calculated by summing the matrix containing the ranks that were assigned to each root cause code, and then dividing them by the total number of installations used in the analysis (14). The means were then ranked from highest to lowest to determine which of the root causes occur most frequently, and are therefore more significant. Homogeneous groupings are then developed to illustrate groupings in which the means are not significantly different from one another. It is from these homogeneous groups that the analysis was justifiably limited

to the top four root causes (P1, P2, P4, P6), as P6 is the last root cause code that is not distinguishable from P1, P2, and P4, but is clearly distinguishable from the last homogeneous grouping starting with E2. Consequently, the first three homogeneous groups are represented and this research draws its conclusions from the top four major root causes (P1, P2, P4, and P6) and their subsequent finding descriptions.

Table 1. Kruskal-Wallis One-Way Nonparametric AOV

VARIABLE	MEAN RANK	SAMPLE SIZE
E1	75.8	14
E2	158.3	14
E3	81.6	14
E4	132.8	14
M1	79.0	14
M2	67.5	14
P1	254.5	14
P2	219.1	14
P3	145.7	14
P4	215.8	14
P5	126.1	14
P6	181.3	14
P7	81.6	14
P8	108.0	14
T1	128.4	14
T2	136.8	14
T3	118.9	14
T4	142.6	14
T5	83.0	14
TOTAL	133.5	266

Table 2. Mean Rank Analysis

VARIABLE	MEAN RANK	HOMOGENEOUS GROUPS
P1	254.50	I
P2	219.07	I I
P4	215.79	I I
P6	181.25	I I I
E2	158.25	I I I I
P3	145.68	.. I I I
T4	142.61	.. I I I
T2	136.75	.. I I I
E4	132.75	.. I I I
T1	128.36	.. I I I
P5	126.11	.. I I I
T3	118.89	.. I I I
P8	108.00	.... I I
T5	83.036	.... I I
P7	81.571	.... I I
E3	81.571	.... I I
M1	79.000	.... I I
E1	75.821	 I
M2	67.500	 I

THERE ARE 4 GROUPS IN WHICH THE MEANS ARE NOT SIGNIFICANTLY DIFFERENT FROM ONE ANOTHER.

Compilation Of Major Root Causes

The description of the findings for the four major root causes identified in the analysis were then extracted from the ECAMP evaluation databases for each of the fourteen installations. A total of 417 finding descriptions were used in the analysis from the four significant root causes (P1, P2, P4, and P6). The finding descriptions are listed according to their corresponding root cause codes, and are presented in Appendix B.

Field Investigation

As a member of an external ECAMP for AETC, a field study was performed at Maxwell Air Force Base, Alabama, to validate the root causes from the ECAMP reports, and to provide a mechanism to determine environmental management system weaknesses. The field investigation involved probing the actual root causes of problems on the installations through personal interviews, and site visits. The data collected during the three-day investigation are presented in Appendix C. The field investigation provided a means by which the root cause descriptors and the root cause codes could be witnessed first hand to determine their underlying meanings. The understanding gained from the field investigation provided a means by which the finding descriptions could be grouped. Specific Maxwell AFB ECAMP findings are not part of the 417 findings used in this analysis.

Finding Description Analysis

Once the finding descriptions were compiled according to the four major root cause headings, the finding descriptions needed to be grouped to determine their relative importance and the essence of the findings. An analytical technique, commonly referred to as the KJ method, was utilized to group the findings.

KJ Method / Affinity Diagram. The KJ method was chosen as the analytical technique used in this analysis because of its ability to be implemented by an individual, effectively handle large amounts of data, and accurately identify prevailing issues. The KJ method, named for its founder Jiro Kawakita, allows the user to "clarify the nature, shape,

and extent of problems that effect the near and distant future in fields where there is little or no prior knowledge and/or experience" (Mizuno, 1988:25). The fundamental structure of the method includes the gathering of data, and the drawing of a diagram based on the relationships and similarities found within the data (Mizuno, 1988:25). The diagram generated using this method is commonly referred to as an affinity diagram. An affinity diagram is defined as "a management practice tool which allows the user to create natural groupings from a large number of apparently unrelated pieces of data" (McCloskey, 1993:143). It is "a tool that allows a group (or sometimes an individual) to organize a large and diverse collection of concepts into natural groupings" (McCloskey, 1993:67). Once this is done, a summary header is created to capture the central idea or theme for each grouping (Brassard, 1994:12-16).

In order to gain a complete and full understanding of the current state of the Air Force environmental management system, the 417 finding descriptions (representing P1, P2, P4, and P6) were organized using this method. Once the descriptions were grouped by similarities, a concise heading was given to capture the essence of each grouping. The resulting affinity diagram, containing all of the finding descriptions, is shown in Appendix D. Definitions for each of these headings were developed to reflect the content and meaning of the finding descriptions that they represent. These definitions are presented in Chapter IV - Results and Analysis. It is from this grouping of the data that conclusions as to the current state of the Air Force environmental management system could be drawn.

IV. Results and Analysis

Overview

This chapter presents the results that were obtained from the data analysis utilizing the KJ method. A breakdown of the areas of vulnerability is provided. The areas of vulnerability identified in this study are compared with model environmental management system elements as exemplified by internationally accepted ISO 14000 standards. Environmental management system theory is addressed in light of the comparison. The chapter also provides an analysis of the results as they apply to the United States Air Force.

Classification of Results

Systemic Areas of Vulnerability. Throughout this research, a systemic area of vulnerability is defined and identified as containing findings that can be specifically and directly attributed to a systemic operation of the organization. Systemic operations typically include organizational structure, responsibilities, practices, procedures, processes, or resources for implementing and maintaining environmental management (von Zharen 1996:198). The eleven systemic areas of vulnerability, along with their definitions, an example of a typical finding found in each area of vulnerability, and the number of findings that were found under each of the areas of vulnerability are presented in Table 3. The definitions capture the essence of each of the finding descriptions represented within

each of the groupings. The number of findings that fell within each area of vulnerability are discussed in the Analysis of Areas of Vulnerability section in this chapter.

Table 3. Summary of Eleven Systemic Areas of Vulnerability

Systemic Areas of Vulnerability*	Definition of Areas of Vulnerability	Typical Finding Found In Area of Vulnerability	Number of Findings In Each Area
Ineffective Communication Between CEV and Shops	Environmental requirements and developments are not communicated between entities effectively and in a timely manner.	The hazardous waste determination should have been communicated to shop personnel as soon as the determination was made. Potentially hazardous materials should be handled with care during determination procedures.(P6)	4
Ineffective Communication between Contractors and the Government	Environmental requirements and developments are not communicated between entities effectively and in a timely manner.	Military Public Health is not receiving notification when contractor pest applications are done at the Officers Club, NCO Club, Golf Course, Lounge, and Bowling Lanes.(P1)	5
Ineffective Communication between MAJCOM and Installation	Environmental requirements and developments are not communicated between entities effectively and in a timely manner.	No Air Force or HQ guidance has been provided to the base level organization for dissemination to the general base offices.(P1)	2
Lack of Procedures, Operational Plans, or Programs	A procedure, plan, or program has not been established to meet the requirement.	AFB does not have a Pollution Prevention Management Plan as required by AFI 32-7080, para 2.2.(P1)	18
CEV Knowledge, Awareness and Interpretation	Lack of knowledge, awareness or misinterpretation of applicable environmental laws, regulations and requirements. Lack of knowledge or awareness of developments on the installation.	Personnel are not fully aware of storm water discharge permit requirements.(P2)	20
Lack of Adequate Resources	Number of personnel is not sufficient to handle tasks, or funding is not available.	Lack of adequate resources (personnel) available to accomplish required update.(P1)	3
Failure to Fulfill Training Requirements	Personnel fail to receive or update training according to laws and regulations, or are unaware of the requirement to receive training.	Personnel who handle hazardous materials do not have documentation of their HAZCOM training and/or have not received any HAZCOM training.(P1)	18

Contractor Lack of Awareness and Inadequate Procedures	Problems arising from the lack of awareness and interpretation of applicable environmental laws, regulations and requirements. Problems also arising from inadequate procedures by the contractor to meet these requirements.	Company was apparently unaware of the state licensing requirements for businesses engaging in pest control services for compensation.(P1)	6
Insufficient Follow-Through / Corrective Action Taken	Follow-through/corrective action to correct environmental problems by CEV and Shops is not performed adequately to meet federal, state, local and Air Force requirements. This category includes all repeat findings.	Remaining open from the 1993 External ECAMP, herbicides and insecticides are stored in same room (facility). A hot water shower for personal decontamination of pesticide applicator is not available at the ANG CE Compound.(P2)	33
Shops' Knowledge, Awareness and Interpretation	Lack of knowledge, awareness or misinterpretation of applicable environmental laws, regulations and requirements.	Auto Skills Development Center personnel were not aware that fuel filters are hazardous waste. (P1)	58
Insufficient Documentation	Records, inventories and operational plans are not updated, improperly updated, or do not contain required or correct information.	The Oct 95 pollution prevention plan lacks several elements and contains outdated POC lists. Pollution areas not adequately addressed are affirmative procurement, energy conservation and air and water pollutant reduction. In addition, the execution section is still generic in tone and has procedures to be developed.(P1)	63

*Systemic Areas of Vulnerability: Areas of vulnerability listed contain findings that can be specifically and directly attributed to a systemic operation of the organization.

Broad Areas of Vulnerability. Four broad areas of vulnerability were identified that contained finding descriptions that were not specific enough to accurately identify and directly tie to a single systemic operation of the organization. The findings found in these areas could be attributed to any one of a number of systemic problems. These four broad areas of vulnerability, along with their definitions, an example of a typical finding found in each area of vulnerability, and the number of findings that were found in each of the areas

of vulnerability are presented in Table 4. Again, the definitions capture the essence of each of the finding descriptions represented within each of the groupings.

Table 4. Summary of Four Broad Areas of Vulnerability

Broad Areas of Vulnerability**	Definition of Areas of Vulnerability	Typical Finding Found In Area of Vulnerability	Number of Findings In Each Area
Procedural Issues	Problems arising from existing procedures associated with carrying out environmental requirements.	Personnel were aware of the requirement but failed to secure the fill lines.(P1)	74
Storage and Labeling Issues	Problems arising from the act of storing and labeling containers and materials.	Flammable and corrosive containers were being stored together on the same containment pallet, and the pallet was positioned next to combustibles.(P1)	86
Spill Containment Issues	Problems arising from insufficient facility containment design, or operations.	The secondary containment drain valve was not locked.(P1)	15
Environmental Reporting / Certification Issues	Problems arising from the failure to properly report information or apply for certification.	Organization had not submitted certification to the USEPA that it has acquired certified recovery or recycling equipment.(P1)	9

**Four Broad Areas of Vulnerability: Areas of vulnerability listed contain findings that may have systemic root causes, but they cannot be readily determined and specifically attributed to a systemic operation.

Unclassified Findings. Due to the fact that the findings used in this analysis were entered by individual auditors, personal experiences, judgments, and training could effect the resulting finding descriptions. Consequently, the use of finding descriptions in this analysis is a source of variability. The reliance on others' efficient and accurate input of information into the databases resulted in three finding descriptions that were too vague and indistinct to accurately group. These three findings are presented in Table 5. Thus, of the original 417 findings isolated by the Kruskal-Wallis one-way nonparametric AOV,

only 414 were actually used in the development of the areas of vulnerability in this research.

Table 5. Unclassified Findings

Root Cause Code	Finding Description
P1 - Awareness of Requirement	Base Cultural Resource Manager identified an area of need to compile a historic record of all installation facilities.
P1 - Awareness of Requirement	AFOSH Standard 161-21 describes the requirement to document work place specific hazard communication training and FHCTP on AF Forms 55. Procedures are in place.
P1 - Awareness of Requirement	Individuals were directed to apply IEX code D to item which ensures item is no longer purchased.

Analysis of Areas of Vulnerability

A breakdown of the areas of vulnerability was then developed. This was accomplished by counting the number of finding descriptions that fell under each of the corresponding areas of vulnerability. The frequency count was performed to clearly delineate which of the finding categories had the most extensive number of findings, and thus presented the greater number of problems from a numerical perspective. The Pareto Diagram presented in Figure 4 was developed to illustrate the frequency count. The headings used in Figure 4 were developed in this research, as presented in the section entitled Classification of Results at the beginning of this chapter. Thus, under the Insufficient Documentation, there were 63 findings. Headings in parentheses represent the four broad areas of vulnerability containing findings that could not be directly and specifically tied to a systemic operation of the organization. These broad areas of

vulnerability represent issues that require further investigation to accurately determine the root causes of the problems.

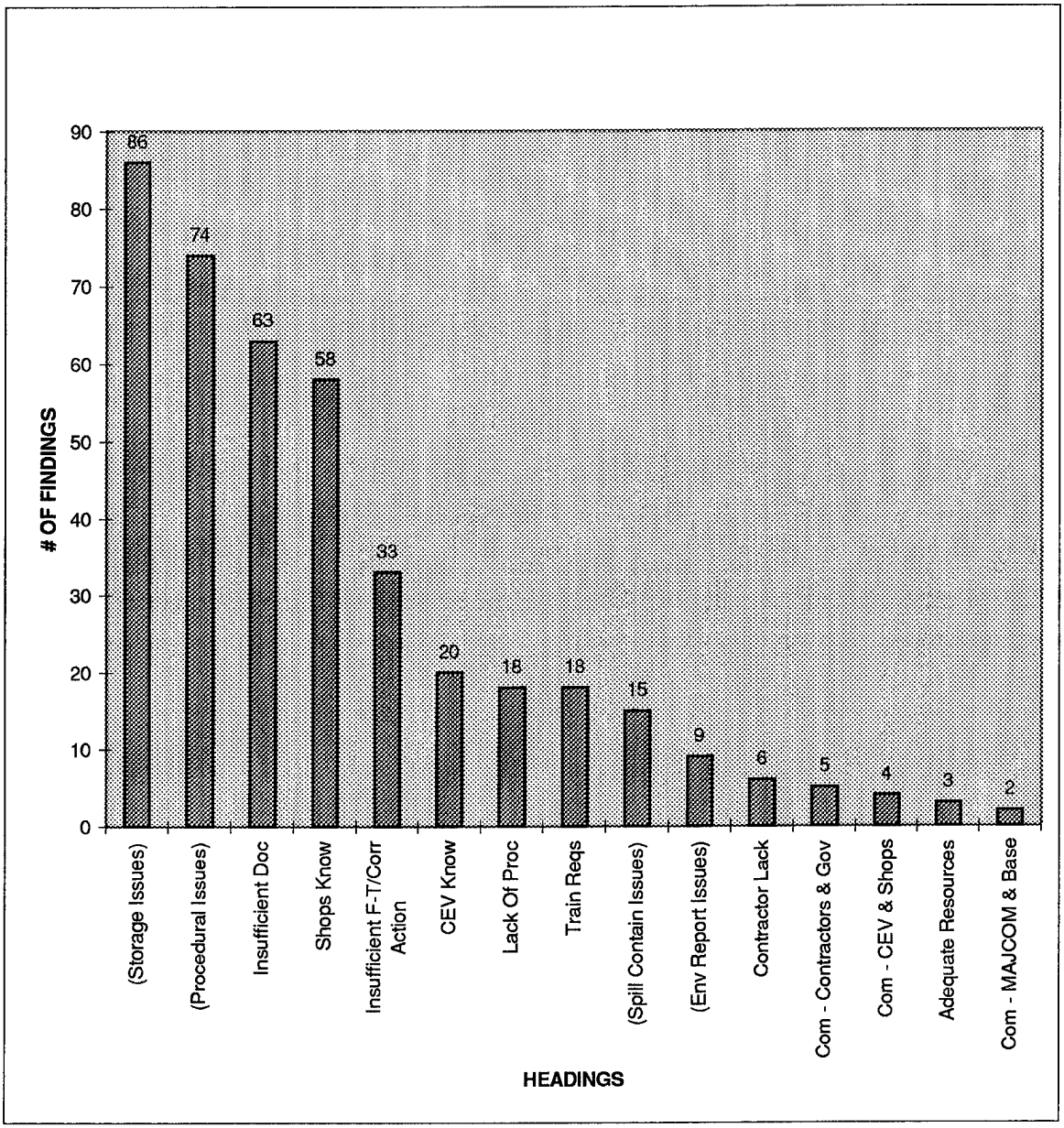


Figure 4. Pareto Diagram of Headings

The Pareto diagram illustrates that of the 414 findings isolated by the Kruskal-Wallis AOV, only 230 could be directly linked to systemic weakness of the existing environmental management system. The other 184 findings were grouped into the four broad areas of vulnerability that require further research. Consequently, only 56% of the total findings are represented in the conclusions of this research.

It is also important to note that the two categories containing the largest number of findings, Storage Issues (86) and Procedural Issues (74), were identified as broad areas of vulnerability. This suggests that the findings found in these two broad areas play a significant role in the number of problems which installations are experiencing. Consequently, this numerical analysis reinforces the need to further investigate these areas.

Breakdown of Systemic Areas of Vulnerability. Using the frequency count, the following pie chart was developed to highlight the eleven systemic areas of vulnerability and the corresponding percentage of the findings that fell under each area. The pie chart is presented in Figure 5. The category entitled "Others" represents the following systemic areas of vulnerability: Insufficient Communication Between Contractors and Government (5), Ineffective Communication Between CEV and Shops (4), Lack of Adequate Resources (3), and Ineffective Communication Between MAJCOM and Base Level (2). They were grouped together only to make the presentation of the areas of vulnerability in the pie chart more manageable.

When using Figure 5 as a guide for correction efforts, areas of vulnerability containing the greatest percentage of the findings should have precedence over the areas containing a smaller percentage of the findings. However, it is important to remember that

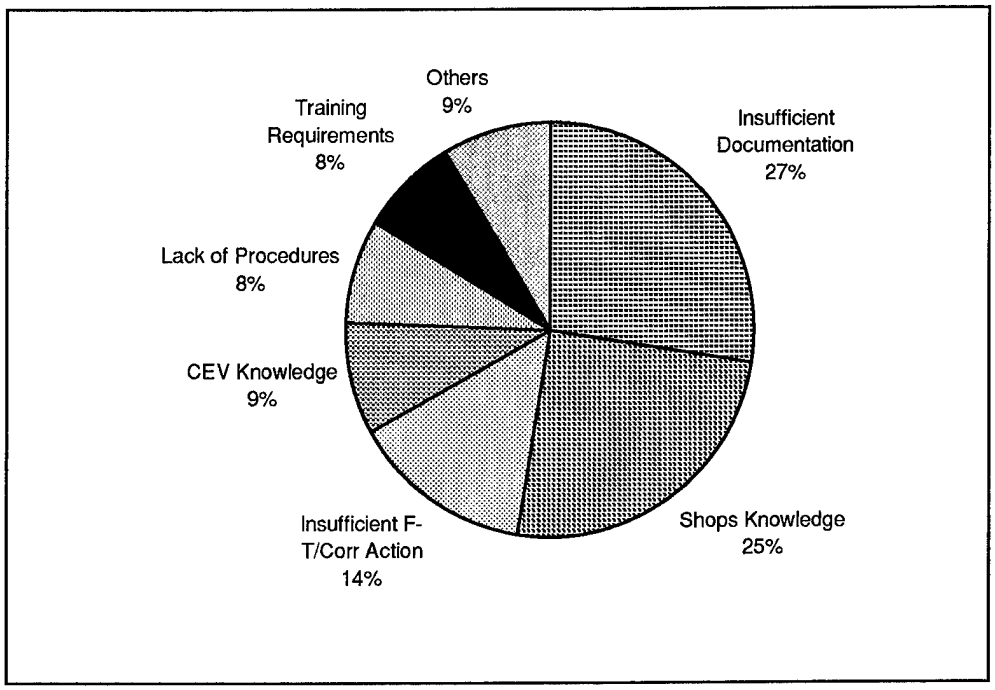


Figure 5. Breakdown of Systemic Areas of Vulnerability

this is a breakdown of the most significant root causes of findings that installations are currently experiencing, as identified by the Kruskal-Wallis one-way nonparametric AOV performed in the initial stages of the research. Therefore it is important to focus on, and systemically correct, each area of vulnerability in Figure 5. Each carries a significant amount of weight in the success of the environmental management system. This breakdown does not include the four broad areas of vulnerability, due to the fact that these areas require further research before they can be accurately targeted and corrected.

ISO 14000 Comparison. To provide a means by which the current Air Force environmental management system could be evaluated against model environmental system elements, a comparison was made between the systemic areas of vulnerability identified in this study that currently exist within the Air Force environmental management

system, and model environmental management system elements as exemplified by ISO 14000. The elements required of ISO 14000, are presented in Figure 1. The four broad areas of vulnerability identified in this research were not compared against ISO 14000 elements because they require further research before the fundamental systemic weaknesses associated with the findings can be accurately identified.

There are obvious similarities between the headings that were developed in this research, representing the systemic areas of vulnerability in the Air Force environmental management system, and the model environmental management system elements presented by ISO 14000. These similarities delineate areas within the current Air Force system that are weak with respect to ISO 14000 standards. Weak elements of the Air Force environmental management system, with respect to the five main ISO 14000 elements, include the following: (1) Planning, (2) Implementation and Operation, and (3) Checking and Corrective Action. A summary of the comparison is presented in Figure 6.

Under Planning, there is one ISO 14000 element, entitled Legal and Other Requirements, that closely matches three systemic areas of vulnerability identified in this research. This ISO 14000 element states that the "organization shall establish and maintain a procedure to identify and have access to legal, and other requirements to which the organization subscribes, that are applicable to the environmental aspects of its activities, products or services" (ISO, 1996: 9). The systemic areas of vulnerability identified in this research which closely match this definition are (1) CEV Knowledge, Awareness and Interpretation, (2) Shops Knowledge, Awareness and Interpretation, and (3) Contractor Lack of Awareness and Inadequate Procedures. These areas are defined as

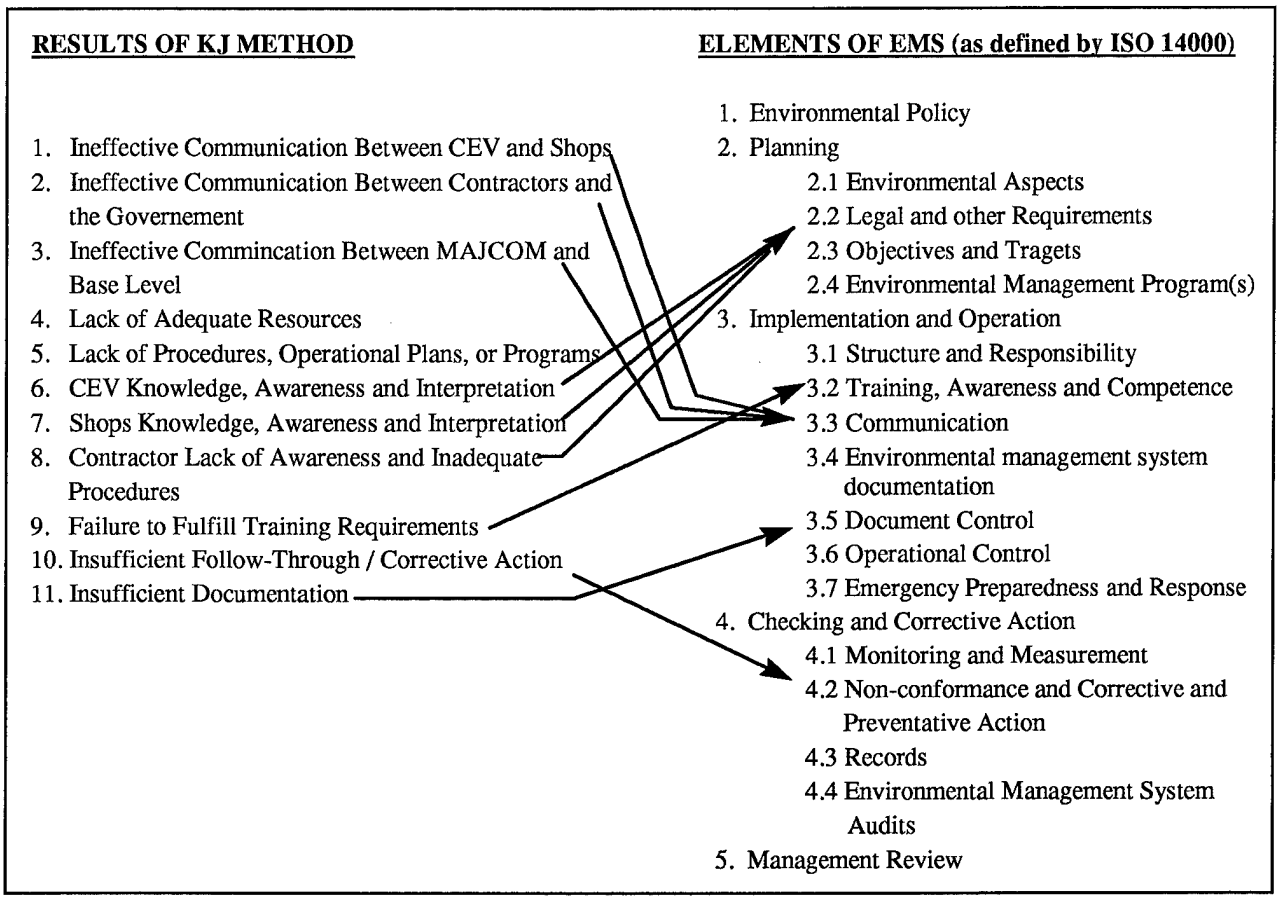


Figure 6. Comparison of KJ Results and ISO 14000 EMS Elements (Fredericks, 1995:3)

problems arising from insufficient familiarity, awareness, and understanding of applicable requirements, and/or arising from the inaccurate assessment of requirements as dictated by environmental laws, regulations, and Air Force polices. Thus, it can be concluded that due to the significant number of findings found under these three headings (84), the Air Force's system of obtaining legal and other environmental requirements may not be sufficient. Improper planning to accommodate all applicable laws and regulations was found to play a major role in the number of findings that were documented.

