ANALYSIS OF THE AIR FORCE ISO 14001 PILOT STUDY CONDUCTED BY DoD

THESIS

Rodney C. Harris, Captain, USAF

AFIT/GEE/ENV/00M-07

DEPARTMENT OF THE AIR FORCE
AIR UNIVERSITY
AIR FORCE INSTITUTE OF TECHNOLOGY
Wright-Patterson Air Force Base, Ohio

AFIT/GEE/ENV/00M-07

ANALYSIS OF THE AIR FORCE ISO 14001 PILOT STUDY CONDUCTED BY DoD

THESIS

Presented to the Faculty

Department of Systems and Engineering Management

Graduate School of Engineering and Management

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

Rodney C. Harris, B.S.

Captain, USAF

March 2000

The views expressed in this thesis are those of the author and do not reflect the official policy or position of the United States Air Force, Department of Defense or the U. S. Government.

AFIT/GEE/ENV/00M-07

ANALYSIS OF THE AIR FORCE ISO 14001

PILOT STUDY CONDUCTED BY DoD

Rodney C. Harris, B.S.
Captain, USAF

Approved:

Michael T. Rehg, Maj, USAF (Chairman) — 9 Mar 00 date

Heidi S. Brothers, Maj, USAF (Member) — 9 Mar 00 date

Jeffrey N. Rumrill, Maj, USAF (Member) — 9 Mar 00 date

Mark A. Ward, Maj, USAF (Member) — 9 Mar '00 date

Acknowledgements

First I would like to thank Air Education and Training Command (AETC), Robins Air Force Base, and Eglin Air Force base for sponsoring this thesis effort. Their sponsorships provided me the means to travel and perform my field investigation. Without their support, this effort would not have been possible.

I also would like to express much thanks to my research advisor, Major Rehg, who kept me on course throughout this research adventure. His guidance and knowledge throughout the research made the completion of this document possible. I would like to thank Major Rumrill, Major Ward and Major Brothers, who all provided numerous in depth reviews and helpful comments, which made the completion of this document possible. Thanks also goes to John Keoshian (Sheppard AFB), Karen Winnie (Robins AFB), and Danny Freeman (Eglin AFB), who aided me in obtaining sponsorships and in the collection of data at their respective bases.

I reserve my final thanks to God. Without His blessings, the completion of this research effort would not have been possible.

Rodney C. Harris

Table of Contents

Page

List of Figures

List of Tables

Abstract

As the Air Force seeks to continue improving its environmental management program, it has begun investigating the feasibility of adopting the International Organization for Standardization (ISO) 14001-based environmental management system as the underlying backbone of its environmental program. The Department of Defense (DoD) conducted an ISO 14001 pilot study with the primary goal of determining how ISO 14001 could help DoD organizations reduce risks, improve compliance with environmental regulations, enhance environmental stewardship, contain costs, and meet emerging regulatory requirements.

This thesis analyzed the pilot study, specifically looking at the ISO 14001 implementation at three Air Force installations participating in the study. The research objectives were to identify factors that affect implementation of ISO 14001, compare the implementation strategies used by the bases, and develop propositions for Air Force managers to consider when implementing ISO 14001. Interviews of key personnel, DoD Component ISO 14001 surveys, and implementation documentation served as the data. The data was analyzed and grouped according to the factors that affected implementation. The factors were conceptually grouped into two constructs. The constructs were compared and relationships developed that identified the impacts on the implementation. Propositions were made to reduce the impacts on implementation. The recommendations from this research can be used in the development of future Air Force guidance on ISO 14001.

ANALYSIS OF THE AIR FORCE ISO 14001

PILOT STUDY CONDUCTED BY DoD

I. Introduction

Background

The United States Air Force, like all federal agencies, is faced with the difficult task of complying with the applicable federal, state, and local environmental laws and standards (Lindhorst, 1997). In the past, the Air Force focused its environmental program on ensuring that its discharges to the environment complied with current regulatory restrictions. In 1994, the Air Force undertook a more proactive approach to environmental management by adopting pollution prevention (source reduction, reuse, and recycling) as its primary means of ensuring compliance (Crum, 1997). For the future, the Air Force is examining what is considered the next step forward in environmental program management, the Environmental Management System (EMS). An EMS is a management structure and system that explores, upon implementation, environmental concerns in all aspects of an organization's operations and then links them together into one integrated program.

A diverse group of organizations, associations, private corporations and governments have been developing and implementing various EMS frameworks for the past twenty years. The possibility that these diverse EMS frameworks could result in

barriers to international trade led to an increased interest in formulating an international voluntary standard for EMSs. The International Organization for Standardization (ISO), consisting of representatives from industry, government, non-governmental, and other entities, finalized the ISO 14001 EMS standard in September 1996. The intent of the standard is to produce a single framework for EMSs, which can accommodate varied applications on a worldwide basis.

In order to continue improving environmental program management, the Air Force explored the possibility of piloting an ISO 14001 EMS at several installations. The primary