Under Implementation and Operation, there are three ISO 14000 elements that closely match the headings and definitions developed in this research. These three areas

include: (1) Training, Awareness and Competence, (2) Document Control, and (3) Communication.

The element Training, Awareness and Competence states that an organization shall identify training needs, and requires that all personnel whose work may create a significant impact upon the environment receive the appropriate training (ISO, 1996:10). This closely matches an area of vulnerability found in this research entitled Failure to Fulfill Training Requirements. Failure to Fulfill Training Requirements is defined as problems arising from the failure of personnel to receive or update training according to laws and regulations, or from a lack of awareness of the requirement to receive training. The training and awareness of personnel regarding particular procedures, laws, regulations and/or policies, was found to play a significant role in number of findings that were documented. Consequently, it can be concluded, due to the substantial number of findings under this heading (18), that the current system for identifying and performing training may not be sufficient.

The element of Document Control dictates that the organization shall establish and maintain procedures for controlling all documents to ensure that they can be located, that they are periodically reviewed/revised as necessary, and that they are approved for adequacy by authorized personnel (ISO, 1996:11). This definition closely matches the area of vulnerability identified in this research as Insufficient Documentation. This area is defined as problems arising from records, inventories and operational plans not being updated, improperly updated, or not containing the required or correct information. Due

to the large number of findings in this area (63), the current system implemented by the Air Force environmental management system may not be effective.

The element of Communication states that the organization shall establish and maintain procedures for internal and external communication (ISO, 1996:10). The areas of vulnerability identified in this research that closely match this definition are entitled (1) Ineffective Communication Between CEV and Shops, (2) Ineffective Communication Between Contractors and the Government, and (3) Ineffective Communication Between MAJCOM and Installation. Ineffective Communication is defined as problems arising from the ineffective interchange of environmental requirements and developments between organizations. It includes ineffective communication between internal and external entities. The total number of findings documented in this area (11) signify that communication procedures within the existing system may not be as effective as they need to be. Specifically, findings indicated that there was a breakdown in communication between CEV, the shops, and the MAJCOM level.

Under Checking and Corrective Action, there is one ISO 14000 element, Non-Conformance and Corrective and Preventative Action, whose definition closely matches an area of vulnerability identified in this research. This element dictates that "organizations shall establish and maintain procedures for defining responsibility and authority for handling and investigating non-conformance, taking action to mitigate any impacts caused, and for initiating and completing corrective and preventive action" (ISO, 1996:12). The area identified as Insufficient Follow-Through / Corrective Action in this research, closely matches this definition. Insufficient Follow-Through / Corrective Action

is defined as problems arising from the lack of follow through by CEV and shops, resulting in the installation not adequately meeting federal, state, local, and Air Force requirements. Numerous repeat findings were evident at the installations, exhibiting signs that proper corrective and preventive action was not being implemented. Consequently, the large number of findings under this heading (33), support that the current system is not sufficiently meeting the requirements of a model environmental management system.

Application of Results

Application of Results to Environmental Management System Theory. The comparison between the compliance audit based results of this study, and the elements of a model environmental management system such as ISO 14000, supports the fundamental concepts of environmental management system theory. Due to the similarities between the ISO 14000 elements and the areas of vulnerability identified by this research, it suggests that the proper implementation of an environmental management system will address and correct a majority (56%) of the compliance issues that the organization is faced with. This lends support to the theory that the proper implementation and operation of an environmental management system will strengthen the environmental posture of the organization.

However, it is important to note that the four broad areas of vulnerability, containing 184 findings and representing 44% of the total number of findings investigated, were not addressed when drawing the conclusion that this research supports environmental management system theory. Further research is required before their

appropriate systemic weaknesses, if any, can be identified and accurately compared with ISO 14000 elements.

Application of Results to the United States Air Force. The results of the KJ method and the ISO 14000 comparison provide insight into the environmental management system currently utilized by the United States Air Force. Through this research, eleven major systemic areas of vulnerability were identified and defined. These eleven systemic areas of vulnerability paint a better picture of the causes of problems on installations in the Air Force than the four vague groupings previously given to the same 414 findings by the existing ECAMP system. The original four groupings presented by the existing system were as follows: Awareness of Requirement (P1), Understanding (P2), Result vs. Action (P3), and Action vs. Procedure (P4). These categories are much too broad to accurately and effectively analyze where problems exist, and what corrections need to be made. The four groupings utilized by the existing system fail to identify the systemic causes of the problems and the corresponding changes needed within the environmental management system.

The eleven major headings developed in this research provide a better understanding of the current state of environmental management systems in the Air Force. They identify and address the systemic changes which are needed in the current environmental management system. The areas identified are the major systemic root causes of the problems and vulnerability issues which installations are experiencing. Effort should be directed toward strengthening these critical areas of systemic vulnerability. If

properly and adequately addressed, the improved environmental management system will act as a mechanism which will prevent future findings in the same areas.

The four broad areas of vulnerability contained findings that were not specific enough to tie to a specific systemic operation of the organization. Consequently, these are areas that require future research. They may contain systemic areas of vulnerability that were not identified by this research.

ISO 14000 Comparison and the Air Force. A majority of the areas of vulnerability found in this study correspond directly to an element of ISO 14000. However, the following two areas of vulnerability did not show a direct connection: (1) Lack of Adequate Resources, and (2) Lack of Procedures, Operational plans, or Programs. Consequently, the failure to accurately match each area of vulnerability found in this study with the elements of ISO 14000 provides insight into the applicability of the use of ISO 14000 as an environmental management system in the United States Air Force. Because two areas of vulnerability failed to match up with the elements of ISO 14000, it may suggest that the use of ISO 14000 as a model environmental management system standard may not fully meet the needs of the Air Force. A modified ISO 14000 model that addresses the unique structure and operations of the Air Force may be more applicable. Although the number of findings associated with the two areas of vulnerability that failed to match-up with ISO 14000 elements were small in number (21), they still need to be accounted for and adequately addressed by the environmental management system.

It is important, however, to mention that one limitation to this research is that the areas identified by the KJ method may never completely match-up with elements of the

environmental management system. Therefore, drawing conclusion about the validity and applicability of ISO 14000 for the United States Air Force should be done cautiously.

V. Conclusions and Recommendations for Future Research

Overview

This chapter reviews the research problem and objectives, summarizes the research results, and makes conclusions based upon the results. The chapter concludes with a recommendation that the Air Force environmental leaders closely review and apply the results of this research. Also, that the Air Force leaders pursue the development of an environmental management system which will meet Air Force requirements. In addition, recommendations for future research are presented.

Problem Review

In order to be effective and responsible stewards of the environment, the environmental management system utilized by the Air Force needs to be properly constructed, organized, and operated. The current state of the Air Force's environmental management system is not clear. Systemic Areas of vulnerability within the current system need to be identified, and corrected in order to prevent future occurrences. Air Force installations worldwide can more effectively and efficiently protect the environment once these systemic areas are identified.

Results Summary

The analysis performed and the results obtained in this research achieved the following objectives:

1. Analyze ECAMP finding descriptions to identify weakness in the current environmental management system.
2. Provide a breakdown of the research findings in an effort to guide Air Force environmental management system correction efforts.
3. Provide a comparison of the current state of the Air Force environmental management system with model environmental management system elements, as exemplified by the internationally accepted ISO 14000 standards.

Objective 1. Research objective 1 was achieved through analysis of ECAMP root cause data from fourteen United States Air Force installations across three MAJCOMs. Statistical techniques were utilized to identify the most significant root causes of the findings. The KJ Method was then implemented to provide a mechanism by which the systemic areas of vulnerability could be identified. As a result of the analysis, eleven specific systemic areas of vulnerability and four broad areas of vulnerability were identified. The eleven specific systemic areas identified by this research as requiring immediate attention included the following:

(1) Ineffective Communication Between CEV and Shops
(2) Ineffective Communication Between Contractors and the Government
(3) Ineffective Communication Between MAJCOM and Installation
(4) Lack of Adequate Resources
(5) Lack of Procedures, Operational Plans, or Programs
(6) CEV Knowledge, Awareness and Interpretation
(7) Shops' Knowledge, Awareness and Interpretation
(8) Contractor Lack of Awareness and Inadequate Procedures
(9) Failure to Fulfill Training Requirements
(10) Insufficient Follow-Through / Corrective Action
(11) Insufficient Documentation.

Each of these major headings are defined and presented in Chapter IV - Results and Analysis. The four broad areas of vulnerability require future research in order to accurately tie the findings into the environmental management system.

Objective 2. Research objective 2 was accomplished by analyzing results obtained in objective 1. A frequency count was performed on the findings found under each heading as presented in Chapter IV - Results and Analysis. A Pareto Diagram, presented in Figure 4, was developed yielding the results of the frequency count. A breakdown of the data was then performed with the results presented in Figure 5. The breakdown was performed to guide Air Force leaders in the implementation of corrective and preventative action. However, it is important to note that each of the eleven systemic areas of vulnerability identified require attention and systemic correction.

Objective 3. To accomplish this objective, an examination of ISO 14000 was performed. Areas of vulnerability identified in this research were compared against the necessary elements of a model environmental management system, as presented by ISO 14000. Areas of vulnerability in the current Air Force environmental management system that were similar to the elements of ISO 14000 include subsections of the following three main ISO 14000 elements: (1) Planning, (2) Implementation and Operation, and (3) Checking and Corrective Action. There were two systemic areas of vulnerability which did not match-up accurately with ISO 14000 elements; Lack of Adequate Resources, and Lack of Procedures, Operational Plans, or Programs. This suggests that the ISO 14000 model may not adequately fit the Air Force. Although, nine of the eleven areas of vulnerability did exhibit close similarities. Consequently, a modified version of ISO

14000, which addresses the two areas of vulnerability that failed to match-up may be appropriate for Air Force use.

Conclusions

The results of this research lend support to the fundamental concept of environmental management system theory; that the proper implementation and operation of an environmental management system will strengthen the environmental posture of the organization. However, it is important to note that the four broad areas of vulnerability, containing 184 findings and representing 44% of the total number of findings investigated, were not addressed when drawing this conclusion. Thus, further research is required before these findings can be accurately compared with ISO 14000 elements and used to draw conclusions about environmental management system theory.

Current weaknesses in the existing Air Force environmental management system are identified in this research. The current ECAMP auditing system is not adequate in accurately identifying the root systemic causes of the environmental problems on Air Force installations. Consequently, many of the environmental problems are not systemically identified or corrected, and re-surface down the road. This leaves Air Force installations vulnerable to enforcement actions initiated by federal, state, and local authorities.

It would be advantageous for Air Force environmental leaders to look at the systemic areas of vulnerability identified in this research and use the breakdown of the areas of vulnerability, as presented in Figure 5, as a guide in their effort to correct existing

deficiencies to achieve a quality environmental management system. Although this study supports the theory that the utilization of an environmental management system will reduce the environmental vulnerability of an organization, model environmental management system elements should be further investigated to find a model which will meet all of the Air Force's requirements. ISO 14000 seems to cover a majority of the requirements, but may not be capable of handling all of the environmental issues that installations experience. A modified version of ISO 14000 standards, which accurately addresses all Air Force issues, may be a solution. EO 12088 stipulates that Executive agencies pursue and implement the "best technology and methods available" to meet environmental obligations (United States Congress, 1978:4659). Thus, using internationally accepted standards as an aid in developing an environmental management system which will meet Air Force requirements, is a viable, necessary, and valuable goal. By developing such a system, the Air Force will build a foundation from which a strong environmental organization can emerge.

Recommendations for Future Research

Now that the systemic areas of vulnerability have been identified, the results of this research need to be applied and tied back into the current existing operational system. The current system needs to be addressed and investigated in light of the findings of this research to determine where exact problems exist in the operational system. This analysis should include the examination of installation level organizational structure,

responsibilities, practices, procedures, processes, and resources in an attempt to determine the specific operational systemic weaknesses (von Zharen 1996:198).

Additionally, follow-on research needs to be performed to accurately and specifically tie the findings that fell into the four broad areas of vulnerability, with the systemic operations of the organization. These areas may contain key systemic deficiencies that were not identified in this research. With this information, the Air Force will have a more complete picture of the current systemic areas of vulnerability, and can thus plan accordingly.

Finally, an environmental management system model which addresses all of the areas of vulnerability identified in this study needs to be identified. Once a suitable system is identified, its implementation will strengthen the compliance posture of Air Force installations throughout the world.

Appendix A: Pareto Diagrams Of Raw Data From14 Installations

ECAMP ROOT CAUSE CODE KEY

Materials:

M1	Supply
M2	Poor Quality

Personnel:

P1	Awareness of Requirement
P2	Understanding
P3	Not Conscientious (Deals with attitude of personnel)
P4	Result vs. Action (The result did not equal the action taken. Procedures were followed which should have produced favorable result but did not.)
P5	Accountability not assigned
P6	Action vs. Procedure (Correct procedure(s) in place but incorrect action taken)
P7	Insufficient Skills
P8	Inexperience (Not an attitude of personnel)

Equipment:

E1	Controls Failure
E2	Inadequate Facility Design
E3	Monitoring Equipment Failure
E4	Poor Maintenance

Techniques:

T1	Time to do the job
T2	No procedures in place
T3	Priority conflict
T4	Inadequate Procedures
T5	Procedures not available

Figure A-1. ECAMP Root Cause Code Key (Radian International, 1997:4)

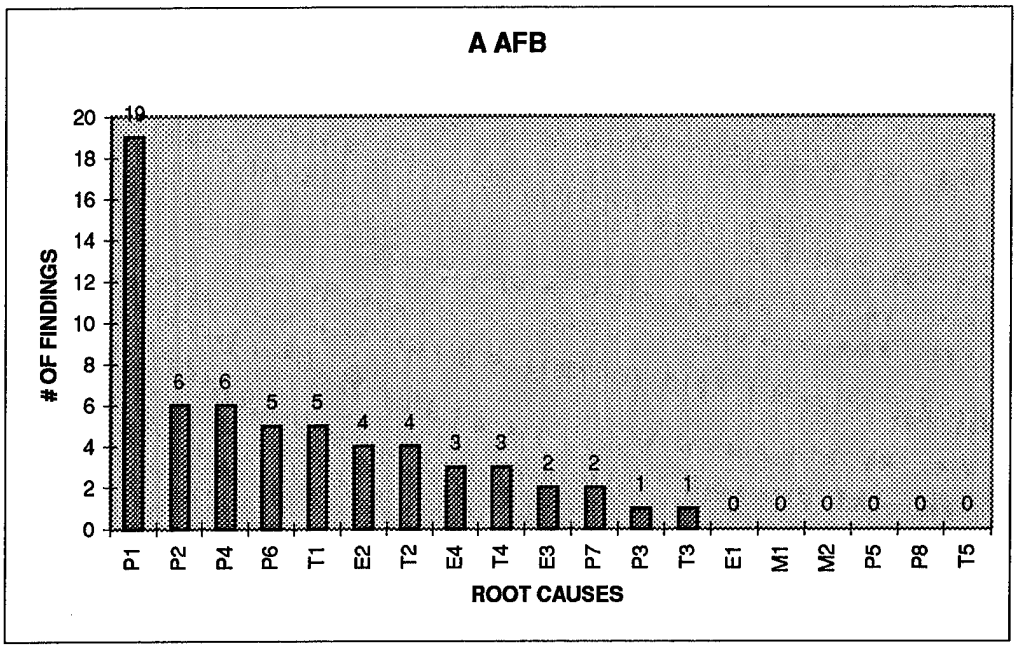
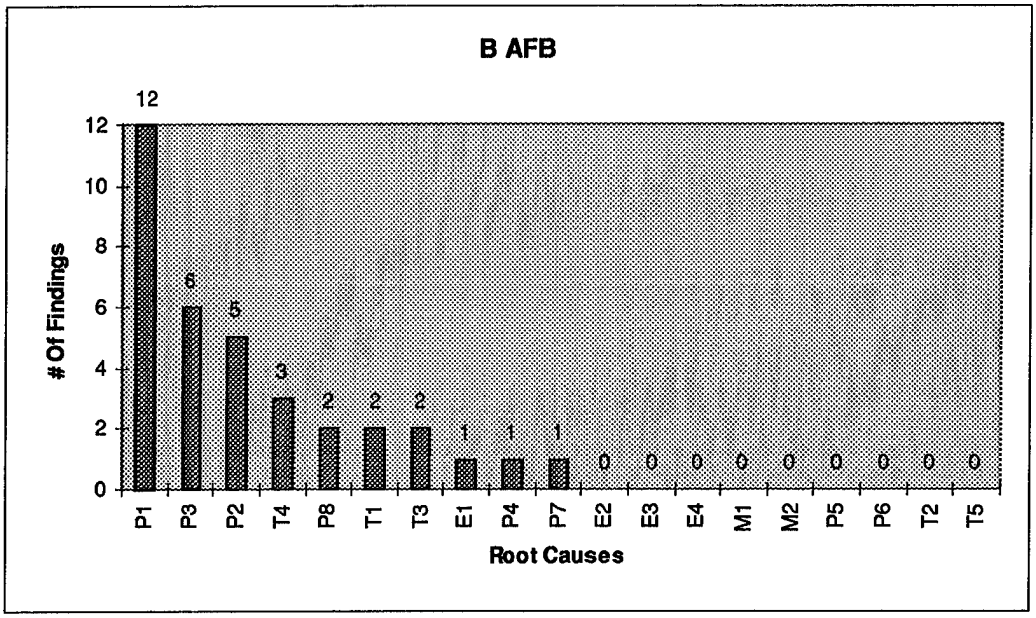


Figure A-2. Pareto Diagram of Raw Data



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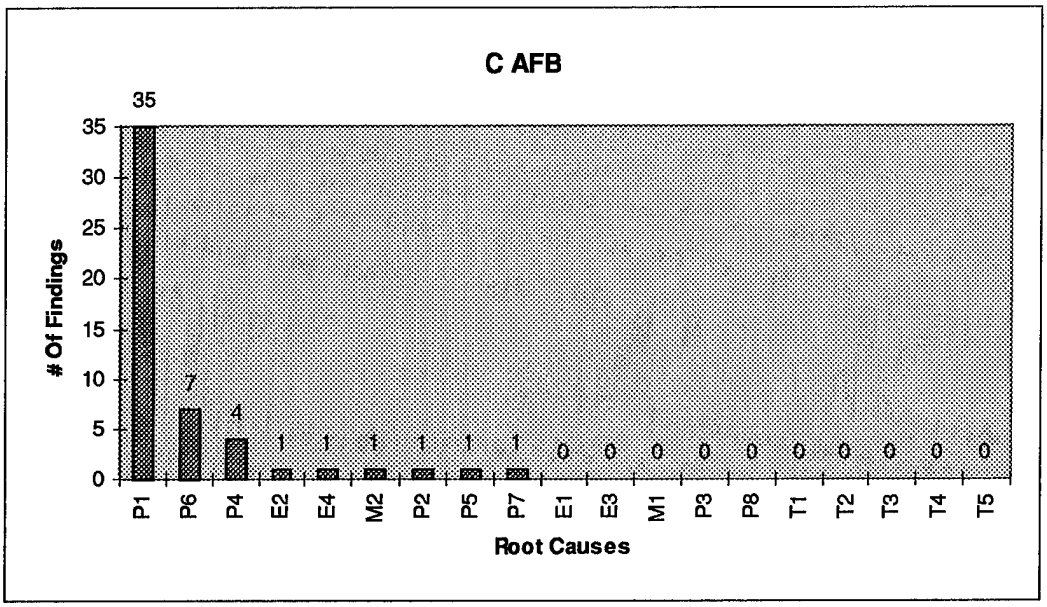

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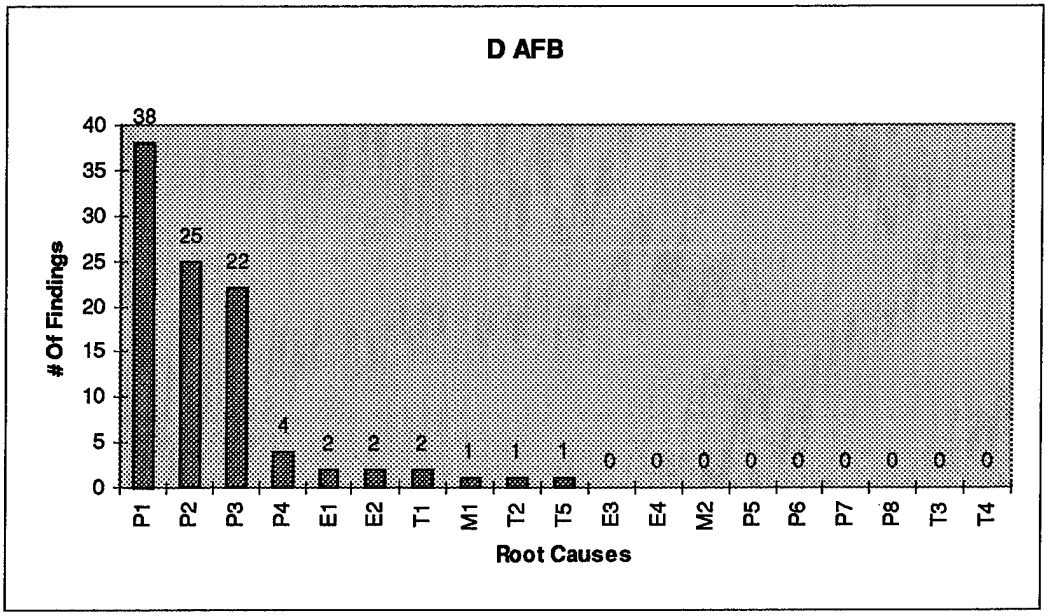

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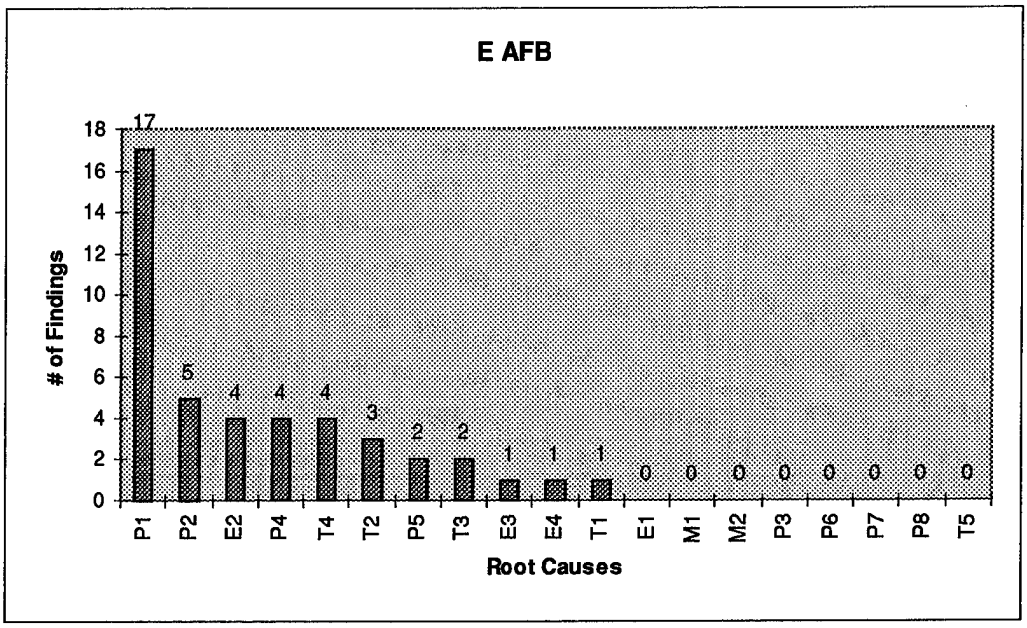

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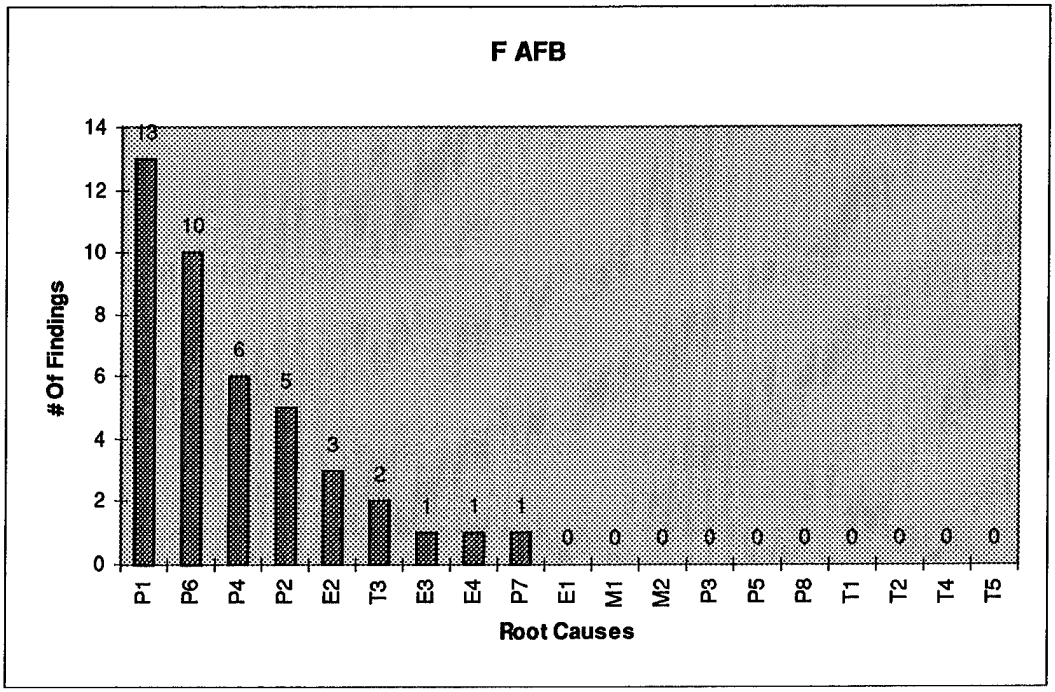
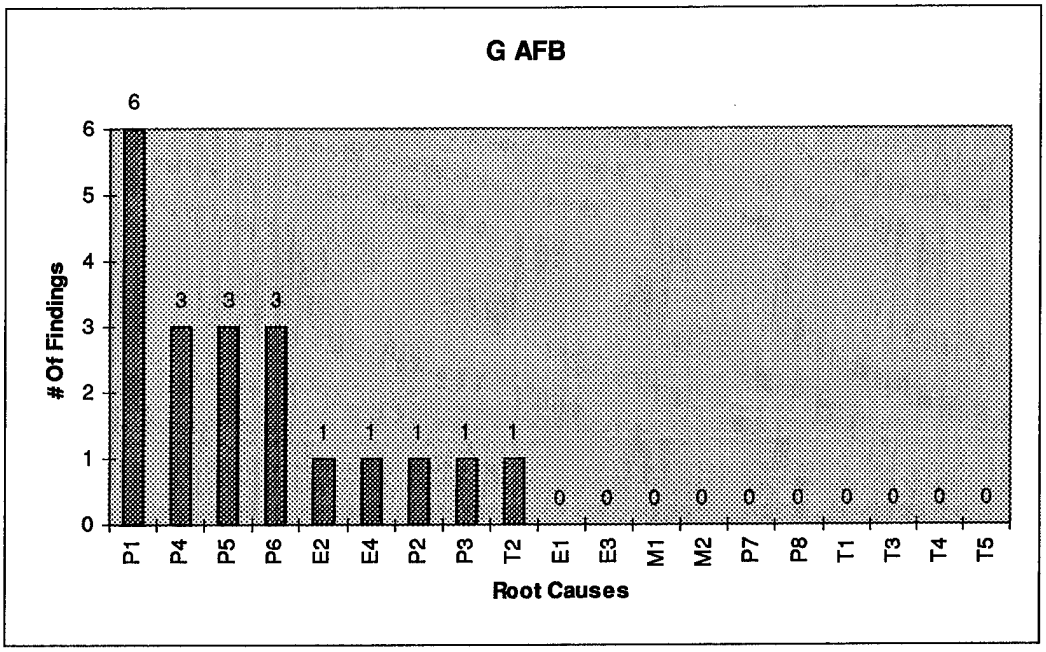


Figure A-7. Pareto Diagram of Raw Data



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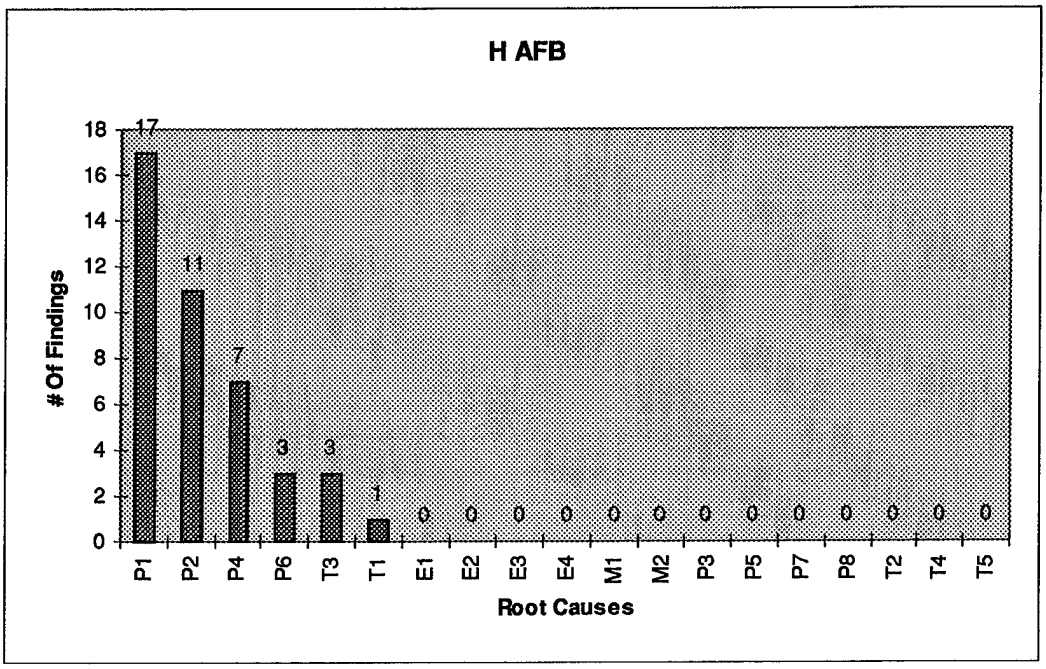

Figure A-9. Pareto Diagram of Raw Data

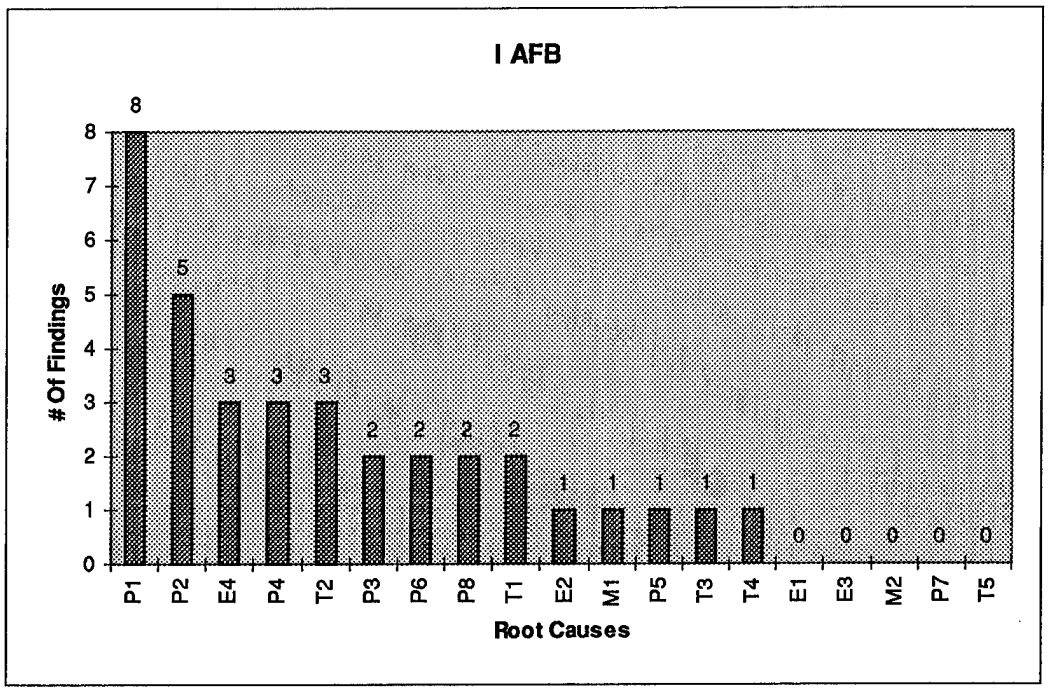

Figure A-10. Pareto Diagram of Raw Data

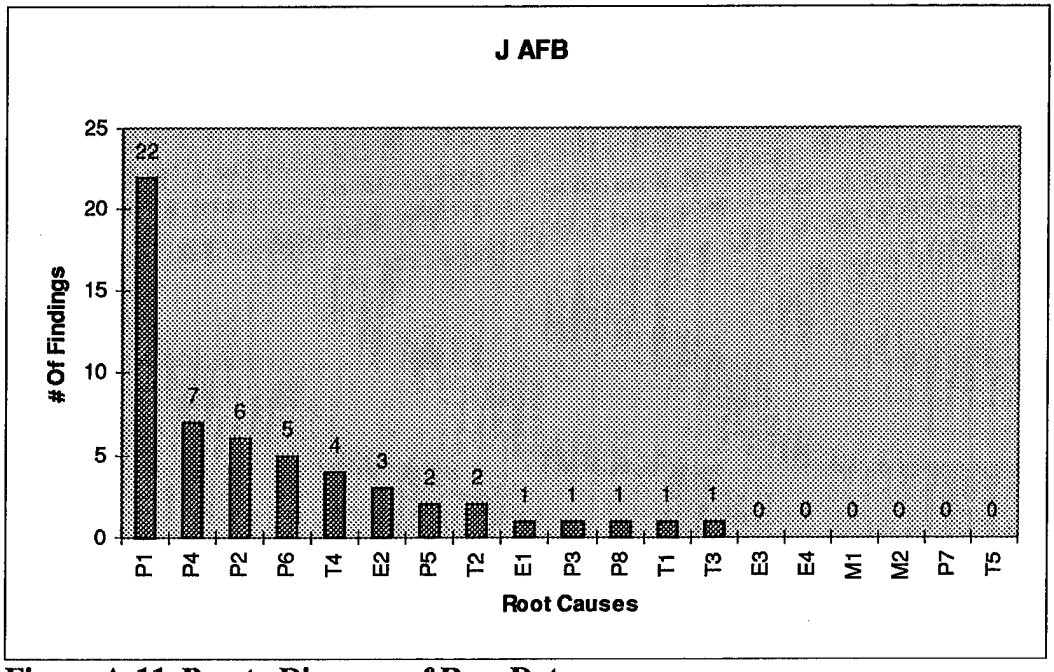

Figure A-11. Pareto Diagram of Raw Data

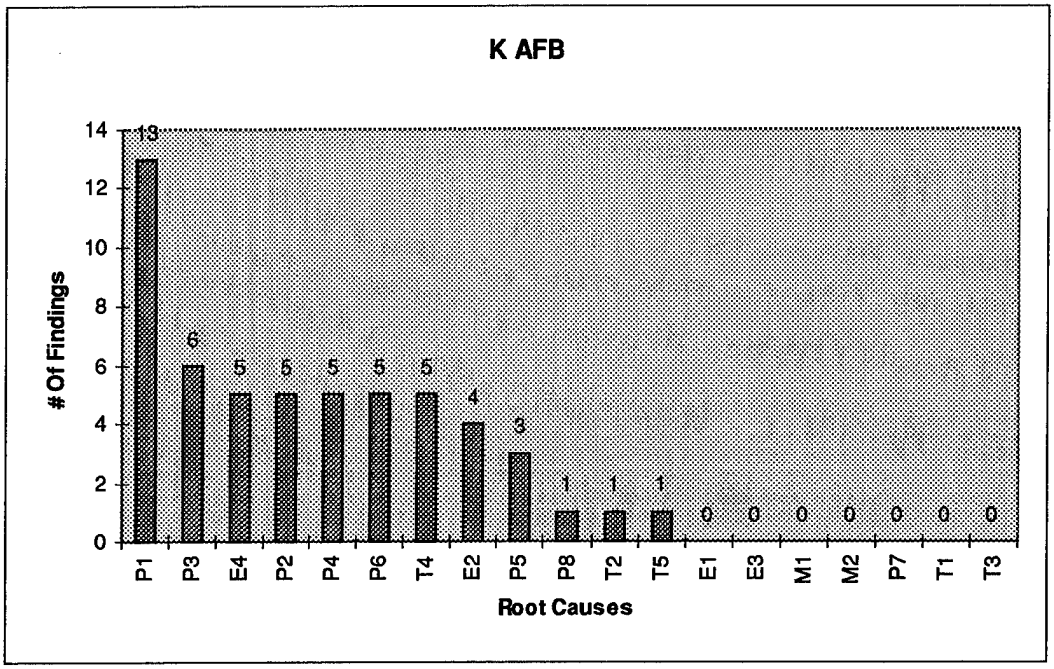

Figure A-12. Pareto Diagram of Raw Data

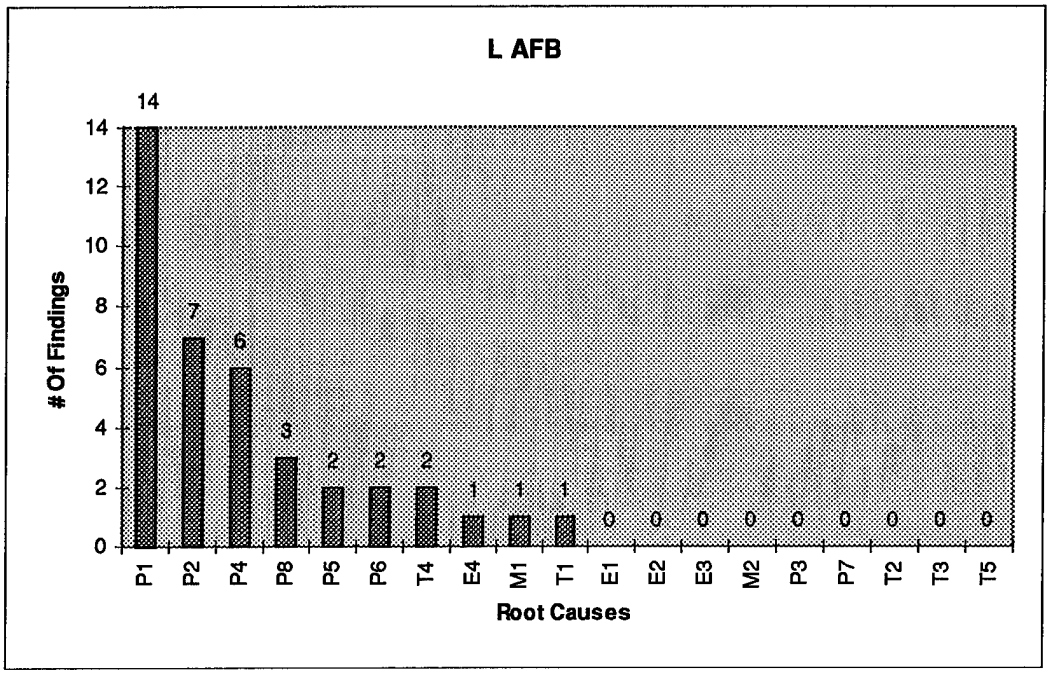

Figure A-13. Pareto Diagram of Raw Data

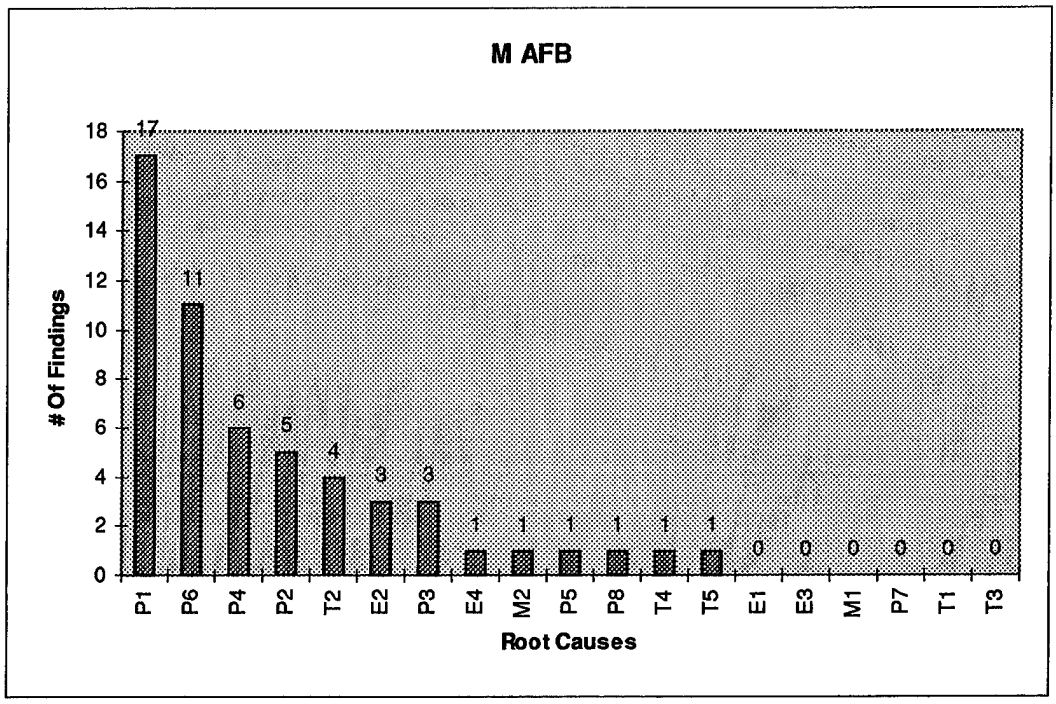

Figure A-14. Pareto Diagram of Raw Data

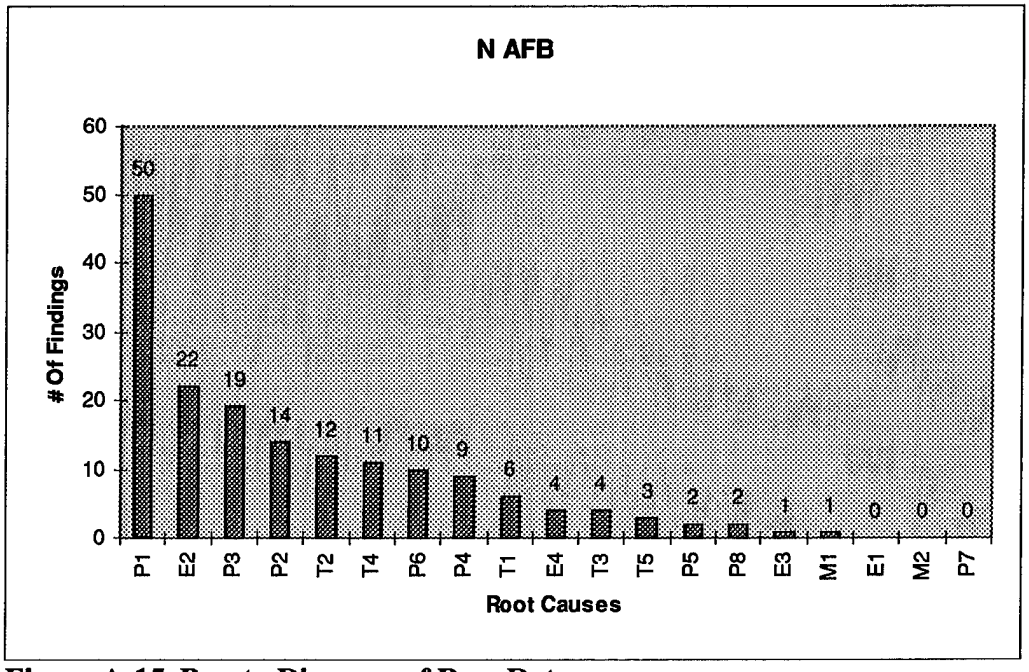

Figure A-15. Pareto Diagram of Raw Data

Appendix B: Four Major Root Causes And Subsequent Descriptions Of Findings

ROOT CAUSE CODE: P1 - Awareness Of Requirement

The responsible organization was unaware that a permit to construct an air emission source was required in addition to a building construction permit.

Auto Skills Development Center personnel were not aware that fuel filters are hazardous waste.

Personnel working in the area were not aware of hazardous waste management procedures.

Two precautions for preventing a spill from entering the storm sewer area prescribed in the Contingency Plan, but only one is being employed.

Personnel thought the requirement only applied to the Air Force definition of PCB containing items (transformers and capacitors)

The plan is prepared by CEX and not coordinated through CEV; therefore, personnel may not be aware of all requirements.

The filters were abandoned at the lay down area by contractors who lacked adequate training regarding waste accumulation, storage, and disposal.

The Env Flight classifies the base as a "generator" facility and not an interim status facility.

Base personnel had pursued this issue with HQ and thought that HQ had resolved the immediate problem.

Unaware of proper manifest requirements. Copy of requirements provided to personnel.

Personnel had not identified these wastes as hazardous.

Personnel were not aware of the significance of the requirement.

Store personnel were unaware of storage requirements. Personnel did move weed and feed back into the building during the ECAMP evaluation.

Personnel unaware of NFPA Requirement

Personnel were not aware of the requirement to keep cylinders securely anchored nor to keep flammable gases at least 20 ft from oxidizers.

The storm water PP Plan dated 24 Feb 96 needs to be updated. Many items identified by a 1994 Reveal Team have been corrected but not documented in the plan. Ensure that the plan is

reviewed and updated annually. Consider adding a "summary of changes" page to capture/document reviews and updates.

Base personnel were not aware that they are required to submit an AEI.

Personnel were unaware that all containers of hazardous materials must have hazard warning labels.

Personnel were unaware of the requirement to register equipment with EPA.

Base Cultural Resources Manager identified an area of need to compile a historic record of all facilities.

None of the items on the Base Supply Retail Sales store shelves are identified as containing recycled content, except those labeled by the supplier as such.: Types of paper in the GSA catalog that meet the Executive Order requirement are not easily identified. Each user specifies their specific needs.

Company was apparently unaware of the Texas licensing requirements for businesses engaging in pest control services for compensation.

Personnel were unaware of requirement due to incorrect guidance from the contractor.

Bases designated Pest Management Coordinator, was not aware he had to be DoD-certified to ensure pesticides are properly used on the base and to comply with DoD and Air Force regulations, directives and guidance.

Person unaware of waiver requirement. Boiler plate statement of Ozone Depleting Substances not in contract.

Unaware of requirements to report recycling metrics, encompassing installation of a single qualified recycling program.

Four units were registered with EPA. Contract effective 1 Oct 1996. Contractors assumed all equipment was registered.

This is a new piece of equipment. Misunderstanding the equipment is certified for R-12 use by the manufacturer. However, it still requires certification with EPA.

Invoices were being maintained for one year. Not aware of three year requirement.

Personnel in the AMUs assigned the "Degree of Hazard" based on dated guidance and provided the BEE a copy of the inventory without BEE input.

Personnel were not aware of the requirement in the AFI.

Individual was not aware of requirement to register equipment with EPA.

Operators were not aware of the requirements.

An unlabeled drum of empty aerosol cans was not classified as a hazardous waste and was not located in the established initial accumulation point. Facility personnel incorrectly thought that the cans would be brought to the newly established hazardous materials pharmacy, though they should be taken to the CEV 90-day accumulation site.

IAPs are located in the supply building (which is at or near the point of generation) for alkaline, lithium, and nicad batteries. The described wastes are then brought to another IAP located outside the building before they are transferred to the 90-day accumulation point. Wastes must be moved from an IAP directly to the 90-day storage area without an intermediate stop.

The CEMIRT generator shop conducts several industrial operations that produce potentially hazardous wastes, though they have not been identified as hazardous wastes. These include waste bead blast media, waste fuel filters, paint waste drained from crushed aerosol cans, and solvents and sludge from the carbon remover degreaser. Hazardous waste determinations must be made on each of these waste streams.

Five drums were found in a 90-day storage area without accumulation start dates. According to 40 CFR 262.34 (a)(2), the date for which each period of accumulation begins must be clearly marked and visible for inspection. The drums contained hazardous paint waste, off-specification gasoline, gasoline filters, and aerosol cans.

A roofing repair contractor has a lay-down area located outside of Building 1617 which is used to store equipment, materials, and wastes. The operation uses several solvents (naphtha, mineral spirits, and paint thinner) and collects the cans for disposal. Because not all of the containers were empty, they were rejected by the local solid waste landfill, and the contractor is storing them in the open where they collect rainwater and rust.

A process in the testing facility generates rags contaminated with MEK. These rags are currently placed in the drum containing POL-contaminated absorbent material, a nonhazardous waste. This procedure is not correct because the MEK-contaminated rags are a separate waste stream. 40 CFR 262.11 requires that a determination be made on each waste stream to determine whether that waste is hazardous or not. Because the MEK-contaminated rags are a listed hazardous waste and the POL-contaminated absorbent material is handled as a nonhazardous solid waste, the MEK material has been inappropriately disposed of in the past.

Unaware of records and waste disposal processes.

Water systems personnel were not aware of a sign requirement.

Unlocked tanks can become contaminated by vandalism or inadvertent receipt of the wrong product due to insufficient key control. Unlocked dike drains could allow inadvertent release of POL product to the environment.

QAE personnel, who are assigned responsibilities to monitor the contractor's performance of pest management services, were not aware that they must have pest management training prior to being assigned these responsibilities.

Personnel were unaware that all containers of hazardous materials must have hazard warning labels.

DRMO personnel were not aware of the base has researched the issues related to the Clean Water Act that are associated with this discharge, but has not yet reviewed potential impacts associated with RCRA. requirement to submit LDR certification forms with each off-site shipment of spent lead-acid batteries destined for recycling.

The base typically marks items for recycle with the appropriate information, but had not considered that fluorescent light bulbs are also subject to this management requirement.

The base has researched the issues related to the Clean Water Act that are associated with this discharge, but has not yet reviewed potential impacts associated with RCRA.

Personnel were unaware of requirement.

No Air Force or HQ AETC guidance has been provided to the base level organization for dissemination to the general base offices

No HQ Air Force or HQ AETC affirmative procurement guidance has ever been distributed to the base level organizations.

Pesticide personnel are not aware of the Air Force regulations governing pesticide usage.

Personnel were not aware of the AFI requirement.

Personnel at the Chiller Plant and CEV were unaware of the requirement to provide notification prior to planned releases to the atmosphere during maintenance periods.

Personnel were unaware that the lid must remain closed when the degreaser is not being used and that an instructional sign must be posted.

Personnel were unaware that an instructional sign must be posted.

Personnel were not aware that the manager was required to attend this course once every 3 years.

Personnel were unaware that use of paint thinners should be recorded in the logbook.

The power production job of CE was absorbed by the exterior electric shop and personnel were not aware of the requirement.

Personnel were not aware of the required contents of Solid Waste Management Plan.

New plan (1 Apr 94) was distributed and ECAMP finding 7-4 closed out, but the tanks in question were still not incorporated in the plan.

Personnel not aware of requirement to secure tank drains.

Personnel were aware of the requirement but failed to secure the fill lines.

Lack of adequate resources (personnel) available to accomplish required update.

The shop foreman and air program manager were unaware of these requirements. In fact, the lid had been pinned open with a "fire safety" pin.

AFOSH Standard 161-21 describes the requirements to document work place specific hazard communication training and FHCTP on AF Forms 55. Procedures are in place.

Supervisors in most areas were not aware of training and documentation requirements.

Personnel were not aware that use of solvents for wipe-down operations is required to be included in record keeping.

Personnel were unaware of the specific requirements for the storage and maintenance of batteries.

Personnel were unaware of the specific requirements for this storage locker.

Personnel were unaware of the specific labeling requirements.

Personnel were unaware of the specific requirements for the storage and labeling of hazardous materials.

Personnel were not aware that fluorescent bulbs were potentially hazardous waste.
Even though the drums were correctly labeled, the label must be visible for inspection as stated in the Base's HWMP.

QAE is performing scheduled and nonscheduled inspections, but inspection does not include the disposal site. QAE unaware of requirement.

Personnel were aware that the PCB container needed to be labeled but were not aware that the storage building also required labeling.
Individuals were directed to apply IEX code D to item which ensures item is no longer purchased.

40 CFR 60.113 b(a)(3)(i) and FDEP permit A003-178743 require that the seals of internal floating roof storage tanks storing volatile organic liquids be inspected at least every five years. This requirement is applicable to Tank 405, which was constructed in 1985. Records do not show that this inspection was performed.

40 CFR 63.468 (a) requires that operators of solvent cleaners containing 25% methylene chloride by weight submit an initial notification to the EPA no later than 29 Aug 1995. CEMIRT has a 500-gallon solvent cleaner machine that contains DUNKIT carbonaceous soil and paint remover. The material contains 65% methylene chloride by weight and its operation should have been reported.

The storage cabinet specifically designated for storage of flammable materials was not conspicuously labeled "FLAMMABLE--KEEP FIRE AWAY."

A compressed gas cylinder (lecture bottle) containing methyl nitrite is labeled with its original label for oxygen. Two pieces of blue tape have been wrapped around the cylinder and labeled "Methyl Nitrite."

Personnel who handle hazardous materials do not have documentation of their HAZCOM training and/or have not received any HAZCOM training.

Sentel does not have a written hazard communication program.

The floor drain at Refueling Maintenance collects sediment and other debris due to the operations in the facility. Currently this sediment is cleaned out of the drain approximately quarterly and thrown away with nonhazardous solid waste. 40 CFR 262.11 requires that the base determine whether or not this waste stream is hazardous.

CC is required to appoint an engineer or appropriate supervisor as the Backflow Program Manager.

Base does not have a Pollution Prevention Management Plan as required by AFI 32-7080, para 2.2.

This installation has no composting program, as required by AFI 32-7080.

Approximately 12 light fixtures with high-pressure sodium type bulbs were disposed of in a solid waste dumpster. This type of light bulb contains mercury and should be disposed of as a hazardous waste.

An open container of oily and unknown substance was placed adjacent to a storm drain.

Several items were omitted from the site map in the SWPC. These included: (a) past and present areas for outdoor storage or disposal of significant materials; (b) material loading and access

areas; (c) where pesticides, herbicides, soil conditioners, and fertilizer are applied; and (d) only one of two underground injection wells was shown.

The installation has not published their supplement to AFI 32-7041, Water Quality Compliance, as part of the installation's water quality compliance program.

To avoid management under hazardous waste requirements of 40 CFR 262, Subpart C (accumulation point and satellite accumulation point requirements), the operator of this incinerator must comply with the requirements of 40 CFR 266.70, including 40 CFR 262, Subpart B (manifest requirements). That regulation requires the operator to maintain records showing (1) the volume of the materials stored at the beginning of the year, (2) the amount of materials generated or received during the calendar year, and (3) the amount of materials remaining at the end of the calendar year. Subpart B of 262 requires the generator to meet all the usual HW manifest requirements. Also noted during the inspection was that drums of waste ash were left uncovered allowing the ash to be illegally released into the surrounding environment.

The manager was not aware of any leak detection system installed on the tanks or pipes. Annual tightness testing was conducted on the system, however there were no records of monthly inventory controls.

The remote fill-lines and the gauging ports were not locked. Only the primary fill-lines were secured.

The AST at the facility did not have secondary containment.

The secondary containment drain valves at Bldg 1052 and Bldg 2115 were not locked. The fill ports and secondary containment drain valves for three tanks at Bldg 3004 were not locked. The gauging hatch, fill port, low point drain, and secondary containment drain valve were not locked at Bldg 3200. The gauging hatch, fill port and low point drain were not locked at Bldg 3395. The low point drain and the secondary containment drain valves were not locked at Bldg 1096 Type O Incinerator; in addition, the containment drain valve was left open.

The fill-line and gauging port were not locked.

Numerous non-regulated USTs had been registered with the state.

Daily inventory records were not kept on AF Form 500.

No policies or procedures were in place to eliminate purchases of ozone depleting substances (ODS). The Hazardous Material Pharmacy ODS manager had not developed a strategy to phase out Class 1 ODS purchases.

The installation's Environmental Leadership Council has no group which reviews NEPA documents.

The secondary containment drain valve was not locked.

Daily gauging had not been accomplished for the past two weeks. The primary tank custodian had recently retired, and the alternate custodian had not received training.

The truck fill stands at Bldg 1037 and Bldg 3002 did not have any secondary containment system.

The circulation pit did not have any secondary containment system.

Flammable and corrosive containers were being stored together on the same containment pallet, and the pallet was positioned next to combustibles.

Three 5-gallon plastic containers containing paint thinner were improperly stored on top of a flammable storage cabinet.

There was no written Hazard Communication program for the AGE flight.

Several shops were not documenting their HAZCOM training properly on AF Form 55 to show date of training.

Documentation of HAZCOM training for workers was not available.

Compressed gas cylinders were being stored on asphalt pavement. Asphalt is oil based and not compatible with oxygen storage.

A worker had punched a hole in a 5-gallon container opposite the pouring spout to equalize pressure in the can when pouring. The lid was secure on the spout, but the holes resulted in open venting of the container.

The installation's Emergency Planning and Response Plan had not received HQ approval. The plan's reporting procedure did not include HQ, and did not state the requirement for release reporting through WIMS-ES.

Maintenance personnel would not be aware of pump failure if there was a power outage. This could cause sewage backup and potential overflow.

The installation had received 22 letters of non-compliance in 1995, and 3 letters in 1996. None of these had been reported to HQ/CEV as required.

There was an overall lack of correlation between the Pollution Prevention Plan, Opportunity Assessments, and A-106 funding requirements. Several opportunities identified in the Opportunity Assessment were not addressed in the Pollution Prevention Management Plan, nor was there a project identified in the A-106.

To avoid management of waste X-ray film under hazardous waste requirements of 40 CFR 262, Subpart C (accumulation point and satellite accumulation point requirements), the operator of this area must comply with the requirements of 40 CFR 266.70, including 40 CFR 262, Subpart B (manifest requirements). That regulation requires the operator to maintain records showing (1) the volume of the materials stored at the beginning of the year, (2) the amount of materials generated or received during the calendar year, and (3) the amount of materials remaining at the end of the calendar year. Subpart B of 262 requires the generator to meet all the usual HW manifest requirements.

Base Asbestos Program Officer (BAPO) is required to have certain training as identified in the asbestos Management and Operations Plan. The BAPO has not received some of the training (Design training) nor was he aware that he should be receiving this training IAW the plan. He was aware of the a portion of the PPE requirement (respirator) and has received the necessary medical clearance, but not the fit test and training.

AGE shop did not maintain servicing records for cooling equipment containing greater than 50 lbs of coolant for three years or until the equipment is transferred to another organization.

AGE Shop had not submitted certification to the USEPA that it acquired certified recovery or recycling equipment.

Ash containers did not have lids on them permitting the ash to scatter to adjacent soils by wind action. Safety equipment provided was in poor condition, ie. face piece of the fire fighters hood was severely scratched making it difficult to see through, hood and jacket had insect droppings, and gloves were in poor condition.

Documentation was not available to determine compliance with state permit requirements. A log to include incinerator charging rate or types of materials was not available. An operators manual was not available in the vicinity of the incinerator.

Organization had not submitted certification to the USEPA that it has acquired certified recovery or recycling equipment.

Drums of silver ash were stored in open containers in the vicinity of the processor. Ash was noted around the pad and soils of the processor which may be high in silver contaminates above hazardous waste standard. If this situation exists, it may require extensive site clean-up.

The current procedure in CE Operational Instruction 19-3 was not specific enough in dealing with PCB spills and the required clean up procedures.

No procedures were in place to train facility maintenance personnel on how their jobs impact the cultural resources management program. Training needed to be initiated to ensure CES personnel, self-help workers, and contractors are aware of the impact of their activities on cultural resources.

Carryover finding from the 1995 Internal ECAMP. The installation did not have a training package that provided information on building structure, site and object maintenance, and penalties for disturbing cultural resources.

The installation had not consulted with the USFWS to obtain a category rating. If the installation is determined to be a Category 1, then a 2-year Fish and Wildlife Management Component Plan must be developed.

There are no maintenance or leak-test records for the permitted R12 recharge equipment.

Carbon dioxide compressed gas cylinders are not properly secured at the concession stand. One cylinder is used to prop open a door.

One compressed gas cylinder of oxygen is stored on its side. Oxygen and acetylene cylinders are stored together on a welding cart. Neither is equipped with a regulator and neither meets the condition of "connected for use."

The nozzles on two eyewash stations are not covered to prevent contamination.

One bottle of sodium chlorite (an oxidizer) is being stored in a flammable cabinet.

The site-specific spill plans for hazardous materials storage areas have not been developed or incorporated into the basewide emergency response plan.

The contingency plan does not include emergency procedures to be followed by the emergency coordinator, as set out in 22 CAR 66265.56.

A spring-top receptacle marked as Hazardous Waste containing oily-contaminated rags, was left in the open position.

The pesticide contracts do not include Statement of Work (SOW). The personnel from CEV are aware of the requirement and are working the issue.

Two high-voltage transformers are incorrectly labeled as non-PCB (<50 ppm). Analytical results indicate PCB concentrations are >50 ppm).

Copies of AFI 32-1066, Plumbing Systems and AFI 32-1067, Water Systems, are not maintained. Program not documented in accordance with AFI 32-1066. Inventory is not maintained. Survey of prevention devises has not been coordinated with Bioenvironmental Engineering to assign degrees of hazard to each cross connection.

An MVAC recover/recycle or recover equipment certification form is not being completed and submitted to the Stratospheric Ozone Protection Branch of the U.S. EPA for each piece of equipment.

CFC recovery equipment information for each piece of equipment is not being completed and submitted to the EPA.

Base lacks a basewide inventory of standing structures that are potentially eligible for listing on the National Register. The buildings that predate the military installation have been identified, as have the significant Cold War structures. However, facilities more than 50 years old associated with the early days of the base have not been identified and evaluated, nor have other structures that may be exceptionally significant Cold War resources. These buildings must be systematically inventoried, and the inventory coordinated.

Flammable and hazardous materials are stored in a common personnel locker. Locker marked as "FLAMMABLE." Flammable materials found in personnel locker (paints, alcohol). No inventory on locker.

Flammable liquids are not stored in proper cabinets.

PCB construction employees (Housing Maintenance) have not receive HAZCOM training. AF 55s are not documented with HAZCOM training. Site-specific hazard communication is not being accomplished. OSHA hazard communication training documents cannot be produced.

Two unlabeled drums (one 55 gal. and one 20 gal.) full of lithium batteries are located outside rear of building. The drums were delivered to this location from the airport area about 30 days ago. The three-day limit is exceeded and the location of this IAP is not near the point of generation.

Aerosol containers are being vented with a hammer and then tossed into a recycling bin. The unit does not have a permit to treat.

A 3,000 gal. aboveground storage tank is abandoned in the Auto Hobby Shop Storage Lot behind building. The tank has been in this location for numerous years (10+) according to the shop foreman. The tank's manhole is open. The tank contains liquid of unknown origin.

Several spent lead acid batteries are stored on wooden tables in these buildings. Spill prevention measures are inadequate. Awaiting pickup for reclamation, the batteries have been stored a long time and there is no contract in-place.

For the week of 7/29-8/3/96 the daily inspection sheet for the Auto Hobby Shop has already been filled out. Also there is a stack of already filled out inspection sheets that just need a date written in. All previous inspection sheets all look the same. The container information on the pre-filled out sheets does not match actual on-hand inventories at the IAP.

Nesting pairs of burrowing owls were disturbed and owls were flushed from abandoned prairie dog burrows by mowing equipment. The burrowing owl is a federal Candidate species and is protected by the state under the Migratory Bird Treaty Act. Currently, there is no basewide raptor survey or management plan to prevent this type of occurrence.

Landscaping does not make maximum use of informal, native, low-maintenance designs and plant materials. Watering is not done in accordance with the Land Management Plan or commitment to water conservation and water has been pooled throughout landscaped areas of the cantonment.

The Natural Resource Manager has not received the required three-year renewal for training.

Newcomer briefings and follow-up training in natural resources is inadequate.

The existing Integrated Natural Resource Management Plan is inadequate in the following areas: Lack of specific survey and management plan guidelines, lack of solutions for potential natural resource impacts, lack of timeline for execution of goals. Recently completed plans and surveys must be incorporated, and SOW must be written and funds programmed to complete additional requirements (such as comprehensive plant survey, raptor survey and management plan, and cropland and grazing plan). The existing land management plan and outdoor recreation plan are stale and should be updated with specific management goals. All information should be incorporated into the installation's comprehensive plan.

Base has not developed or publish a Base Comprehensive Plan.

There is no comprehensive Natural Resource database, nor is GIS used in comprehensive planning. Contracts have not previously required GIS compatible database deliverables. Map products are not being updated annually.

There is no management plan for threatened and endangered species for species and candidate species known to reside at the base.

Empty "Fumitoxin" aluminum containers are "triple-rinsed" by soaking containers in a 55-gal. drum of water. The rinsate is then dumped near railroad tracks.

Remaining open from the 1993 External ECAMP, building continues to be the storage area for herbicides. Building lacks a containment barrier.

Remaining open from the 1991 Internal and the 93 External, mixing is done along the fence in an open area and drainage was running down the road berm. Tractors and Toro cart are not decontaminated and are stored in the open on a gravel area within the maintenance compound. A 150-gal. spray unit was leaking oil (from its pumping system) onto the gravel.

Respirator with a face shield is stored next to insecticides in wall locker.

Three different tractors and a Toro cart used for pesticide spraying do not carry emergency phone numbers or spill clean-up kits. None of the tractors or Toro carts have chemical-resistant panel.

Base Bioenvironmental Engineers and Military Public Health are not notified prior to pesticide applications in the child development center, dining halls or commissary.

The Cushman Cart and John Deere Tractor do not carry emergency phone numbers or spill clean-up kits. The Cushman Cart does not have a plastic bed liner or has chemical-resistant paint.

There are no spill response procedures for the pesticide, storage/mixing area in building. Spill kit (absorbent materials) for spill containment and clean-up are not available at the storage site.

The undated base Pest Management Plan lacks: (1) coordination with U.S. Fish & Wildlife Service (threatened species), installation Natural Resources manager, Military Public Health officer, and Bioenvironmental Engineer officer; (2) Installation maps and narratives on sensitive wildlife habitat areas wetland and/or flood plains; (3) The pest management activities; (4) Annual review notation; and (5) Pesticide labels and MSDSs.

Quarterly Pesticide inventories are not provided to base fire station #1.

Military Public Health is not receiving notification when contractor pest applications are done at the Officers Club, NCO Club, Golf Course, Lounge, and Bowling Lanes.

150-gal. sprayer trailer and three tractors are not marked "CONTAMINATED WITH PESTICIDES."

As many as 14 55-gal. drums are used to store used oil in a caged roof storage area north of the building before a DRMO contractor removes oil for off-site recycling. None of the drums has the label "USED OIL" as required. Housekeeping in the cage is poor. All of the drums have spilled oil or oil-saturated absorbent pads on their lids. Some of the drums have open bungs. An oil/water separator located in the cage is full of oil and debris. Also, containers of what appears to be used motor oil are outside the cage, apparently left there the night before by persons unknown.

The base landfill only accepts Construction Debris. The operating personnel are not placing cover material at the end of each operating day. They have had debris in landfill for three weeks without covering.

Lead and copper sampling is not accomplished according to the required schedule. Medium-sized water systems are required to sample between July 1 -- December 31 of each calendar year. 1995 and 1996 Lead and Copper sampling was performed between Jan 1 and June 30 of each year.

Pathological incinerator hours of operation are not recorded as required by code. Temperature and oxygen content of exhaust gases are not continuously measured and recorded.

The fuel pumps at both the AAFES and Military Gas Stations do not have signs that are required by state law. (They do have the federally required language, however.)

Nine vent hoods in building are not included in the base inventory. These hoods vent acid gases to the atmosphere from lab benches. These are hazardous air pollution sources. If these sources

of hazardous air pollutants are not considered in calculations to qualify for a synthetic minor source status, exemption from Title V may be put into question.

There are no MSDS sheets for aerosol paint cans, gasoline, or diesel fuel.

There is one five-gallon gasoline container open in the Golf Course maintenance shed.

There is no MSDS sheet for an aerosol spray can.

A five-gal. container located inside the storage building has no labels to identify the hazardous contents, appropriate warnings and/or the chemical manufacturer, distributor or other responsible party.

There are no MSDS sheets for sulfuric acid or masklenze MK-1 located in the acid cabinet.

Sulfuric acid is co-stored with other mineral acids and required segregation is not maintained within the acid cabinet.

In various locations throughout the Analytical Services laboratory, sulfuric acid is co-stored with other mineral acids and required segregation is not maintained.

Some of the AF Forms 55 reviewed do not document HAZCOM training.

Three two-gal. containers of waste materials (i.e., adhesive) and several partially full aerosol cans (i.e., ship-to-shore containing 1,1,1-trichloroethane) are being stored in a small containment tray by a small building in open storage. No labels as hazardous waste or waste material; not a designated IAP, no hazard labels on some, no inspection logs, etc. The waste is turned in from various custodians throughout the base.

A container of mercury waste (approximately 3.5 lbs) is unlabeled and open (stopper with open tubing).

Five-gallon waste containers in IAPs in Bldg 140 are not labeled. Five-gallon containers are open (funnel in place)

An open beaker of used fixer (glutaraldehyde/paraformaldhyde/sodium cacodylate) is stored under the hood. Although marked "Used Daily Fixer," and destined for the IAP container at the end of the day, it is being accumulated at this point of generation in this open container.

There are 15 rusted drums located between buildings. Although some labels indicate "empty" the drums have unidentified material in them. Ownership of the drums is unclear.

In the laboratories, waste is generated in the separate laboratories and accumulated in small containers. At the end of the day the waste is taken to a designated, centralized IAP, which is in another area within the same building.

Dental and medical X-ray departments is accumulated in five-gal. containers. When full, they are transferred to supply for silver recovery. The containers are not in an established IAP, are not properly labeled (the words Hazardous Waste, the RCRA ID number and the hazard), and no inspections are performed. This is also the case in another Bldg where fixer accumulated for silver recovery is in improperly labeled containers, and do not meet IAP requirements. Also there are no records to document these precious metals are not being accumulated speculatively.

Acid waste is stored in an acid cabinet. Although the waste container is properly labeled, this is not a designated IAP, has no monitor, no inspection log, etc.

The Hazardous Waste Monitor did not perform weekly inspections on two occasions during June, July, and August.

The IAP manager has monthly inspection logs not weekly. In addition, IAP manager has not received annual refresher training (last trained 5/95).

A container of hazardous waste does not have a label identifying the common name of its contents.

A waste container at the IAP (Molecular Biology Lab) is labeled "HAZARDOUS WASTE -- USAMRD 97002." The label does not include the common name of waste contained therein, the hazard designation or the RCRA ID number. This information can be obtained from container log by matching container numbers.

The base has not had either State or Federal Fish and Wildlife agencies tour the base to determine if there is a potential for fish and wildlife management, or made any determination of classification in accordance to the AFI.

Carried forward from the 1996 Internal ECAMP, the base has not coordinated the outdoor recreation potential, with the Park Service or state officials. There is no outdoor recreation component plan to implement any recreation program.

The Oct 95 pollution prevention plan lacks several elements and contains outdated POC lists. Pollution areas not adequately addressed are Affirmative Procurement, Energy conservation and air and water pollutant reduction. In addition, the execution section is still generic in tone and has procedures to be developed.

Although the Pest Management Plan was finalized in July 95, it has not been coordinated with Environmental Management, Bioenvironmental Engineering, Military Public Health and Natural Resources manager.

A 400-gal. AST located in the southwest corner of the Auto Skills facility does not have the required "Used Oil" label. Instead, it is labeled "Waste Oil."

The MOU support of the liquid fuel systems stipulates the MOU will be updated annually. This review has not been accomplished.

Piles of soil mixed with scrap metal and demolition debris are dumped along the side of Perimeter Road. Landfill inspections are not being conducted. The Solid Waste contract manager is not sure where waste is being disposed.

Operating plan does not adequately address several requirements of AFI 32-1052, para 6. Plan does not establish inspection and repair teams. Plan does not reference AFPD 32-70 or AFI 91-301. Plan does not address equipment and supply requirements, yearly budget estimates, or requirements for a special response team.
Alcohol's are disposed of directly to the sanitary sewer. These alcohol's would be hazardous waste if otherwise disposed.

Under the Multi-Sector General Permit for Industrial Activity, the permittee must develop a Storm Water Pollution Prevention Plan (SWP3) that reflects the requirement of the General Permit. Although base has a SWP3, Nov 94, it was developed to support the exemption of base from storm water permitting and not in support of the NOI for the Multi-Sector Permit, and does not contain all the required provisions for a SWP3 for Motor Freight Transportation Facility.

Boilers #1 and #3 exceeded the 145-gal./hr/burner in Feb 96, which is the conditional AO limitation.

Flammable aerosol paint cans, solvents, lubricants and cleaners in RADC shop are not stored in flammable storage cabinet. Contract cleaning service is storing several cans of a combustible cleaner in an office cabinet with combustible materials (rags).

There is no hazardous chemical inventory list.

Three compressed gas cylinders of nitrogen are laying on the floor in the boiler house (near the burners). These cylinders are reported to have been left by the contractor who was refurbishing the chillers at the heating plant.

Two compressed gas cylinders are stored without safety caps.

Three cylinders designed to have safety caps secured over the valve did not have them.

Two cylinders of oxygen and one acetylene cylinder are stored together. They are not in-service and are not clearly marked.

One bottle stored in a HAZMAT storage cabinet did not have any label or markings. It was determined to contain pump oil.

Five jerry cans, each containing variable amounts of an unknown liquid, are unlabeled and located in the former generator building.

Waste oil is being collected and stored in an unlabeled container. The container collecting oil under the oil filter press/drain device has no hazardous waste labels.

Carried forward from the 1995 ECAMP, installations are required to establish a natural resources management database to track program progress. The current database is located in the Conservation Module of WIMS-ES. Base has not entered their information into the database.

The grounds shop is issuing two different, non-approved weed and feed materials through the Self-Help Store. A summer weed and feed with Trimec and a crabgrass control herbicide are issued to MFH occupants and building managers upon request.

The sink in the pesticide mixing room does not have a reduced pressure backflow prevention device.

Two grounds maintenance people are applying weed and feed type materials and diazinon insecticide. Their DoD pesticide applicator certificates expired in 1990 and 1991.

Twenty-four of 93 dumpsters inspected were open and contained food wastes, and 13 of 93 dumpsters inspected had broken lids and/or holes in the side/bottom which keeps the dumpsters from being closed. Dumpster is rusted through at side, dumpster has "tear" in side where fork lifts dumpster, and 11 dumpsters have broken or missing lids.

Severe erosion has occurred on the west side of building subsequent to its construction. No vegetative cover has been established leading to gully erosion and discharge of sediments to the River.

A 2,000-gal. AST holding #2 heating fuel has no label. "NO SMOKING" signs are not posted in the area of this tank. A second, 500-gal. AST holding diesel fuel also has no label and is located outside of Bldg. The tank can be identified by the fact that it is cooled with a black asphalt coating.

ROOT CAUSE CODE: P2 - Understanding

When medicines are recalled from use, clinic supply personnel contact Bioenvironmental Engineering for approval of the disposal method (usually down the sink). There is no coordination with CEV to characterize the material prior to disposal to determine compliance with environmental requirements.

Waste oil being accumulated in a 500 gal. UST is removed monthly by a local hauler for delivery to an off-site waste oil reclaimer. Since organization does not hold a MA class B(3) recycling permit, the waste must be managed as hazardous waste (310 CMR 30.211). The supervisor has

had no hazardous waste training commensurate with his responsibilities. In addition, the tank is not marked with the words "HAZARDOUS WASTE."

Since the personnel bring waste solvent with asphalt from remote site property jobs and add it to their hazardous waste drum, the waste is not accumulated at or near the point of generation, and the site cannot be an IAP.

The AST used to collect waste oil for this facility's heating system is labeled as "HAZARD WASTE -- WASTE OIL -- TOXIC." Tank should more properly be labeled as "REGULATED RECYCLABLE MATERIAL," since this site operates under a Recycling Permit.
Partially empty containers of degreasers, floor stripper, Trane 22 refrigerant oil, and scrap metal exist in the rolloff container at the southeast corner.

The hazardous chemical inventory and Material Safety Data Sheet Book include all chemicals except Nickel Chloride and Boric Acid.

The backflow program manager does not review all plans and drawings of new or modified water systems to identify potential cross-connections. Consequently, inappropriate devices have been installed at inappropriate locations.

Current baseline and annual industrial hygiene survey reports are not maintained by the water treatment plant supervisor.

One 55-gal. drum of used oil does not have the required label of "USED OIL." The drum is labeled "30-weight oil" but facility personnel report the material to be used oil.

Repeated from 1993 External ECAMP, PCB inspection records are not maintained for three years after disposing of the transformer. Most records date back to only one year prior.

Remaining open from the 1991 Internal ECAMP, 1993 External and 1994 Internal, approximately 68% of all occupied facilities have been surveyed to determine the presence of ACM.

Remaining open from the 1993 External ECAMP, the base does not have a comprehensive basewide environmental monitoring plan that identifies the locations and monitoring/sampling procedures for environmental media. Sampling and Analysis Plans (SAM) are to be updated annually.

The effluent collected during the cleanout of oil/water separators and discharged to a manhole was composed of both wastewater and sludge. This discharge was not consistent with the base guidance on wastewater discharge from oil/water separators and as reported to the city.

The narrative statement on "Grease, Sand, Oil, or Grit Shipping Certification" in the recent Wastewater Discharge Semi-Annual Report (1/1/96 - 6/30/96) indicates that wastewater from the cleanout of oil/water separators was discharged to the sanitary sewer when in fact, there was no such discharge during the reporting period.

Remaining open from the 1993 External ECAMP, there is no secondary containment at any fuel transfer facilities within the Bulk Fuels Facility, including the JP-8 loading header, two JP-8 fillstands, diesel and MOGAS loading header, two diesel and MOGAS fillstands.

At various locations, used oil is being accumulated in improperly labeled containers. A 386-gal. AST storing used oil at Vehicle Maintenance also does not have the required label. The label does not contain the words "USED OIL" as required.

Fuel transfer pipelines are routinely inspected by personnel. However, a record of there inspections is not being produced. The checklists that have been developed for these inspections are outdated and do not reflect current facility configurations.

The Auto Hobby Shop has a yard where customers can leave automobiles in various stages of repair for a fee. The yard is fenced and kept locked. Hidden in one corner of the yard is a row of neatly piled tires numbering around 125 and weighing approximately 900 lbs. The pile was originally in a more conspicuous spot and was moved in the last year to be less unsightly. The original ownership of the tires is no longer available. They have been abandoned and now the Auto Hobby Shop's responsibility for disposal.

Repeated from the 1994 Internal ECAMP, Pest Management personnel are not monitored for physical examinations. Personnel are with the understanding that AG personnel are being monitored when in fact the organization does not perform any medical surveillance for weekend ANG personnel.

Remaining open from the 1993 External ECAMP, herbicides and insecticides are stored in same room (facility). A hot water shower for personal decontamination of pesticide applicator is not available at the CE Compound.

Insecticides are being stored directly on a concrete, exterior, mixing pad and covered with a tarp. The Interior storage area is not available due to modifications to upgrade the substandard storage facility.

Bioenvironmenal Engineering confirmed they have not completed a respirator fit test on a Guardsman with ANG. Notification of this testing requirement has been sent to ANG without response. ANG/EM reports that the Guardsman performs his duty only on weekends when testing is not available.

The Chief, Horizontal, acts as the AF Installation Pest Control Supervisor since the position is vacant. The individual does not have any pest management certification.

An inventory of pesticides stored within the building is not posted outside of the storage area.

Although the requirements had been brought to the attention of base managers, the gazebo construction project was completed in a floodplain with no environmental assessment, FONSI, or FONPA.

In Central Receiving, a flammable material cabinet contains an open, unlabeled coffee can holding cellulose nitrate, a highly flammable paint thinner. A used paint brush is also in the can.

A red can used to accumulate rags contaminated with degreaser and oil is marked "SOILED RAGS -- EMPTY WEEKLY." It does not bear the words "HAZARDOUS WASTE" or an initial accumulation date. The rags are taken weekly to the ACCS in Maintenance but are not included in the Electrical Shop drum tracking logs.
A red can used to collect rags contaminated with grease and oils is marked "EMPTY DAILY." It does not bear the words "HAZARDOUS WASTE" or an initial accumulation date. The rags are taken daily to the ACCS, but are not included in the ACCS Container Log. Container was labeled at the time of assessment.

Improper placement and labeling of biohazard receptacle. Improper labeling of biohazard receptacle.

A base standard wastewater treatment procedure is required to govern the discharge of industrial and nondomestic waste to the sanitary system in accordance with AFI 32-1067. Conditions are present for potential discharge of non-permitted industrial waste to sanitary sewer located near diesel lines and tank. Sanitary drains are located in several industrial-use areas such as AAFES service station and other Bldg.

13 CFC recovery units are not labeled in accordance with 40 CFR 82.158.

Materials found in a flammable cabinet are listed in the HAZMAT Book as inactive. The materials lacked container labels. The items appear to have been purchased by bypassing HAZMAT Pharmacy.

There are several "sample" materials located in the organizations flammable storage cabinet which the shop is not authorized to store/use. Shop personnel stated that the "sample" material as issued by the Hazardous Material Cell (HMC) /Distribution Support Center (DSC) as a possible "less hazardous" substitute. Material is being evaluated by the shop. This hazardous material is not entered into the Hazardous Material Management System (HMMS). Material: Zinsser, Bulls Eye 1-2-3, Primer/Sealer; multiple colors of Sprayon, Clean-N-Safe, Aerosol Acrylic Enamels.

When servicing hydrazine cylinders, a pan of water is placed under the cylinder to catch drips. The hydrazine-contaminated water is neutralized with bleach, the pH in the wastewater is then adjusted. The wastewater is disposed of through DRMO as non-regulated waste. Hydrazine is a listed waste (U133), and spill residue continues to bear the same waste code.

A locker is marked with the words "CORROSIVE WASTE." Inside the locker are lead acid batteries, NiCad, and lithium batteries. The battery locker has not been reported as part of the

waste stream for the customer. There are no waste profiles, inspection records, or documentation of waste stream sources.

IAP managers throughout the base lack current and initial training for hazardous waste management.

The fire department was working from an out-dated list of hazardous waste locations.

Documentation was not available to determine type of waste by percentage (paper vs plastic) and load rate (pounds/hour). A copy of the operators manual was not available in the vicinity of the incinerator. The log indicated that items burned as 80 bags, 50 boxes, etc which is not specific enough to meet permit requirements. Log entries indicate that unauthorized materials were burned (microfiche and film).

Documentation on AF Form 55 was not current for all pesticide applicators.

The dental lab treats their spent hydrofluoric acid with an "acid neutralizer" and then washes the spent solution down the drain with the approval. However, except for acids neutralized "in process," this acid should be collected, tested, and managed as a hazardous waste.

Organization stores small amounts of hazardous waste in an industrial refrigerator (adhesion promoter and sealing compound containing MEK). The site is not designated or authorized as a satellite accumulation point.

According to the AFI referenced below, all base waste streams regulated under RCRA must be re-evaluated periodically for presence of hazardous constituents. Base has approximately one dozen waste streams in this category (eg., paint sludge, MEK solvent, sand-blast media, used oil, etc.). Large volume waste streams in this category must be re-evaluated annually, and small volume streams every three years. The majority of the waste streams have not been tested in strict compliance with this schedule, although all have been tested at least once in the last five years except for parts washers. The status of parts washers is currently in flux due to on-going conversion. In the past, parts washer solvents were handled by contractors, however, the base is converting to newer systems that will not be contractor maintained, thereby creating additional waste streams requiring periodic re-evaluation.

Drums of HW are stored on-site for over 90 days without proper authority. On the date of the inspection (28 Oct 96), there were three containers of hazardous waste with accumulation start dates of 29 July 96. As of this date, this waste was stored 91-92 days, depending on whether the initial date is counted as a day of storage. This illegal storage was caused by an incorrect assumption that 90 days equals 3 months. A review of recent records revealed other instances of drums stored for 1 to 3 days over the 90-day time limit.

A single fill log was used to account for two wastes accumulated in two different drums (used oil and aerosol cans).

Two personnel were appointed as satellite accumulation point manager and alternate effective 3 Feb 96. However, they did not receive their initial hazardous waste management training until May and October.

A container of waste rags contaminated with MEK was unmarked, and there were no security measures to control access to the container.

Two compressed gas cylinders had no labels, and were only haphazardly secured.

The September 1995 waste analysis plan does not include all waste streams that should be tested. It omits the following: crushed glass from Bldg, sludge and filters from the aqueous parts cleaners in Bldgs, and incinerator ash from Bldg.

The temporary AST was not properly secured, did not have secondary containment, and did not have appropriate tank markings. In addition, the tank was set up as both an issue and support tank.

Personnel did not recognize reducing ignitability as treatment.

A proper description of drum contents is stenciled on the drum. However, the proper description may be contradicted by previously stenciled text.

There are a number of air pollution emitting sources that are operating without a construction permit, an operating permit, or a valid permit exemption required by 62-210.300. These sources include numerous degreasers, seven paint booths, the area 400 fuel stand, and abrasive blaster equipment.

Shop supervisor was unaware that the required labeling must be present at each degreaser.

Personnel were confused as to the exact requirement for MSDS in the Supply warehouse.

Personnel were unaware that these materials were incompatible.

Personnel did not consider the fuel filters as hazardous.

CEV personnel had a different interpretation of at or near.

Personnel at installation did not know that these two waste streams required a separate hazardous waste determination.

Personnel were not aware that hazard warnings were needed on each container.

Personnel did not understand the labeling and storage requirements.

Personnel did not know that containers must be tightly sealed.

The waste has not been stored in a designated hazardous waste storage area because the waste has not been conclusively determined to be hazardous. The procedures that the Base has in place do not ensure the receipt of analytical results within the 90-day time limit.

Although the operator understood that records are required, he did not understand the purpose of the records or what they needed to include.

Personnel at the Transportation Shop believed that the facility's new oil filter crusher met the regulatory requirements of hot-draining.

The Asbestos Program Manager was not aware of the requirements for the Asbestos Operating Plan.

CEV Personnel believed that EPA Form 8700-12 had to be submitted along with the biannual report.

Engineers did not understand the question "environmental project (y/n)" in the PCMS.

Even though the likelihood that the operations at the old FTA resulted in any contamination is slim, it still must be assessed before demolition and repaving occurs.

Because latex paints, which are not hazardous wastes, are allowed to be dried, shop personnel did not understand that non-latex paints require a different management approach.

Shop personnel were not aware that accepting the materials for resale could potentially require DRMO to manage them as hazardous waste.

Bulbs will be recycled, and are therefore being accumulated at the recycle center. However, because they are hazardous they should be accumulated at the 270-day area.

DRMO did not realize that accepting the materials for resale could potentially require them to take responsibility for disposal of the wastes.

Personnel did not feel that a sufficient volume of fuel was collected to merit managing an IAP.

Personnel did not know the exact requirements for historic preservation.

Personnel are not fully aware of storm water discharge permit requirements.

No awareness of regulatory requirement.

Unaware that there was an incompatibility, Not on the MSDS.

Personnel assumed a "worst case" sample would satisfy disposal method requirements for the remaining oil/water separators on the base.

The lab staff did not fully understand that the accumulation point at the gram stain area was, in itself, a satellite accumulation point.

Base personnel lacked sufficient understanding and guidance on methods to determine local interest in the formation of a RAB.

Personnel understand that used oil is not hazardous, but do not understand the potential for confusion arising from conflicting labels.

Personnel did not understand that allowing paint to dry before disposal constituted treatment.

The personnel at T-1 Maintenance did not realize that they may be generating a hazardous waste.

CES/CEV does provide qtrly recycling reports to MAJCOM. Personnel unaware BX/Commissary bypassing base recycling process .

Personnel assumed the degree of hazard class or category would be the same as in the superseded AFM.

Methyl Ethyl Ketone (MEK) is used in a paint stripping process in Hangar 2. After use, the spent MEK is disposed of along with POL-contaminated rags as nonhazardous solid waste. Because MEK is a listed hazardous waste, it must be managed as such and has been inappropriately managed in the past.

The corrosion control facility at Transportation generates two hazardous waste streams. One is liquid paint-related materials, and the other is solid paint-related materials. The drum containing the solid paint-related waste was not labeled. 40 CFR 262.34(c) requires that this drum be labeled to identify its contents. The liquid paint-related waste was contained in two drums at two locations. 40 CFR 262.34(c) also requires that the waste be located in one place and be limited to 55 gallons.

Most industrial shops on base collect spilled or otherwise off-specification POL. This material is collected in two 10,000-gallon tanks and eventually taken off base to be recycled. 40 CFR 279.22(c) requires that all containers used to accumulate these products be labeled "Used Oil." Currently, the collection points across the base are labeled inconsistently.

The spill containment area at the fuel fill stand and off-loading areas in the 400 area is cracked.

The existing trash collection container was full and overflowing. This condition contributes to problems with rats and other vectors on the base.

The 7-cubic yard dumpsters were not adequate to contain all green waste generated in the housing areas on the installation.

Carryover finding from the 1995 Internal ECAMP. Industrial wastewater discharges into the sewage system require certificates issued by the FOTW. 85 applications had been submitted to the FOTW, but only 40 certificates had been issued. Of the 40 certificates, 7 had expired.

This finding was originally identified in the 1994 external ECAMP. There is no spill containment facility at the truck fill stand and off-loading areas in the POL bulk storage area.

Both the federal regulation (40 CFR 61.145) and the FAC Rule 62-257.301 require notification of intent to demolish or renovate structures containing regulated asbestos-containing materials. This notification must be received by the FDEP, the States Asbestos Coordinator, the department's district office, and local air programs ten days prior to the start of demolition.

ROOT CAUSE CODE: P4 - Result vs Action (The proper action was taken, i.e. they followed an appropriate policy, OI etc., but the results were not what was intended) example: applied for an air permit with the appropriate information, but the one received had incorrect information.

Conditional AO, dated Mar 86, lists three Zurn boilers and one Keeler boiler on site. Actual equipment on site are three Erie boilers and one Keeler boiler.

Carried forward from the 1993 External ECAMP, 1994 Internal ECAMP and 1995 Internal ECAMP. The solid waste transfer station is being operated without a permit as required by state law. Site assessment has been approved by the town. Application for both construction and operating permits was turned into the State on 16 May 96.

A groundwater "pump and treat" system that operates in the field south of Pesticide Shop discharges backflush from the air stripper into a 275-gal. double-walled steel AST. This AST has a hazardous waste label that is badly weathered and illegible. A second label that may have been an NFPA diamond is also completely illegible.

A new plan was written after the last external ECAMP; however, the new plan did not remedy all the issues brought up in the finding.

Repeat finding from 1995 Internal ECAMP. Evidence of open dumping existed at numerous locations: (a) adjacent to beach (green waste): (b) throughout the scrub-brush around the facilities; (c) across from the golf course. A finding for Unpermitted Dump Site in the 1995 Internal ECAMP evaluation had been reported as closed in the Management Action Plan.

The infectious waste dumpster was full of plastic bags containing sharps and other infectious waste. Closure of the dumpster lid was compacting the bags of waste, increasing the possibility of breaking a bag open.

The entomology services section of the Military Family Housing (MFH) maintenance contract was not reviewed or approved by the MAJCOM.

Carried forward from the 1996 Internal ECAMP, the open grates at the Military Car Wash allow storm water to enter the sanitary sewer system. This is inconsistent with the City's industrial wastewater agreement.

Repeat finding from the 1994 External ECAMP. The drainage ditch along road is being stripped of all trees and other vegetation leaving the soil bare. Because the ditch is scheduled to be re-contoured and re-seeded in April 1997, there is potential for erosion which could become a non-point source of pollution in the interim. Although this condition is different from 1994, erosion control considerations pertaining to ditch are still difficult.

One heavily corroded/rusted acetylene gas cylinder is stored at the site. It is exposed to the elements and presents a safety threat.

A one-gallon can labeled "FLAMMABLE," contents unknown, is in a water-filled asphalt cart.

Efforts were made to update the May 94 draft plan with a Nov 95 plan, but additional items or corrections were not included in the latest plan.

Facility personnel who handle hazardous waste are required to complete initial hazardous waste training within six months of employment and refresher training on an annual basis thereafter. Personnel in several different shops have not had the required hazardous waste training (initial or refresher). These shops include: Munitions, Corrosion Control, Electrical.

Two shipments of hazardous waste involving multiple drums of waste were stored on site for more than 90 days.

The drums contained waste alodine rags (from 27 April, 1993 to 29 July, 1993) and photo waste (from 30 June, 1995 to 11 October, 1995).

The Phase II land disposal restrictions (LDRs) require that underlying hazardous constituents be identified for certain land-banned wastes to ensure complete and thorough treatment. A hazardous waste shipment on 14 December 1995 included a waste stream for which these requirements apply (waste solids with MEK and toluene). Although the LDR certifications were attached to the manifest, they were not completely filled in; identification of the underlying hazardous constituents is required for waste code D035. If analysis shows that there are no underlying hazardous constituents for that waste, code 248 should have been used to indicate that "none apply."

The fuels shop uses small amounts of MEK on rags to remove grease. When the rags are no longer useable, they are placed in the POL nonhazardous waste drum for disposal. Because MEK

is a listed hazardous waste and the POL drip pads are disposed of as nonhazardous waste, the MEK rags have been inappropriately disposed of in the past.

The hazardous waste determination had been conducted, but the results had not been properly applied.

The base has taken steps to change its management process though the result still may not meet the intent of the federal rules.

CEV received approval for its permit modification request, but did not ensure that all permit copies were updated.
Form submitted but release detection methods not accurate.

The facility has recently been relocated to a new building and all other signs and security controls had been relocated. This one was just overlooked.

The shop collects waste fuel as a hazardous waste, but had not considered that the filters would also be hazardous.

The Base Hazardous Waste Management Plan and the Spill Prevention Response Plan refer to each other for the contingency planning data required by 40 CFR 265.52 (i.e., each document states that the other document includes the contingency plan).

The plan was updated in March 1997, but the update did not address all requirements.

The Auto Hobby Shop has a hazardous waste management program, but had not considered that the fuel filters might be hazardous waste.

The documents were prepared in a timely way, only a slight tracking error occurred.

The new tank had been installed and shop personnel assumed it was labeled correctly; however, the words "used oil" were not present. A base-wide effort to properly label used oil was conducted, and this container was overlooked.

Although the drain is covered by a spill prevention mat, cross contamination occurred. The hazardous waste labels were placed on the drums and marked "pending analysis" as a precaution while awaiting results from the lab.

This was an example of oversight. All other Safety Kleen manifests had LDRs.

The drain valve was locked and closed, but did not ensure it could not be bypassed.

Records were revised to reflect usage and identify materials used, but VOC content is not tracked.

Lack of adequate resources (personnel) available to accomplish required update.

The plan has been under review for approximately one year. The plan is currently being revised.

Because this waste is generated in extremely small quantities, establishing individual points is impractical. This management operation is subject to interpretation AETC policy is to seek approval from the TNRCC.

Although the NOR is well maintained, this segment has not been recently reviewed.

If the recovery system does produce reusable Alodine, current procedures are adequate for the unit.

CEV had difficulty obtaining the funds. The HQ/CEV personnel who assumed responsibility for completing the MAP schedule update just received adequate funding to complete the schedules

Personnel thought the previous write-up was corrected. The storage room was used to store flammable materials for the jet engine shop.

HAZCOM program not in required format per AFOSH STD 161-21 and base I 48-104.

Must review IEX coding procedures with HMP and BE prior to purchase of LP Hazmat.

No MSDS was available for squalene, which was located on a shelf labeled "AW3."

Personnel working in the entomology shop must either be certified for pesticide application and management or must work under the supervision of a certified applicator. Currently there is an insufficient number of certified personnel.

The secondary containment drain valve was not properly locked, and was open.

The Oct 96 Asbestos Management and Operations Plan contained outdated references and responsibility assignments. The plan also contained procedures which have been superseded either formally or by "common practices".

The Oct 96 revision of the LBP Management Plan still contains inaccurate references to a draft AF Policy on LBP in Facilities and a reference to EPA future training and certification requirements to be finalized in May 94. The AF policy was finalized and implemented in May 93 and the EPA requirements for LBP activities in target facilities was issue in the 29 Aug 96 Federal Register with various implementation requirements stretching thru 1999.
In addition, the plan does not address a few key responsibilities assigned in the AF Policy such as CE's responsibility to train facility managers and the BEE's responsibility to conduct sampling and testing of paint.

There was no implementation letter or planned method of implementing the new draft that would ensure the information reached all responsible organizations.

Multiple shops have not performed site-specific hazard communication training. Documentation could not be produced to show completion of training (AF Form 55 or CAMS Training Computer System). Examples of shops deficient in training: MXS/LGMFN, MXS/LGMCF , OS/DOL.

Remaining open from the 1993 External ECAMP, on south side of Bldg inside compound adjacent to pesticide facility, there is a 120/240 size transformer on a wooden pallet. The transformer appears to be old. Personnel located at Bldg stated the transformer was used only for training exercises. However, transformer has not been tested for PCBs. The shop does not have the transformer on record. It's possible, according to personnel at the ANG, that the transformer was here before CE and EM began inventory.

Remaining open from the 1991 External ECAP, there are no backflow prevention devices installed on the water min that supplies water to laboratories, other Area, the fire protection deluge system and the other area. A sanitary survey of the water supply system conducted by the state on 17-18 Ma 1988.

Large dirt piles on the construction site lack erosion control. Straw bales placed at storm drains are deteriorated and insufficient.

ROOT CAUSE CODE: P6 - Action vs Procedure (the correct procedure was in place but an incorrect action was taken) example: the maintenance guy read the TO wrong and flipped a switch open resulting in a spill.

Repeat finding from the 1995 Internal ECAMP. The AST was not marked with a "NO SMOKING" sign.

Carried forward from the 1993 External ECAMP and the 1996 Internal ECAMP (POL-3). There is no containment system at the AAFES service station. Tank filling by commercial tank truck is located approximately 10' from two storm drains and an open roadway. Traffic is not stopped while filling operations are in progress. In the event of spill, the contents of the tanker truck would flow directly into the storm drain system.

Base Hazardous Materials Emergency Response Plan (HMERP) dated 30 Aug 96, considered the Spill Prevention Control and Countermeasures Plan (SPCC Plan) has not been reviewed by a registered professional engineer. The HMERP as distributed, has been mis-printed and needs to be corrected. The site-specific contingency plan data for Boiler Plant are not correct. The Appendix A tabulation of aboveground and underground storage tanks is not accurate.

Brush and tree trimmings, trash, and scrap metal are being dumped at a landfill posted as closed. Trash dumped as late as August of 96 (newspaper Aug '96).

WD40 and paint cans were found in a dumpster at Bldg. The dumpster at Bldg contained a paint can with more than an inch of liquid gray paint. The dumpster at Bldg contained several fluorescent light tubes.

The permits for USTs, obtained from the appropriate municipal fire authorities, expired in 1995. No requests have been made for permit extensions.

The fill port for the 1,000-gal. #2 fuel oil AST east of Bldg is not secured. The building owned by the Army Reserve is not now occupied.

Transit panels stored in the asbestos conex, are not wrapped or bagged. The panels do not have the required labeling.

The conex used for temporary storage of ACMs is not properly labeled.

There were no procedures for discharging to the sanitary sewage system. Procedures must describe (a) pretreatment requirements, (b) discharge procedures, and (c) effluent limitations for industrial waste.

Some employee's AF Form 55 did not have required signatures indicating training had been accomplished. There were other minor documentation errors, and some program letters were obsolete.

A tin household trash barrel is used to collect wood dust from the end of the chute connected to the cyclone outside on the south side of Bldg. The chute is not aligned exactly with, or tightly connected to, the barrel. This may result in fugitive particulate emissions during operation.

Hazardous materials provided to various organizations free by vendors or provided for evaluation testing are not represented in the basewide inventory maintained by HMC. Examples of such evaluation activities are found at Dental Investigation Services, and Vehicle Maintenance. The basewide inventory is also incomplete because hazardous materials already in the possession of the organizations at the inception of the HMC were not retroactively added to the inventory. Examples of such pre-HMC inventories are found at Analytical Services.

The site-specific spill plan for the base lacks details on drain controls or provide incorrect information. Examples include Analytical Labs.

Radioactivity Analytical Laboratory only analyzes the samples they receive from off-base for radioactive characteristics and has no procedures to determine if samples have hazardous characteristics. The unused or analyzed samples are discarded to the solid waste.

There was no separate Facility Response Plan (FRP) for AFB as required by the Oil Pollution Act (OPA) of 1990, which amended Section 311 of the Clean Water Act. There was a chapter of OPA's requirements in the Spill Prevention and Response (SPR) Plan entitled Emergency Planning and Response Plan (EPRP). However, the two plans are different and combining them is not

allowed. The purpose of the FRP is to extend prevention and preparedness activities, improve response capabilities, ensure responsible parties pay the cost of spill cleanup, etc, to the maximum extent practicable and for the worst case discharge. There are numerous interactions and agreements among on-base and off-base agencies for a coordinated effort if a catastrophic spill should occur.

The hazardous waste determination should have been communicated to shop personnel as soon as the determination was made. Potentially hazardous materials should be handled with care during determination procedures.

Pollution Prevention Plan met all requirements of the state, but didn't fulfill all requirements of the Air Force Instruction.

Personnel failed to follow established procedures for waste disposal.

Installation Restoration Program (IRP) wastes (presumed non-hazardous) were left on site following the completion of removal action at the Runway Dump. Contractor who conducted the removal action is required to remove the waste. Wastes left on site consisted of approximately twenty 55-gallon drums, and approximately twelve "super sacks" containing plastic scraps and personal protective garments.

A procedure for consolidating the permit files has not been established.

Isolated instance of personnel oversight. Other containers were properly labeled.

Personnel failed to follow the shop written hazard communication program is in place, which states the requirement for a hazardous chemical inventory.

Established procedures followed by this shop require MSDSs for all hazardous materials used there. These procedures were not followed.

Opacity readings are taken periodically and records are maintained but the problem has not been solved.

All other containers in the cabinet were properly labeled. Established procedures were not followed.

The spill response plan was not verified against the tank inventory maintained within CE.

The cover letter for the plan asks for any updates or corrections, but none were identified or submitted.

CE supply has a hazardous communication program in place which should address these storage issues. It appears that no self-inspection is conducted.

The vehicle maintenance area has a good overall hazard communication program. More frequent inspections would solve this problem in the future.

Personnel were aware of the tank tightness testing req. However, due to the installation of new UST, testing wasn't completed on existing USTs.

The AAFES Service Station manager needs to make this finding a special interest item, due to this being a repeat finding from last year's inspection.

Corrective actions were taken but not reported to the person cited.
Personnel were trained as recently as 20 Mar 96 but still could not find MSDSs.

Corrosive and flammable materials stored together in a flammable storage locker located under a work bench.

The base is recycling the cans but the shop needs to ensure that all useable material is eliminated before recycling.

Personnel failed to follow established procedures for waste disposal.

MAP is being updated as required, but complete information was not listed in either the current MAP or the draft update.

AFOSH Standard 161-21 describes the requirements to document work place specific hazard communication training and FHCTP on AF Forms 55. Procedures are in place. Most supervisors knew that the training needed to be documented but had not yet done it.

The recovery system was recently modified, and a new drum had been installed. The drum should have been labeled hazardous, but this had not yet been done.

The form used for the operating record provides a field for the date of removal; however, in some cases this field has not been completed.

The Hazardous Waste Management Plan and the Satellite Accumulation Point Inspection Form instruct Point Managers to conduct daily inspections. However, inspections are only performed weekly.

Base not providing required data.

Lecture Bottles (small compressed gas cylinders) containing oxidizers and flammable materials are stored together under the lab hood.

Three small nitrogen cylinders were unsecured. They were located in the oxygen, oxygen aviator, and nitrogen full-cylinder storage area.

Oxygen and acetylene gas cylinders are not sufficiently secured and could fall or rupture. Flammable gases and oxidizers should be segregated by the hazard classification of the gas.

Corrosive and flammable materials were stored together in a flammable storage building. Bleach (sodium hypochloride) stored with flammable materials in an outside storage area. Ammonium hydroxide was stored with flammable materials.

MSDSs were not located in the immediate work area.

The environmental staff has determined that dried tape and paper produced in the painting facility at Transportation are not hazardous waste. However, there is no analysis currently on file. 40 CFR 262.40(c) requires the facility to maintain all records documenting waste stream determinations for at least three years after the waste was last removed from the base.

CEOE personnel conduct scheduled and unscheduled inspections of an off-base landfill where refuse from the installation is disposed of by the contractor. However, these inspections are not documented.

40 CFR 761.180(a) requires all facilities that use or store at least 45kg of PCBs to prepare an annual document log. Logs must be kept for at least three years. Manifests dated 9/16/92 (manifest #633229) and 6/4/93 (#31551) indicate that 45kg of PCBs were shipped each time. These manifests show 45kg of PCBs in use or storage, which require annual documentation.

Appendix C: Filed Investigation Data - Maxwell AFB, Alabama

17 June 1997 - Site visits performed with the hazardous waste protocol personnel

Established procedures are inadequate to meet laws and regulations - Draining of fuel filters prior to disposal could be considered treatment of a hazardous material.

Improper use of terms - Personnel were unaware of the difference between a hazardous waste and a hazardous material. Made a difference in how the waste was to be handled.

Non-conscientious - Personnel don't take the time to tighten drum caps.

Personnel fail to follow established procedures - Personnel fail to tighten the drum every time that it is used due to laziness.

Insufficient Training - Personnel don't know there was a requirement to tighten the drum caps.

Non-conscientious - Personnel failed to re-label the hazardous waste sticker on the drum of fuel filters after it had rubbed off.

Ineffective Communication between CEV and the shops - Personnel are confused on which labels need to be on which drums.

Personnel do not know how or where to dispose of an item - Personnel left a drum of mineral spirits in their shop for approximately six months and failed to properly dispose of it. Their explanation was that they didn't know where to dispose of it.

Ineffective communication between CEV and the shop - Personnel where unaware of how the oil dry was disposed. This makes it difficult for shop personnel to ensure that the oil dry constituents meet the disposal methods criteria.

Failure to keep accurate records, update operational plans, etc. - CEV personnel failed to update the AICUZ study once every other year.

Insufficient communication between the government and the contractor - CEV failed to communicate to the contractor that an installation points of contact listing be included in Volume I of the AICUZ study.

18 June 1997 - Site visits performed with the hazardous material protocol personnel

Established procedures are inadequate - Changes in labeling process not carried over to new personnel who are handling the flammable lockers. Procedure used to be by color.

Insufficient AF personnel training - Personnel Failure to understand chemical compatibility. Personnel didn't read and understand the MSDs. Failed to move items after taking over the job. Assumed it was correct before.

Established procedures are inadequate - Procedures are not set up to ensure that there is a no-smoking sign placed in the correct locations.

Insufficient AF personnel training - Personnel failure to understand chemical compatibility. Personnel didn't know that acids and bases needed to be separated.

Insufficient AF/civilian training - Personnel failure to understand chemical compatibility. New personnel were unaware that bases (alkali) and acids (hydrochloric acid) and oxidizers (calcium hypochlorite) need to be stored separately. No inspection procedures are set up on a routine basis.

19June 1997 - Site visits performed with the hazardous material protocol personnel

Insufficient contractor training - Personnel are not knowledgeable on the compatibility of acids and bases. Personnel defense: They told us to all corrosives are compatible and can be placed together.

Personnel fail to follow established procedures - Items in the flammable storage locker were not labeled. Personnel were fully aware that the items needed to be labeled.

Omission of training - CEV feels that the reserve unit on base should be responsible for their own training.

Knowledge and interpretation of laws - CEV interpret the training requirements for 90 day personnel differently than the regulations.

Ineffective communication between shops and CEV - Shops fail to inform CEV on new personnel and their need for training.

Ineffective communication from CEV to the shops - CEV fails to convey all training requirements to the shops. Possibly need a larger number of personnel.

Failure of CEV to understand shop procedures - Some shops were using MEK and throwing the rags in the trash.

Non-Conscientious Personnel - Failure to have all of the MSDs on file.

Appendix D: Resulting Affinity Diagram - Headings and Descriptions Of Findings

Systemic Areas of Vulnerability: Areas of vulnerability listed below contain findings that can be specifically and directly attributed to a systemic operation.

Ineffective Communication Between CEV and Shops - Environmental requirements and developments are not communicated between entities effectively and in a timely manner.

The plan is prepared by CEX and not coordinated through CEV; therefore, personnel may not be aware of all requirements.(P1)

Base Bioenvironmental Engineers and Military Public Health are not notified prior to pesticide applications in the child development center, dining halls or commissary.(P1)

When medicines are recalled from use, clinic supply personnel contact Bioenvironmental Engineering for approval of the disposal method (usually down the sink). There is no coordination with CEV to characterize the material prior to disposal to determine compliance with environmental requirements.(P2)

The hazardous waste determination should have been communicated to shop personnel as soon as the determination was made. Potentially hazardous materials should be handled with care during determination procedures.(P6)

Ineffective Communication between MAJCOM and Installation - Environmental requirements and developments are not communicated between entities effectively and in a timely manner.

AFB personnel had pursued this issue with HQ and thought that HQ had resolved the immediate problem.(P1)

No Air Force or HQ guidance has been provided to the base level organization for dissemination to the general base offices. (P1)

The installation had received 22 letters of non-compliance in 1995, and 3 letters in 1996. None of these had been reported to HQ CEV as required.(P1)

No HQ Air Force or HQ affirmative procurement guidance has ever been distributed to the base level organizations.(P1)

Base personnel lacked sufficient understanding and guidance on methods to determine local interest in the formation of a RAB.(P2)

Ineffective Communication between Contractors and the Government - Environmental requirements and developments are not communicated between entities effectively and in a timely manner.

Military Public Health is not receiving notification when contractor pest applications are done at the Officers Club, NCO Club, Golf Course, Lounge, and Bowling Lanes.(P1)

Personnel were unaware of requirement due to incorrect guidance from the contractor.(P1)

Lack of Adequate Resources - Number of personnel is not sufficient to handle tasks, or funding is not available.

Lack of adequate resources (personnel) available to accomplish required update.(P1)

AETC/CEV had difficulty obtaining the funds. The HQ AETC/CEV personnel who assumed responsibility for completing the MAP schedule update just received adequate funding to complete the schedules.(P4)

Lack of adequate resources (personnel) available to accomplish required update.(P4)

Lack of Procedures, Operational Plans, or Programs - A procedure, plan, or program has not been established to meet the requirement.

No policies or procedures were in place to eliminate purchases of ozone depleting substances (ODS). The Hazardous Material Pharmacy ODS manager had not developed a strategy to phase out Class 1 ODS purchases.(P1)

There are no spill response procedures for the pesticide, storage/mixing area in Bldg. Spill kit (absorbent materials) for spill containment and clean-up are not available at the storage site.(P1)

No procedures were in place to train facility maintenance personnel on how their jobs impact the cultural resources management program. Training needed to be initiated to ensure CES personnel, self-help workers, and contractors are aware of the impact of their activities on cultural resources.(P1)

The installation's Environmental Leadership Council has no group which reviews NEPA documents.(P1)

CE has not developed or publish a Base Comprehensive Plan.(P1)

AFB does not have a Pollution Prevention Management Plan as required by AFI 32-7080, para 2.2.(P1)

There was no written Hazard Communication program for the AGE flight.(P1)

This installation has no composting program, as required by AFI 32-7080.(P1)

There is no comprehensive Natural Resource database, nor is GIS used in comprehensive planning. Contracts have not previously required GIS compatible database deliverables. Map products are not being updated annually.(P1)

Sentel does not have a written hazard communication program.(P1)

Nesting pairs of burrowing owls were disturbed and owls were flushed from abandoned prairie dog burrows by mowing equipment. The burrowing owl is a federal Candidate species and is protected by the State under the Migratory Bird Treaty Act. Currently, there is no basewide raptor survey or management plan to prevent this type of occurrence.(P1)

There is no management plan for threatened and endangered species for species and candidate species known to reside at AFB.(P1)

The site-specific spill plans for hazardous materials storage areas have not been developed or incorporated into the basewide emergency response plan.(P1)

The installation has not published their supplement to AFI 32-7041, Water Quality Compliance, as part of the installation's water quality compliance program.(P1)

A base standard wastewater treatment procedure is required to govern the discharge of industrial and non-domestic waste to the sanitary system in accordance with AFI 32-1067. Conditions are present for potential discharge of non-permitted industrial waste to sanitary sewer located near diesel lines and tank in Bldg. Sanitary drains are located in several industrial-use areas such as AAFES service station and other Bldg.(P2)

There were no procedures for discharging to the sanitary sewage system. Procedures must describe (a) pretreatment requirements, (b) discharge procedures, and (c) effluent limitations for industrial waste.(P6)

Radioactivity Analytical Laboratory only analyzes the samples they receive from off-base for radioactive characteristics and has no procedures to determine if samples have hazardous characteristics. The unused or analyzed samples are discarded to the solid waste.(P6)

A procedure for consolidating the permit files has not been established.(P6)

CEV Knowledge, Awareness and Interpretation - Lack of knowledge, awareness or misinterpretation of applicable environmental laws, regulations and requirements. Lack of knowledge or awareness of developments on the installation.

Unaware of requirements to report recycling metrics, encompassing installation of a single qualified recycling program.(P1)

Individual was not aware of requirement to register equipment with EPA.(P1)

Personnel at the Chiller Plant and CEV were unaware of the requirement to provide notification prior to planned releases to the atmosphere during maintenance periods.(P1)

Personnel were not aware of the AFI requirement.(P1)

The Env Flight classifies AFB as a "generator" facility and not an interim status facility. (P1)

Unaware of proper manifest requirements. Copy of requirements provided to personnel.(P1)

The shop foreman and air program manager were unaware of these requirements. In fact, the lid had been pinned open with a "fire safety" pin.(P1)

Base personnel were not aware that they are required to submit an AEI.(P1)

Invoices were being maintained for one year. Not aware of three year requirement.(P1)

The base typically marks items for recycle with the appropriate information, but had not considered that fluorescent light bulbs are also subject to this management requirement.(P1)

Personnel were not aware of the required contents of Solid Waste Management Plan.(P1)

AFB lacks a basewide inventory of standing structures that are potentially eligible for listing on the National Register. The buildings that predate the military installation have been identified, as have the significant Cold War structures. However, facilities more than 50 years old associated with the early days of AFB have not been identified and evaluated, nor have other structures that may be exceptionally significant Cold War resources. These buildings must be systematically inventoried, and the inventory coordinated with the SHPO.(P1)

The Asbestos Program Manager was not aware of the requirements for the Asbestos Operating Plan.(P2)

Personnel did not know the exact requirements for historic preservation.(P2)

Personnel are not fully aware of storm water discharge permit requirements.(P2)

No awareness of regulatory requirement.(P2)

The responsible organization was unaware that a permit to construct an air emission source was required in addition to a building construction permit. (P1)

CEV personnel had a different interpretation of at or near.(P2)

Engineers did not understand the question "environmental project (y/n)" in the PCMS.(P2)

Because this waste is generated in extremely small quantities, establishing individual points is impractical. This management operation is subject to interpretation policy is to seek approval.(P4)

Shops' Knowledge, Awareness and Interpretation - Lack of knowledge, awareness or misinterpretation of applicable environmental laws, regulations and requirements.

Pesticide personnel are not aware of the Air Force regulations governing pesticide usage.(P1)

Personnel were not aware of the AFI requirement.(P1)

The manager was not aware of any leak detection system installed on the tanks or pipes. Annual tightness testing was conducted on the system, however there were no records of monthly inventory controls.(P1)

The power production job of CE was absorbed by the exterior electric shop and personnel were not aware of the requirement.(P1)

Personnel not aware of requirement to secure tank drains.(P1)

Maintenance personnel would not be aware of pump failure if there was a power outage. This could cause sewage backup and potential overflow.(P1)

Personnel were unaware that use of paint thinners should be recorded in the logbook.(P1)

Personnel were unaware that the lid must remain closed when the degreaser is not being used and that an instructional sign must be posted.(P1)

Personnel had not identified these wastes as hazardous.(P1)

Personnel were unaware that an instructional sign must be posted.(P1)

Personnel unaware of NFPA Requirement.(P1)

Personnel were not aware of the requirement in the AFI.(P1)

Personnel were unaware of requirement.(P1)

Auto Skills Development Center personnel were not aware that fuel filters are hazardous waste. (P1)

Operators were not aware of the requirements.(P1)

Designated Pest Management Coordinator, was not aware he had to be DoD-certified to ensure pesticides are properly used on the base and to comply with DoD and Air Force regulations, directives and guidance.(P1)

Personnel were unaware that all containers of hazardous materials must have hazard warning labels.(P1)

Personnel were unaware of the requirement to register equipment with EPA.(P1)

Personnel working in the area were not aware of hazardous waste management procedures.(P1)

Personnel were not aware of the significance of the requirement.(P1)

Store personnel were unaware of storage requirements. Personnel did move weed and feed back into the building during the ECAMP evaluation.(P1)

Personnel were not aware of the requirement to keep cylinders securely anchored nor to keep flammable gases at least 20 ft from oxidizers.(P1)

Unaware of records and waste disposal processes.(P1)

Water systems personnel were not aware of a sign requirement.(P1)

Personnel were unaware that all containers of hazardous materials must have hazard warning labels.(P1)

DRMO personnel were not aware of the base has researched the issues related to the Clean Water Act that are associated with this discharge, but has not yet reviewed potential impacts associated with RCRA. requirement to submit LDR certification forms with each off-site shipment of spent lead-acid batteries destined for recycling.(P1)

Personnel were not aware that use of solvents for wipe-down operations is required to be included in record keeping.(P1)

Personnel was unaware of the specific requirements for the storage and maintenance of batteries.(P1)

Personnel was unaware of the specific requirements for this storage locker.(P1)

Personnel was unaware of the specific labeling requirements.(P1)

Personnel was unaware of the specific requirements for the storage and labeling of hazardous materials.(P1)

Personnel at Hangar 37 were not aware that fluorescent bulbs were potentially hazardous waste. Even though the drums were correctly labeled, the label must be visible for inspection as stated in the Base's HWMP.(P1)

CES/CEO QAE is performing scheduled and nonscheduled inspections, but inspection does not include the disposal site. QAE unaware of requirement.(P1)

Personnel were aware that the PCB container needed to be labeled but were not aware that the storage building also required labeling.(P1)

Shop supervisor was unaware that the required labeling must be present at each degreaser.(P2)

Personnel at installation did not know that these two waste streams required a separate hazardous waste determination.(P2)

Personnel did not understand that allowing paint to dry before disposal constituted treatment.(P2)

Personnel assumed the degree of hazard class or category would be the same as in the superseded AFM.(P2)

Personnel at the Transportation Shop believed that the facility's new oil filter crusher met the regulatory requirements of hot-draining.(P2)

Although the operator understood that records are required, he did not understand the purpose of the records or what they needed to include.(P2)

Personnel did not recognize reducing ignitability as treatment.(P2)

Personnel were confused as to the exact requirement for MSDS in the Supply warehouse.(P2)

Personnel were unaware that these materials were incompatible.(P2)

Personnel did not understand the labeling and storage requirements.(P2)

Personnel did not consider the fuel filters as hazardous.(P2)

Drums of HW are stored on-site for over 90 days without proper authority. On the date of the inspection (28 Oct 96), there were three containers of hazardous waste with accumulation start

dates of 29 July 96. As of this date, this waste was stored 91-92 days, depending on whether the initial date is counted as a day of storage. This illegal storage was caused by an incorrect assumption that 90 days equals 3 months. A review of recent records revealed other instances of drums stored for 1 to 3 days over the 90-day time limit.(P2)

Personnel were not aware that hazard warnings were needed on each container.(P2)

Personnel did not know that containers must be tightly sealed.(P2)

Because latex paints, which are not hazardous wastes, are allowed to be dried, shop personnel did not understand that non-latex paints require a different management approach.(P2)

Shop personnel were not aware that accepting the materials for resale could potentially require DRMO to manage them as hazardous waste.(P2)

DRMO did not realize that accepting the materials for resale could potentially require them to take responsibility for disposal of the wastes.(P2)

The personnel at T-1 Maintenance did not realize that they may be generating a hazardous waste.(P2)

The shop collects waste fuel as a hazardous waste, but had not considered that the filters would also be hazardous.(P4)

The Auto Hobby Shop has a hazardous waste management program, but had not considered that the fuel filters might be hazardous waste.(P4)

Personnel thought the requirement only applied to the Air Force definition of PCB containing items (transformers and capacitors). (P1)

Personnel did not feel that a sufficient volume of fuel was collected to merit managing an IAP.(P2)

Personnel assumed a "worst case" sample would satisfy disposal method requirements for the remaining oil/water separators on the base.(P2)

The lab staff did not fully understand that the accumulation point at the gram stain area was, in itself, a satellite accumulation point.(P2)

Contractor Lack of Awareness and Inadequate Procedures - Problems arising from the lack of awareness and interpretation of applicable environmental laws, regulations and requirements. Problems also arising from inadequate procedures by the contractor to meet these requirements.

Company was apparently unaware of the state licensing requirements for businesses engaging in pest control services for compensation.(P1)

Person unaware of waiver requirement. Boiler plate statement of Ozone Depleting Substances not in contract.(P1)

Four units were registered with EPA. Contract effective 1 Oct 1996. Contractors assumed all equipment was registered.(P1)

Carbon dioxide compressed gas cylinders are not properly secured at the Concession stand. One cylinder is used to prop open a door.(P1)

A roofing repair contractor has a lay-down area located outside of Building which is used to store equipment, materials, and wastes. The operation uses several solvents (naphtha, mineral spirits, and paint thinner) and collects the cans for disposal. Because not all of the containers were empty, they were rejected by the local solid waste landfill, and the contractor is storing them in the open where they collect rainwater and rust.(P1)

Installation Restoration Program (IRP) wastes (presumed non-hazardous) were left on site following the completion of removal action at the Runway Dump. Contractor who conducted the removal action is required to remove the waste. Wastes left on site consisted of approximately twenty 55-gallon drums, and approximately twelve "super sacks" containing plastic scraps and personal protective garments.(P6)

Failure to Fulfill Training Requirements - Personnel fail to receive or update training according to laws and regulations, or are unaware of the requirement to receive training.

The Natural Resource Manager has not received the required three-year renewal for training.(P1)

Personnel were not aware that the manager was required to attend this course once every 3 years.(P1)

Supervisors in most areas were not aware of training and documentation requirements.(P1)

QAE personnel, who are assigned responsibilities to monitor the contractor's performance of pest management services, were not aware that they must have pest management training prior to being assigned these responsibilities.(P1)

Waste oil being accumulated in a 500 gal. UST is removed monthly by a local hauler for delivery to an off-site waste oil reclaimer. Since MIT/LL does not hold a MA class B(3) recycling permit, the waste must be managed as hazardous waste (310 CMR 30.211). The supervisor has had no hazardous waste training commensurate with his responsibilities. In addition, the tank is not marked with the words "HAZARDOUS WASTE."(P2)

Two grounds maintenance people are applying weed and feed type materials and diazinon insecticide. Their DoD pesticide applicator certificates expired in 1990 and 1991.(P1)

The IAP manager has monthly inspection logs not weekly. In addition, IAP manager has not received annual refresher training (last trained 5/95).(P1)

Base Asbestos Program Officer (BAPO) is required to have certain training as identified in the AFB Asbestos Management and Operations Plan. The BAPO has not received some of the training (Design training) nor was he aware that he should be receiving this training IAW the plan. He was aware of the a portion of the PPE requirement (respirator) and has received the necessary medical clearance, but not the fit test and training.(P1)

Personnel who handle hazardous materials do not have documentation of their HAZCOM training and/or have not received any HAZCOM training.(P1)

PCB construction employees (Housing Maintenance) have not receive HAZCOM training (CES/CEH). AF 55s are not documented with HAZCOM training (TRNS/Allied Trades). Site-specific hazard communication is not being accomplished. OSHA hazard communication training documents cannot be produced.(P1)

Daily gauging had not been accomplished for the past two weeks. The primary tank custodian had recently retired, and the alternate custodian had not received training.(P1)

IAP managers throughout the ABW lack current and initial training for hazardous waste management.(P2)

Personnel were appointed as satellite accumulation point manager and alternate effective 3 Feb 96. However, they did not receive their initial hazardous waste management training until May and October.(P2)

The Chief, Horizontal, acts as the AF Installation Pest Control Supervisor since the position is vacant. The individual does not have any pest management certification.(P2)

Facility personnel who handle hazardous waste are required to complete initial hazardous waste training within six months of employment and refresher training on an annual basis thereafter. Personnel in several different shops have not had the required hazardous waste training (initial or refresher). These shops include: Munitions, Corrosion Control, Electrical.(P4)

Personnel working in the entomology shop must either be certified for pesticide application and management or must work under the supervision of a certified applicator. Currently there is an insufficient number of certified personnel.(P4)

Multiple shops have not performed site-specific hazard communication training. Documentation could not be produced to show completion of training (AF Form 55 or CAMS Training Computer System). Examples of shops deficient in training: MXS/LGMFN, MXS/LGMCF, SOS/DOL.(P4)

AFOSH Standard 161-21 describes the requirements to document work place specific hazard communication training and FHCTP on AF Forms 55. Procedures are in place. Most supervisors knew that the training needed to be documented but had not yet done it.(P6)

Insufficient Follow-Through / Corrective Action Taken - Follow-through/corrective action to correct environmental problems by CEV and Shops is not performed adequately to meet federal, state, local and Air Force requirements. This category includes all repeat findings.

Carryover finding from the 1995 Internal ECAMP. The installation did not have a training package that provided information on building structure, site and object maintenance, and penalties for disturbing cultural resources.(P1)

Remaining open from the 1993 External ECAMP, Bldg continues to be the storage area for herbicides. Bldg lacks a containment barrier.(P1)

The base has researched the issues related to the Clean Water Act that are associated with this discharge, but has not yet reviewed potential impacts associated with RCRA.(P1)

Remaining open from the 1991 Internal and the 93 External, mixing is done along the fence in an open area and drainage was running down the road berm. Tractors and Toro cart are not decontaminated and are stored in the open on a gravel area within the maintenance compound. A 150-gal. spray unit was leaking oil (from its pumping system) onto the gravel.(P1)

Carried forward from the 1995 ECAMP, installations are required to establish a natural resources management database to track program progress. The current database is located in the Conservation Module of WIMS-ES. AFB has not entered their information into the database.(P1)

Carried forward from the 1996 Internal ECAMP, the base has not coordinated the outdoor recreation potential, with the Park Service or state officials. There is no outdoor recreation component plan to implement any recreation program.(P1)

The hazardous waste determination had been conducted, but the results had not been properly applied.(P4)

Repeated from 1993 External ECAMP, PCB inspection records are not maintained for three years after disposing of the transformer. Most records date back to only one year prior.(P2)

Remaining open from the 1991 Internal ECAMP, 1993 External and 1994 Internal, approximately 68% of all occupied facilities have been surveyed to determine the presence of ACM.(P2)

Remaining open from the 1993 External ECAMP, the base does not have a comprehensive basewide environmental monitoring plan that identifies the locations and monitoring/sampling procedures for environmental media. Sampling and Analysis Plans (SAM) are to be updated annually.(P2)

Remaining open from the 1993 External ECAMP, there is no secondary containment at any fuel transfer facilities within the Bulk Fuels Facility, including the JP-8 loading header, two JP-8 fillstands, diesel and MOGAS loading header, two diesel and MOGAS fillstands.(P2)

Repeated from the 1994 Internal ECAMP, Pest Management personnel are not monitored for physical examinations. Personnel at ANG/Medical Group are with the understanding that AG personnel are being monitored by AMDS/SGPM when in fact AMDS does not perform any medical surveillance for weekend ANG personnel.(P2)

Remaining open from the 1993 External ECAMP, herbicides and insecticides are stored in same room (facility). A hot water shower for personal decontamination of pesticide applicator is not available at the ANG CE Compound.(P2)

Bioenvironmental Engineering confirmed they have not completed a respirator fit test on a Guardsman with ANG. The AMDS/SGPB has sent notification of this testing requirement to ANG without response. ANG/EM reports that the Guardsman performs his duty only on weekends when AMDS/SGPB is not available.(P2)

Carryover finding from the 1995 Internal ECAMP. Industrial wastewater discharges into the sewage system require certificates issued by the FOTW. 85 applications had been submitted to the FOTW, but only 40 certificates had been issued. Of the 40 certificates, 7 had expired.(P2)

This finding was originally identified in the 1994 external ECAMP. There is no spill containment facility at the truck fill stand and off-loading areas in the POL bulk storage area near Bldg.(P2)

Carried forward from the 1993 External ECAMP, 1994 Internal ECAMP and 1995 Internal ECAMP. The solid waste transfer station is being operated without a permit as required by state law. Site assessment has been approved by the town. Application for both construction and operating permits was turned into the State on 16 May 96.(P4)

Repeat finding from 1995 Internal ECAMP. Evidence of open dumping existed at numerous locations: (a) adjacent to Beach (green waste): (b) throughout the scrub-brush around the facilities; (c) across from the golf course. A finding for Unpermitted Dump Site in the 1995 Internal ECAMP evaluation had been reported as closed in the Management Action Plan.(P4)

Carried forward from the 1996 Internal ECAMP, the open grates at the Military Car Wash allow storm water to enter the sanitary sewer system. This is inconsistent with the City industrial wastewater agreement.(P4)

Repeat finding from the 1994 External ECAMP. The drainage ditch along Road is being stripped of all trees and other vegetation leaving the soil bare. Because the ditch is scheduled to be re-contoured and re-seeded in April 1997, there is potential for erosion which could become a non-point source of pollution in the interim. Although this condition is different from 1994, erosion control considerations pertaining to Ditch are still difficult.(P4)

CEV received approval for its permit modification request, but did not ensure that all permit copies were updated.(P4)

Personnel thought the previous write-up was corrected. The storage room was used to store flammable materials for the jet engine shop.(P4)

There was no implementation letter or planned method of implementing the new draft that would ensure the information reached all responsible organizations.(P4)

The facility has recently been relocated to a new building and all other signs and security controls had been relocated. This one was just overlooked.(P4)

A new plan was written after the last external ECAMP; however, the new plan did not remedy all the issues brought up in the finding.(P4)

Remaining open from the 1993 External ECAMP, on south side of Bldg inside compound adjacent to pesticide facility, there is a 120/240 size transformer on a wooden pallet. The transformer appears to be old. Personnel located at Bldg stated the transformer was used only for training exercises. However, transformer has not been tested for PCBs. The ABW/CEOIE shop does not have the transformer on record. It's possible, according to personnel at the ANG, that the transformer was here before CE and EM began inventory.(P4)

Remaining open from the 1991 External ECAP, there are no backflow prevention devices installed on the Water min that supplies water to Laboratory, Tech Area III, the fire protection deluge system and the area. A sanitary survey of the water supply system conducted by the State on 17-18 Ma 1988.(P4)

Repeat finding from the 1995 Internal ECAMP. The AST was not marked with a "NO SMOKING" sign.(P6)

Carried forward from the 1993 External ECAMP and the 1996 Internal ECAMP. There is no containment system at the AAFES service station. Tank filling by commercial tank truck is located approximately 10' from two storm drains and an open roadway. Traffic is not stopped

while filling operations are in progress. In the event of spill, the contents of the tanker truck would flow directly into the storm drain system.(P6)

Opacity readings are taken periodically and records are maintained but the problem has not been solved.(P6)

The AAFES Service Station manager needs to make this finding a special interest item, due to this being a repeat finding from last year's inspection.(P6)

Corrective actions were taken but not reported to the person cited.(P6)

MAP is being updated as required, but complete information was not listed in either the current MAP or the draft update.(P6)

Insufficient Documentation - Records, inventories and operational plans are not updated, improperly updated, or do not contain required or correct information.

The storm water PP Plan dated 24 Feb 96 needs to be updated. Many items identified by a 1994 Reveal Team have been corrected but not documented in the plan. Ensure that the plan is reviewed and updated annually. Consider adding a "summary of changes" page to capture/document reviews and updates.(P1)

The MOU support of the liquid fuel systems stipulates the MOU will be updated annually. This review has not been accomplished.(P1)

The Oct 95 pollution prevention plan lacks several elements and contains outdated POC lists. Pollution areas not adequately addressed are Affirmative Procurement, Energy conservation and air and water pollutant reduction. In addition, the execution section is still generic in tone and has procedures to be developed.(P1)

Operating plan does not adequately address several requirements of AFI 32-1052, para 6. Plan does not establish inspection and repair teams. Plan does not reference AFPD 32-70 or AFI 91-301. Plan does not address equipment and supply requirements, yearly budget estimates, or requirements for a special response team.(P1)

Although the Pest Management Plan was finalized in July 95, it has not been coordinated with functions including Environmental Management, Bioenvironmental Engineering, Military Public Health and Natural Resources manager.(P1)

The installation's Emergency Planning and Response Plan had not received HQ approval. The plan's reporting procedure did not include HQ, and did not state the requirement for release reporting through WIMS-ES.(P1)

Some of the AF Forms 55 reviewed do not document HAZCOM training.(P1)

Copies of AFI 32-1066, Plumbing Systems and AFI 32-1067, Water Systems, are not maintained. Program not documented in accordance with AFI 32-1066. Inventory is not maintained. Survey of prevention devises has not been coordinated with Bioenvironmental Engineering to assign degrees of hazard to each cross connection.(P1)

There is no hazardous chemical inventory list.(P1)

Nine vent hoods in Bldg are not included in the base inventory. These hoods vent acid gases to the atmosphere from lab benches. These are hazardous air pollution sources. If these sources of hazardous air pollutants are not considered in calculations to qualify for a synthetic minor source status, exemption from Title V may be put into question.(P1)

There was an overall lack of correlation between the Pollution Prevention Plan, Opportunity Assessments, and A-106 funding requirements. Several opportunities identified in the Opportunity Assessment were not addressed in the Pollution Prevention Management Plan, nor was there a project identified in the A-106.(P1)

Several shops were not documenting their HAZCOM training properly on AF Form 55 to show date of training.(P1)

The undated AFB Pest Management Plan lacks: (1) coordination with U.S. Fish & Wildlife Service (threatened species), installation Natural Resources manager, Military Public Health officer, and Bioenvironmental Engineer officer; (2) Installation maps and narratives on sensitive wildlife habitat areas wetland and/or flood plains; (3) The ANG pest management activities; (4) Annual review notation; and (5) Pesticide labels and MSDSs.(P1)

Documentation of HAZCOM training for workers was not available.(P1)

The pesticide contracts do not include Statement of Work (SOW). The personnel from CEV are aware of the requirement and are working the issue.(P1)

Documentation was not available to determine compliance with State permit requirements. A log to include incinerator charging rate or types of materials was not available. An operators manual was not available in the vicinity of the incinerator.(P1)

The existing Integrated Natural Resource Management Plan is inadequate in the following areas: Lack of specific survey and management plan guidelines, lack of solutions for potential natural resource impacts, lack of timeline for execution of goals. Recently completed plans and surveys must be incorporated, and SOW must be written and funds programmed to complete additional requirements (such as comprehensive plant survey, raptor survey and management plan, and cropland and grazing plan). The existing land management plan and outdoor recreation plan are stale and should be updated with specific management goals. All information should be incorporated into the installation's comprehensive plan.(P1)

Several items were omitted from the site map in the SWPC. These included: (a) past and present areas for outdoor storage or disposal of significant materials; (b) material loading and access areas; (c) where pesticides, herbicides, soil conditioners, and fertilizer are applied; and (d) only one of two underground injection wells was shown.(P1)

To avoid management under hazardous waste requirements of 40 CFR 262, Subpart C (accumulation point and satellite accumulation point requirements), the operator of this incinerator must comply with the requirements of 40 CFR 266.70, including 40 CFR 262, Subpart B (manifest requirements). That regulation requires the operator to maintain records showing (1) the volume of the materials stored at the beginning of the year, (2) the amount of materials generated or received during the calendar year, and (3) the amount of materials remaining at the end of the calendar year. Subpart B of 262 requires the generator to meet all the usual HW manifest requirements. Also noted during the inspection was that drums of waste ash were left uncovered allowing the ash to be illegally released into the surrounding environment.(P1)

AGE shop did not maintain servicing records for cooling equipment containing greater than 50 lbs of coolant for three years or until the equipment is transferred to another organization.(P1)

The contingency plan does not include emergency procedures to be followed by the emergency coordinator, as set out in 22 CAR 66265.56.(P1)

To avoid management of waste X-ray film under hazardous waste requirements of 40 CFR 262, Subpart C (accumulation point and satellite accumulation point requirements), the operator of this area must comply with the requirements of 40 CFR 266.70, including 40 CFR 262, Subpart B (manifest requirements). That regulation requires the operator to maintain records showing (1) the volume of the materials stored at the beginning of the year, (2) the amount of materials generated or received during the calendar year, and (3) the amount of materials remaining at the end of the calendar year. Subpart B of 262 requires the generator to meet all the usual HW manifest requirements.(P1)

For the week of 7/29-8/3/96 the daily inspection sheet for the Auto Hobby Shop has already been filled out. Also there is a stack of already filled out inspection sheets that just need a date written in. All previous inspection sheets all look the same. The container information on the pre-filled out sheets does not match actual on-hand inventories at the IAP.(P1)

New plan (1 Apr 94) was distributed and ECAMP finding 7-4 closed out, but the tanks in question were still not incorporated in the plan.(P1)

40 CFR 60.113 b(a)(3)(i) and FDEP permit A003-178743 require that the seals of internal floating roof storage tanks storing volatile organic liquids be inspected at least every five years. This requirement is applicable to Tank 405, which was constructed in 1985. Records do not show that this inspection was performed.(P1)

Daily inventory records were not kept on AF Form 500.(P1)

There are no maintenance or leak-test records for the permitted R12 recharge equipment.(P1)

Under the Multi-Sector General Permit for Industrial Activity, the permittee must develop a Storm Water Pollution Prevention Plan (SWP3) that reflects the requirement of the General Permit. Although AFB has a SWP3, Nov 94, it was developed to support the exemption of AFB from storm water permitting and not in support of the NOI for the Multi-Sector Permit, and does not contain all the required provisions for a SWP3 for Motor Freight Transportation Facility.(P1)

A single fill log was used to account for two wastes accumulated in two different drums (used oil and aerosol cans).(P2)

The hazardous chemical inventory and Material Safety Data Sheet Book include all chemicals except Nickel Chloride and Boric Acid.(P2)

Current BES baseline and annual industrial hygiene survey reports are not maintained by the water treatment plant supervisor.(P2)

The narrative statement on "Grease, Sand, Oil, or Grit Shipping Certification" in the recent Wastewater Discharge Semi-Annual Report (1/1/96 - 6/30/96) indicates that wastewater from the clean-out of oil/water separators was discharged to the sanitary sewer when in fact, there was no such discharge during the reporting period.(P2)

Fuel transfer pipelines are routinely inspected by LFM personnel. However, a record of there inspections is not being produced. The checklists that have been developed for these inspections are outdated and do not reflect current facility configurations.(P2)

The September 1995 waste analysis plan does not include all waste streams that should be tested. It omits the following: crushed glass from Bldg , sludge and filters from the aqueous parts cleaners in Bldgs, and incinerator ash from Bldg.(P2)

A locker next to Bldg is marked with the words "CORROSIVE WASTE." Inside the locker are lead acid batteries, NiCad, and lithium batteries. The battery locker has not been reported to AB/EM as part of the waste stream for the customer. There are no waste profiles, inspection records, or documentation of waste stream sources.(P2)

The fire department was working from an out-dated list of hazardous waste locations.(P2)

Documentation on AF Form 55 was not current for all pesticide applicators.(P2)

Conditional AO, dated Mar 86, lists three Zurn boilers and one Keeler boiler on site. Actual equipment on site are three Erie boilers and one Keeler boiler.(P4)

The documents were prepared in a timely way, only a slight tracking error occurred.(P4)

Efforts were made to update the May 94 draft plan with a Nov 95 plan, but additional items or corrections were not included in the latest plan.(P4)

The Phase II land disposal restrictions (LDRs) require that underlying hazardous constituents be identified for certain land-banned wastes to ensure complete and thorough treatment. A hazardous waste shipment on 14 December 1995 included a waste stream for which these requirements apply (waste solids with MEK and toluene). Although the LDR certifications were attached to the manifest, they were not completely filled in; identification of the underlying hazardous constituents is required for waste code D035. If analysis shows that there are no underlying hazardous constituents for that waste, code 248 should have been used to indicate that "none apply."(P4)

Form submitted but release detection methods not accurate.(P4)

The Base Hazardous Waste Management Plan and the Spill Prevention Response Plan refer to each other for the contingency planning data required by 40 CFR 265.52 (i.e., each document states that the other document includes the contingency plan).(P4)

The plan was updated in March 1997, but the update did not address all requirements.(P4)

This was an example of oversight. All other Safety Kleen manifests had LDRs.(P4)

HAZCOM program not in required format per AFOSH STD 161-21 and AFBI 48-104.(P4)

The Oct 96 Asbestos Management and Operations Plan contained outdated references and responsibility assignments. The plan also contained procedures which have been superseded either formally or by "common practices".(P4)

The Oct 96 revision of the LBP Management Plan still contains inaccurate references to a draft AF Policy on LBP in Facilities and a reference to EPA future training and certification requirements to be finalized in May 94. The AF policy was finalized and implemented in May 93 and the EPA requirements for LBP activities in target facilities was issue in the 29 Aug 96 Federal Register with various implementation requirements stretching through 1999. In addition, the plan does not address a few key responsibilities assigned in the AF Policy such as CE's responsibility to train facility managers and the BEE's responsibility to conduct sampling and testing of paint.(P4)

Records were revised to reflect usage and identify materials used, but VOC content is not tracked.(P4)

The plan has been under review for approximately one year. The plan is currently being revised.(P4)

Although the NOR is well maintained, this segment has not been recently reviewed.(P4)

AFB Hazardous Materials Emergency Response Plan (HMERP) dated 30 Aug 96, considered the BAFB Spill Prevention Control and Countermeasures Plan (SPCC Plan) has not been reviewed by a registered professional engineer. The AFB HMERP as distributed, has been miss-printed and needs to be corrected. The site-specific contingency plan data for Boiler Plant are not correct. The Appendix A tabulation of aboveground and underground storage tanks is not accurate.(P6)

Some employee's AF Form 55 did not have required signatures indicating training had been accomplished. There were other minor documentation errors, and some program letters were obsolete.(P6)

The site-specific spill plan for the base lacks details on drain controls or provide incorrect information. Examples include Analytical Labs.(P6)

There was no separate Facility Response Plan (FRP) for AFB as required by the Oil Pollution Act (OPA) of 1990, which amended Section 311 of the Clean Water Act. There was a chapter of OPA's requirements in the Spill Prevention and Response (SPR) Plan entitled Emergency Planning and Response Plan (EPRP). However, the two plans are different and combining them is not allowed. The purpose of the FRP is to extend prevention and preparedness activities, improve response capabilities, ensure responsible parties pay the cost of spill cleanup, etc., to the maximum extent practicable and for the worst case discharge. There are numerous interactions and agreements among on-base and off-base agencies for a coordinated effort if a catastrophic spill should occur.(P6)

Pollution Prevention Plan met all requirements of the state, but didn't fulfill all requirements of the Air Force Instruction.(P6)

The spill response plan was not verified against the tank inventory maintained within CE.(P6)

The cover letter for the plan asks for any updates or corrections, but none were identified or submitted.(P6)

The form used for the operating record provides a field for the date of removal; however, in some cases this field has not been completed.(P6)

Hazardous materials provided to various organizations free by vendors or provided for evaluation testing are not represented in the basewide inventory maintained by HMC. Examples of such evaluation activities are found at Dental Investigation Services and Vehicle Maintenance. The basewide inventory is also incomplete because hazardous materials already in the possession of the organizations at the inception of the HMC were not retroactively added to the inventory. Examples of such pre-HMC inventories are found at Analytical Services.(P6)

40 CFR 761.180(a) requires all facilities that use or store at least 45kg of PCBs to prepare an annual document log. Logs must be kept for at least three years. Manifests dated 9/16/92 and 6/4/93 indicate that 45kg of PCBs were shipped each time. These manifests show 45kg of PCBs in use or storage, which require annual documentation.(P6)

The environmental staff has determined that dried tape and paper produced in the painting facility at Transportation are not hazardous waste. However, there is no analysis currently on file. 40 CFR 262.40(c) requires the facility to maintain all records documenting waste stream determinations for at least three years after the waste was last removed from the base.(P6)

CEOE personnel conduct scheduled and unscheduled inspections of an off-base landfill where refuse from the installation is disposed of by the contractor. However, these inspections are not documented.(P6)

Four Broad Areas of Vulnerability: Areas of vulnerability listed below contain findings that may have systemic root causes, but they cannot be readily determined and specifically attributed to a systemic operation.

Procedural Issues - Problems arising from the existing procedures associated with carrying out environmental requirements.

The Hazardous Waste Monitor did not perform weekly inspections on two occasions during June, July, and August.(P1)

An unlabeled drum of empty aerosol cans was not classified as a hazardous waste and was not located in the established initial accumulation point. Facility personnel incorrectly thought that the cans would be brought to the newly established hazardous materials pharmacy, though they should be taken to the CEV 90-day accumulation site.(P1)

Quarterly Pesticide inventories are not provided to base fire station #1.(P1)

Personnel were aware of the requirement but failed to secure the fill lines.(P1)

Piles of soil mixed with scrap metal and demolition debris are dumped along the side of Perimeter Road. Landfill inspections are not being conducted. The Solid Waste contract manager is not sure where waste is being disposed. (P1)

The base has not had either State or Federal Fish and Wildlife agencies tour the base to determine if there is a potential for fish and wildlife management, or made any determination of classification in accordance to the AFI.(P1)

Personnel in the AMUs assigned the "Degree of Hazard" based on dated guidance and provided the BEE a copy of the inventory without BEE input.(P1)

Two precautions for preventing a spill from entering the storm sewer area prescribed in the Contingency Plan, but only one is being employed. (P1)

Landscaping does not make maximum use of informal, native, low-maintenance designs and plant materials. Watering is not done in accordance with the Land Management Plan or wings commitment to water conservation and water has been pooled throughout landscaped areas of the cantonment.(P1)

The base landfill only accepts Construction Debris. The operating personnel are not placing cover material at the end of each operating day. They have had debris in landfill for three weeks without covering.(P1)

Lead and copper sampling is not accomplished according to the required schedule. Medium-sized water systems are required to sample between July 1 -- December 31 of each calendar year. 1995 and 1996 Lead and Copper sampling was performed between Jan 1 and June 30 of each year.(P1)

The installation had not consulted with the USFWS to obtain a category rating. If the installation is determined to be a Category 1, then a 2-year Fish and Wildlife Management Component Plan must be developed.(P1)

Severe erosion has occurred on the west side of Bldg subsequent to its construction. No vegetative cover has been established leading to gully erosion and discharge of sediments to the River.(P1)

The CEMIRT generator shop conducts several industrial operations that produce potentially hazardous wastes, though they have not been identified as hazardous wastes. These include waste bead blast media, waste fuel filters, paint waste drained from crushed aerosol cans, and solvents and sludge from the carbon remover degreaser. Hazardous waste determinations must be made on each of these waste streams.(P1)

Pathological incinerator hours of operation are not recorded as required by Code. Temperature and oxygen content of exhaust gases are not continuously measured and recorded.(P1)

CES/CC is required to appoint an engineer or appropriate supervisor as the Backflow Program Manager.(P1)

The fuel pumps at both the AAFES and Military Gas Stations do not have signs required by state. (They do have the federally required language, however.)(P1)

Even though the likelihood that the operations at the old FTA resulted in any contamination is slim, it still must be assessed before demolition and repaving occurs.(P2)

Although the requirements had been brought to the attention of base managers, the gazebo construction project was completed in a floodplain with no environmental assessment, FONSI, or FONPA.(P2)

CEV does provide qtrly recycling reports to MAJCOM. Personnel unaware BX/Commissary bypassing base recycling process .(P2)

According to the AFI referenced below, all base waste streams regulated under RCRA must be re-evaluated periodically for presence of hazardous constituents. Base has approximately one dozen waste streams in this category (e.g., paint sludge, MEK solvent, sand-blast media, used oil, etc.). Large volume waste streams in this category must be re-evaluated annually, and small volume streams every three years. The majority of base waste streams have not been tested in strict compliance with this schedule, although all have been tested at least once in the last five years except for parts washers. The status of parts washers is currently in flux due to on-going conversion (see Finding HW-013). In the past, parts washer solvents were handled by contractors, however, the base is converting to newer systems that will not be contractor maintained, thereby creating additional waste streams requiring periodic re-evaluation.(P2)

The entomology services section of the Military Family Housing (MFH) maintenance contract was not reviewed or approved by the MAJCOM.(P4)

Must review IEX coding procedures with HMP and BE prior to purchase of LP Hazmat.(P4)

Large dirt piles on the construction site lack erosion control. Straw bales placed at storm drains are deteriorated and insufficient.(P4)

The permits for USTs, obtained from the appropriate municipal fire authorities, expired in 1995. No requests have been made for permit extensions.(P6)

The base is recycling the cans but the shop needs to ensure that all useable material is eliminated before recycling.(P6)

CE supply has a hazardous communication program in place which should address these storage issues. It appears that no self-inspection is conducted.(P6)

The vehicle maintenance area has a good overall hazard communication program. More frequent inspections would solve this problem in the future.(P6)

Personnel failed to follow established procedures for waste disposal.(P6)

Personnel failed to follow the shop written hazard communication program is in place, which states the requirement for a hazardous chemical inventory.(P6)

Established procedures followed by this shop require MSDS's for all hazardous materials used there. These procedures were not followed.(P6)

Personnel were aware of the tank tightness testing req. However, due to the installation of new UST, testing wasn't completed on existing USTs.(P6)

Personnel failed to follow established procedures for waste disposal.(P6)

The Hazardous Waste Management Plan and the Satellite Accumulation Point Inspection Form instruct Point Managers to conduct daily inspections. However, inspections are only performed weekly.(P6)

Base not providing required data.(P6)

Approximately 12 light fixtures with high-pressure sodium type bulbs were disposed of in a solid waste dumpster. This type of light bulb contains mercury and should be disposed of as a hazardous waste.(P1)

Brush and tree trimmings, trash, and scrap metal are being dumped at a landfill posted as closed. Trash dumped as late as August of 96 (newspaper Aug '96).(P6)

WD40 and paint cans were found in a dumpster at Bldg. The dumpster at Bldg contained a paint can with more than an inch of liquid gray paint. The dumpster at Bldg contained several fluorescent light tubes.(P6)

The current procedure in CE Operational Instruction 19-3 was not specific enough in dealing with PCB spills and the required clean up procedures.(P1)

Three two-gal. containers of waste materials (i.e., adhesive) and several partially full aerosol cans (i.e., ship-to-shore containing 1,1,1-trichloroethane) are being stored in a small containment tray by a small building in open storage. No labels as hazardous waste or waste material; not a designated IAP, no hazard labels on some, no inspection logs, etc. The waste is turned in from various custodians throughout the base.(P1)

Boilers #1 and #3 exceeded the 145-gal./hr/burner in Feb 96, which is the conditional AO limitation.(P1)

Newcomer briefings and follow-up training in natural resources is inadequate.(P1)

Aerosol containers are being vented with a hammer and then tossed into a recycling bin. The unit does not have a permit to treat.(P1)

IAPs are located in the supply building (which is at or near the point of generation) for alkaline, lithium, and nicad batteries. The described wastes are then brought to another IAP located outside the building before they are transferred to the 90-day accumulation point. Wastes must be moved from an IAP directly to the 90-day storage area without an intermediate stop.(P1)

A process in the testing facility generates rags contaminated with MEK. These rags are currently placed in the drum containing POL-contaminated absorbent material, a nonhazardous waste. This procedure is not correct because the MEK-contaminated rags are a separate waste stream. 40 CFR 262.11 requires that a determination be made on each waste stream to determine whether

that waste is hazardous or not. Because the MEK-contaminated rags are a listed hazardous waste and the POL-contaminated absorbent material is handled as a nonhazardous solid waste, the MEK material has been inappropriately disposed of in the past.(P1)

The floor drain at Refueling Maintenance collects sediment and other debris due to the operations in the facility. Currently this sediment is cleaned out of the drain approximately quarterly and thrown away with nonhazardous solid waste. 40 CFR 262.11 requires that the base determine whether or not this waste stream is hazardous. (P1)

Empty "Fumitoxin" aluminum containers are "triple-rinsed" by soaking containers in a 55-gal. drum of water. The rinsate is then dumped near railroad tracks.(P1)

In the laboratories, waste is generated in the separate laboratories and accumulated in small containers. At the end of the day the waste is taken to a designated, centralized IAP, which is in another area within the same building.(P1)

The grounds shop is issuing two different, non-approved weed and feed materials through the Self-Help Store. A summer weed and feed with Trimec and a crabgrass control herbicide are issued to MFH occupants and building managers upon request.(P1)

In Bldgs alcohol's are disposed of directly to the sanitary sewer. These alcohol's would be hazardous waste if otherwise disposed.(P1)

None of the items on the Base Supply Retail Sales store shelves are identified as containing recycled content, except those labeled by the supplier as such.: Types of paper in the GSA catalog that meet the Executive Order requirement are not easily identified. Each user specifies their specific needs.(P1)

Three different tractors and a Toro cart used for pesticide spraying do not carry emergency phone numbers or spill clean-up kits. None of the tractors or Toro carts have chemical-resistant panel.(P1)

The nozzles on two eyewash stations are not covered to prevent contamination.(P1)

The Cushman Cart and John Deere Tractor do not carry emergency phone numbers or spill clean-up kits. The Cushman Cart does not have a plastic bed liner or has chemical-resistant paint.(P1)

Since the Snow Barn personnel bring waste solvent with asphalt from remote site property jobs and add it to their hazardous waste drum, the waste is not accumulated at or near the point of generation, and the site cannot be an IAP.(P2)

The backflow program manager does not review all plans and drawings of new or modified water systems to identify potential cross-connections. Consequently, inappropriate devices have been installed at inappropriate locations.(P2)

Partially empty containers of degreasers, floor stripper, Trane 22 refrigerant oil, and scrap metal exist in the roll-off container at the southeast corner.(P2)

Bulbs will be recycled, and are therefore being accumulated at the recycle center. However, because they are hazardous they should be accumulated at the 270-day area.(P2)

When servicing hydrazine cylinders, a pan of water is placed under the cylinder to catch drips. The hydrazine-contaminated water is neutralized with bleach, the pH in the wastewater is then adjusted. The wastewater is disposed of through DRMO as non-regulated waste. Hydrazine is a listed waste (U133), and spill residue continues to bear the same waste code.(P2)

The effluent collected during the clean-out of oil/water separators and discharged to manhole was composed of both wastewater and sludge. This discharge was not consistent with the base guidance on wastewater discharge from oil/water separators (AFB O/W Separator Clean-out Plan, 1995) and as reported to the city.(P2)

There are a number of air pollution emitting sources that are operating without a construction permit, an operating permit, or a valid permit exemption required by 62-210.300. These sources include numerous degreasers, seven paint booths, the area 400 fuel stand, and abrasive blaster equipment.(P2)

Documentation was not available to determine type of waste by percentage (paper vs. plastic) and load rate (pounds/hour). A copy of the operators manual was not available in the vicinity of the incinerator. The log indicated that items burned as 80 bags, 50 boxes, etc. which is not specific enough to meet permit requirements. Log entries indicate that unauthorized materials were burned (microfiche and film).(P2)

The dental lab treats their spent hydrofluoric acid with an "acid neutralizer" and then washes the spent solution down the drain with the approval of MG/SGPB. However, according to HQ SGPB, except for acids neutralized "in process," this acid should be collected, tested, and managed as a hazardous waste.(P2)

The waste has not been stored in a designated hazardous waste storage area because the waste has not been conclusively determined to be hazardous. The procedures that the Base has in place do not ensure the receipt of analytical results within the 90-day time limit.(P2)

The existing trash collection container was full and overflowing. This condition contributes to problems with rats and other vectors on AFB.(P2)

The 7-cubic yard dumpsters were not adequate to contain all green waste generated in the housing areas on the installation.(P2)

The drums contained waste alodine rags (from 27 April, 1993 to 29 July, 1993) and photo waste (from 30 June, 1995 to 11 October, 1995).(P4)

The fuels shop uses small amounts of MEK on rags to remove grease. When the rags are no longer useable, they are placed in the POL nonhazardous waste drum for disposal. Because MEK is a listed hazardous waste and the POL drip pads are disposed of as nonhazardous waste, the MEK rags have been inappropriately disposed of in the past.(P4)

The base has taken steps to change its management process though the result still may not meet the intent of the federal rules.(P4)

The infectious waste dumpster was full of plastic bags containing sharps and other infectious waste. Closure of the dumpster lid was compacting the bags of waste, increasing the possibility of breaking a bag open.(P4)

Although the drain is covered by a spill prevention mat, cross contamination occurred. The hazardous waste labels were placed on the drums and marked "pending analysis" as a precaution while awaiting results from the lab.(P4)

Methyl Ethyl Ketone (MEK) is used in a paint stripping process in Hangar 2. After use, the spent MEK is disposed of along with POL-contaminated rags as nonhazardous solid waste. Because MEK is a listed hazardous waste, it must be managed as such and has been inappropriately managed in the past.(P2)

If the recovery system does produce reusable Alodine, current procedures are adequate for the unit.(P4)

A tin household trash barrel is used to collect wood dust from the end of the chute connected to the cyclone outside on the south side of Bldg. The chute is not aligned exactly with, or tightly connected to, the barrel. This may result in fugitive particulate emissions during operation.(P6)

Storage and Labeling Issues - Problems arising from the act of storing and labeling containers and materials.

Flammable and corrosive containers were being stored together on the same containment pallet, and the pallet was positioned next to combustibles.(P1)

Flammable liquids are not stored in proper cabinets.(P1)

Two compressed gas cylinders are stored without safety caps.(P1)

There are no MSDS sheets for sulfuric acid or masklenze MK-1 located in the acid cabinet.(P1)

A waste container at the IAP in Molecular Biology Lab is labeled "HAZARDOUS WASTE -- USAMRD 97002." The label does not include the common name of waste contained therein, the

hazard designation or the AFB RCRA ID number. This information can be obtained from container log by matching container numbers.(P1)

A 3,000 gal. aboveground storage tank is abandoned in the Auto Hobby Shop Storage Lot behind Bldg. The tank has been in this location for numerous years (10+) according to the shop foreman. The tank's manhole is open. The tank contains liquid of unknown origin.(P1)

Drums of silver ash were stored in open containers in the vicinity of the processor. Ash was noted around the pad and soils of the processor which may be high in silver contaminates above hazardous waste standard. If this situation exists, it may require extensive site clean-up.(P1)

Two cylinders of oxygen and one acetylene cylinder are stored together. They are not in-service and are not clearly marked.(P1)

A container of mercury waste (approximately 3.5 lbs) is unlabeled and open (stopper with open tubing).(P1)

Five-gallon waste containers in IAPs in Bldg are not labeled. Five-gallon containers are open (funnel in place).(P1)

A container of hazardous waste does not have a label identifying the common name of its contents.(P1)

As many as 14 55-gal. drums are used to store used oil in a caged roof storage area north of the building before a DRMO contractor removes oil for off-site recycling. None of the drums has the label "USED OIL" as required. Housekeeping in the cage is poor. All of the drums have spilled oil or oil-saturated absorbent pads on their lids. Some of the drums have open bungs. An oil/water separator located in the cage is full of oil and debris. Also, containers of what appears to be used motor oil are outside the cage, apparently left there the night before by persons unknown.(P1)

Materials found in a flammable cabinet are listed in the HAZMAT Book as inactive. The materials lacked container labels. The items appear to have been purchased by bypassing HAZMAT Pharmacy.(P2)

Flammable and hazardous materials are stored in a common personnel locker. Locker marked as "FLAMMABLE." Flammable materials found in personnel locker (paints, alcohol). No inventory on locker.(P1)

A worker had punched a hole in a 5-gallon container opposite the pouring spout to equalize pressure in the can when pouring. The lid was secure on the spout, but the holes resulted in open venting of the container.(P1)

Flammable aerosol paint cans, solvents, lubricants and cleaners in shop are not stored in flammable storage cabinet. Contract cleaning service is storing several cans of a combustible cleaner in an office cabinet with combustible materials (rags).(P1)

Three 5-gallon plastic containers containing paint thinner were improperly stored on top of a flammable storage cabinet.(P1)

Ash containers did not have lids on them permitting the ash to scatter to adjacent soils by wind action. Safety equipment provided was in poor condition, i.e. face piece of the fire fighters hood was severely scratched making it difficult to see through, hood and jacket had insect droppings, and gloves were in poor condition.(P1)

One bottle stored in a HAZMAT storage cabinet did not have any label or markings. It was determined to contain pump oil.(P1)

Five jerry cans, each containing variable amounts of an unknown liquid, are unlabeled and located in the former generator building.(P1)

The storage cabinet specifically designated for storage of flammable materials was not conspicuously labeled "FLAMMABLE--KEEP FIRE AWAY."(P1)

One bottle of sodium chlorite (an oxidizer) is being stored in a flammable cabinet.(P1)

There are 15 rusted drums located between Bldgs. Although some labels indicate "empty" the drums have unidentified material in them. Ownership of the drums is unclear.(P1)

A compressed gas cylinder (lecture bottle) containing methyl nitrite is labeled with its original label for oxygen. Two pieces of blue tape have been wrapped around the cylinder and labeled "Methyl Nitrite."(P1)

One compressed gas cylinder of oxygen is stored on its side. Oxygen and acetylene cylinders are stored together on a welding cart. Neither is equipped with a regulator and neither meets the condition of "connected for use."(P1)

Respirator with a face shield is stored next to insecticides in wall locker.(P1)

There are no MSDS sheets for aerosol paint cans, gasoline, or diesel fuel.(P1)

There is no MSDS sheet for an aerosol spray can.(P1)

Sulfuric acid is co-stored with other mineral acids and required segregation is not maintained within the acid cabinet.(P1)

In various locations throughout the Analytical Services laboratory, sulfuric acid is co-stored with other mineral acids and required segregation is not maintained.(P1)

An open beaker of used fixer (glutaraldehyde/paraformaldhyde/sodium cacodylate) is stored under the hood. Although marked "Used Daily Fixer," and destined for the IAP container at the end of the day, it is being accumulated at this point of generation in this open container.(P1)

Dental and medical X-ray departments in Bldg is accumulated in five-gal. containers. When full, they are transferred to supply for silver recovery. The containers are not in an established IAP, are not properly labeled (the words Hazardous Waste, the AFB RCRA ID number and the hazard), and no inspections are performed. This is also the case at Bldg 125 where fixer accumulated for silver recovery is in improperly labeled containers, and do not meet IAP requirements. Also there are no records to document these precious metals are not being accumulated speculatively.(P1)

Acid waste is stored in an acid cabinet. Although the waste container is properly labeled, this is not a designated IAP, has no monitor, no inspection log, etc.(P1)

Waste oil is being collected and stored in an unlabeled container. The container collecting oil under the oil filter press/drain device has no hazardous waste labels.(P1)

A 2,000-gal. AST holding #2 heating fuel has no label. "NO SMOKING" signs are not posted in the area of this tank. A second, 500-gal. AST holding diesel fuel also has no label and is located outside of Bldg. The tank can be identified by the fact that it is cooled with a black asphalt coating.(P1)

Compressed gas cylinders were being stored on asphalt pavement. Asphalt is oil based and not compatible with oxygen storage.(P1)

A 400-gal. AST located in the southwest corner of the Auto Skills facility does not have the required "Used Oil" label. Instead, it is labeled "Waste Oil."(P1)

Five drums were found in a 90-day storage area without accumulation start dates. According to 40 CFR 262.34 (a)(2), the date for which each period of accumulation begins must be clearly marked and visible for inspection. The drums contained hazardous paint waste, off-specification gasoline, gasoline filters, and aerosol cans.(P1)

Two high-voltage transformers are incorrectly labeled as non-PCB (<50 ppm). Analytical results indicate PCB concentrations are >50 ppm).(P1)

A spring-top receptacle marked as Hazardous Waste containing oily-contaminated rags, was left in the open position.(P1)

Two unlabeled drums (one 55 gal. and one 20 gal.) full of lithium batteries are located outside rear of Bldg. The drums were delivered to this location from the airport area about 30 days ago. The three-day limit is exceeded and the location of this IAP is not near the point of generation.(P1)

150-gal. sprayer trailer and three tractors are not marked "CONTAMINATED WITH PESTICIDES."(P1)

There is one five-gallon gasoline container open in the Golf Course maintenance shed.(P1)

A five-gal. container located inside the storage building has no labels to identify the hazardous contents, appropriate warnings and/or the chemical manufacturer, distributor or other responsible party.(P1)

Twenty-four of 93 dumpsters inspected were open and contained food wastes, and 13 of 93 dumpsters inspected had broken lids and/or holes in the side/bottom which keeps the dumpsters from being closed. Dumpster is rusted through at side, dumpster has "tear" in side where fork lifts dumpster, and several dumpsters have broken or missing lids.(P1)

An open container of oily and unknown substance was placed adjacent to a storm drain.(P1)

The Auto Hobby Shop has a yard where customers can leave automobiles in various stages of repair for a fee. The yard is fenced and kept locked. Hidden in one corner of the yard is a row of neatly piled tires numbering around 125 and weighing approximately 900 lbs. The pile was originally in a more conspicuous spot and was moved in the last year to be less unsightly. The original ownership of the tires is no longer available. They have been abandoned and now the Auto Hobby Shop's responsibility for disposal.(P2)

The AST used to collect waste oil for this facility's heating system is labeled as "HAZARD WASTE -- WASTE OIL -- TOXIC." Tank should more properly be labeled as "REGULATED RECYCLABLE MATERIAL," since this site operates under a Recycling Permit.(P2)

There are several "sample" materials located in the flammable storage cabinet which the shop is not authorized to store/use. Shop personnel stated that the "sample" material as issued by the Hazardous Material Cell (HMC) /Distribution Support Center (DSC) as a possible "less hazardous" substitute. Material is being evaluated by the shop. This hazardous material is not entered into the Hazardous Material Management System (HMMS). Material: Zinsser, Bulls Eye 1-2-3, Primer/Sealer; multiple colors of Sprayon, Clean-N-Safe, Aerosol Acrylic Enamels.(P2)

One 55-gal. drum of used oil does not have the required label of "USED OIL." The drum is labeled "30-weight oil" but facility personnel report the material to be used oil.(P2)

At various locations, used oil is being accumulated in improperly labeled containers. A 386-gal. AST storing used oil at Vehicle Maintenance also does not have the required label. The label does not contain the words "USED OIL" as required.(P2)

The corrosion control facility at Transportation generates two hazardous waste streams. One is liquid paint-related materials, and the other is solid paint-related materials. The drum containing the solid paint-related waste was not labeled. 40 CFR 262.34(c) requires that this drum be

labeled to identify its contents. The liquid paint-related waste was contained in two drums at two locations. 40 CFR 262.34(c) also requires that the waste be located in one place and be limited to 55 gallons.(P2)

A red can used to accumulate rags contaminated with degreaser and oil is marked "SOILED RAGS -- EMPTY WEEKLY." It does not bear the words "HAZARDOUS WASTE" or an initial accumulation date. The rags are taken weekly to the ACCS in Maintenance but are not included in the Electrical Shop drum tracking logs.(P2)

A red can used to collect rags contaminated with grease and oils is marked "EMPTY DAILY." It does not bear the words "HAZARDOUS WASTE" or an initial accumulation date. The rags are taken daily to the ACCS in Bldg, but are not included in the ACCS Container Log. Container was labeled at the time of assessment.(P2)

Improper placement and labeling of biohazard receptacle. Improper labeling of biohazard receptacle.(P2)

An inventory of pesticides stored within the building is not posted outside of the storage area.(P2)

Most industrial shops on base collect spilled or otherwise off-specification POL. This material is collected in two 10,000-gallon tanks and eventually taken off base to be recycled. 40 CFR 279.22(c) requires that all containers used to accumulate these products be labeled "Used Oil." Currently, the collection points across the base are labeled inconsistently.(P2)

Insecticides are being stored directly on a concrete, exterior, mixing pad and covered with a tarp. The Interior storage area is not available due to modifications to upgrade the substandard storage facility.(P2)

In Central Receiving, a flammable material cabinet contains an open, unlabeled coffee can holding cellulose nitrate, a highly flammable paint thinner. A used paint brush is also in the can.(P2)

13 CFC recovery units are not labeled in accordance with 40 CFR 82.158.(P2)

Organization stores small amounts of hazardous waste in an industrial refrigerator (adhesion promoter and sealing compound containing MEK). The site is not designated or authorized as a satellite accumulation point.(P2)

A container of waste rags contaminated with MEK was unmarked, and there were no security measures to control access to the container.(P2)

Two compressed gas cylinders had no labels, and were only haphazardly secured.(P2)

A proper description of drum contents is stenciled on the drum. However, the proper description may be contradicted by previously stenciled text.(P2)

Unaware that there was an incompatibility, Not on the MSDS.(P2)

Personnel understand that used oil is not hazardous, but do not understand the potential for confusion arising from conflicting labels.(P2)

Two shipments of hazardous waste involving multiple drums of waste were stored on site for more than 90 days.(P4)

One heavily corroded/rusted acetylene gas cylinder is stored at the site. It is exposed to the elements and presents a safety threat.(P4)

A one-gallon can labeled "FLAMMABLE," contents unknown, is in a water-filled asphalt cart.(P4)

A groundwater "pump and treat" system that operates in the field south of Pesticide Shop discharges backflush from the air stripper into a 275-gal. double-walled steel AST. This AST has a hazardous waste label that is badly weathered and illegible. A second label that may have been an NFPA diamond is also completely illegible.(P4)

The new tank had been installed and shop personnel assumed it was labeled correctly; however, the words "used oil" were not present. A base-wide effort to properly label used oil was conducted, and this container was overlooked.(P4)

No MSDS was available for squalene, which was located on a shelf labeled "AW3."(P4)

The conex used for temporary storage of ACMs is not properly labeled.(P6)

Personnel were trained as recently as 20 Mar 96 but still could not find MSDSs.(P6)

Corrosive and flammable materials stored together in a flammable storage locker located under a work bench.(P6)

Lecture Bottles (small compressed gas cylinders) containing oxidizers and flammable materials are stored together under the lab hood.(P6)

Corrosive and flammable materials were stored together in a flammable storage building. Bleach (sodium hypochloride) stored with flammable materials in an outside storage area. Ammonium hydroxide was stored with flammable materials.(P6)

MSDSs were not located in the immediate work area.(P6)

Three small nitrogen cylinders were unsecured. They were located in the oxygen, oxygen aviator, and nitrogen full-cylinder storage area.(P6)

Oxygen and acetylene gas cylinders are not sufficiently secured and could fall or rupture. Flammable gases and oxidizers should be segregated by the hazard classification of the gas.(P6)

The recovery system was recently modified, and a new drum had been installed. The drum should have been labeled hazardous, but this had not yet been done.(P6)

Transit panels stored in the asbestos conex, are not wrapped or bagged. The panels do not have the required labeling.(P6)

Isolated instance of personnel oversight. Other containers were properly labeled.(P6)

All other containers in the cabinet were properly labeled. Established procedures were not followed.(P6)

The filters were abandoned at the lay down area by contractors who lacked adequate training regarding waste accumulation, storage, and disposal. (P1)

Three compressed gas cylinders of nitrogen are laying on the floor in the boiler house (near the burners). These cylinders are reported to have been left by the contractor who was refurbishing the chillers at the heating plant.(P1)

Spill Containment Issues - Problems arising from insufficient facility containment design, or operations.

The secondary containment drain valves at Bldgs were not locked. The fill ports and secondary containment drain valves for three tanks at Bldg 3004 were not locked. The gauging hatch, fill port, low point drain, and secondary containment drain valve were not locked at Bldg. The gauging hatch, fill port and low point drain were not locked at Bldg. The low point drain and the secondary containment drain valves were not locked at Bldg Type O Incinerator; in addition, the containment drain valve was left open.(P1)

The fill-line and gauging port were not locked.(P1)

The secondary containment drain valve was not locked.(P1)

The remote fill-lines and the gauging ports were not locked. Only the primary fill-lines were secured.(P1)

The sink in the pesticide mixing room does not have a reduced pressure backflow prevention device.(P1)

The AST at the facility did not have secondary containment.(P1)

The truck fill stands at Bldgs did not have any secondary containment system.(P1)

The circulation pit did not have any secondary containment system.(P1)

Unlocked tanks can become contaminated by vandalism or inadvertent receipt of the wrong product due to insufficient key control. Unlocked dike drains could allow inadvertent release of POL product to the environment.(P1)

Several spent lead acid batteries are stored on wooden tables in these buildings. Spill prevention measures are inadequate. Awaiting pickup for reclamation, the batteries have been stored a long time and there is no contract in-place.(P1)

The temporary AST was not properly secured, did not have secondary containment, and did not have appropriate tank markings. In addition, the tank was set up as both an issue and support tank.(P2)

The spill containment area at the fuel fill stand and off-loading areas in the 400 area is cracked.(P2)

The drain valve was locked and closed, but did not ensure it could not be bypassed.(P4)

The secondary containment drain valve was not properly locked, and was open.(P4)

The fill port for the 1,000-gal. #2 fuel oil AST east of Bldg is not secured. The building owned by the Army Reserve is not now occupied.(P6)

Environmental Reporting/Certification Issues - Problems arising from the failure to properly report information or apply for certification.

This is a new piece of equipment. Misunderstanding the equipment is certified for R-12 use by the manufacturer. However, it still requires certification with EPA.(P1)

Numerous non-regulated USTs had been registered with the state DOH.(P1)

AGE Shop had not submitted certification to the USEPA that it acquired certified recovery or recycling equipment.(P1)

Organization had not submitted certification to the USEPA that it has acquired certified recovery or recycling equipment.(P1)

An MVAC recover/recycle or recover equipment certification form is not being completed and submitted to the Stratospheric Ozone Protection Branch of the U.S. EPA for each piece of equipment.(P1)

CFC recovery equipment information for each piece of equipment is not being completed and submitted to the EPA.(P1)

40 CFR 63.468 (a) requires that operators of solvent cleaners containing 25% methylene chloride by weight submit an initial notification to the EPA no later than 29 Aug 1995. HQ CEMIRT, located in building 1134, has a 500-gallon solvent cleaner machine that contains DUNKIT carbonaceous soil and paint remover. The material contains 65% methylene chloride by weight and its operation should have been reported.(P1)

Both the federal regulation (40 CFR 61.145) and the FAC Rule 62-257.301 require notification of intent to demolish or renovate structures containing regulated asbestos-containing materials. This notification must be received by the FDEP, the States Asbestos Coordinator, the department's district office, and local air programs ten days prior to the start of demolition.(P2)

CEV Personnel believed that EPA Form 8700-12 had to be submitted along with the biannual report.(P2)

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Vita

First Lieutenant Christopher Michael Lindhorst was born on [redacted]. He graduated from St. Pius X High School in Albuquerque, New Mexico, in 1989. After graduation, he accepted an appointment to the United States Air Force Academy. At the United States Air Force Academy, he earned a Bachelor of Science Degree in Civil Engineering. Upon graduation 1 June 1994, he was commissioned in the United States Air Force as a Second Lieutenant, and served his first tour at Moody AFB, Georgia.

In his first assignment as a member of the 347th Civil Engineering Squadron, he served as Chief of the Pollution Prevention Element from June 1994 to August 1995. From August 1995 to May 1996, he served in the same squadron as a Civil Engineer/ Construction Inspector. In May 1996 he entered the Graduate Engineering and Environmental Management Program at the Air Force Institute of Technology, Wright-Patterson AFB, Ohio. He is married to the former Grace C. O'Neill of Tucson, Arizona.

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In order to be effective and responsible stewards of the environment, the Air Force needs an environmental management system that is properly constructed, organized, and operated. Unfortunately, the current state of the Air Force's environmental management system is not clear.

This research, utilizing a variety of analytical and quantitative tools, provides a better understanding of the current state of the environmental management system in the Air Force. First, areas of vulnerability within the existing Air Force environmental management system were identified through an analysis of Environmental Compliance Assessment and Management Program (ECAMP) data and a field investigation. Through this analysis, eleven systemic areas of vulnerability were identified. A breakdown of the areas of vulnerability are presented to provide insight and guide Air Force environmental leaders in correction efforts. Additionally, a correlation was made of areas of vulnerability in the current Air Force environmental management system with model environmental management system elements exemplified by International Organization for Standardization (ISO) 14000 standards.

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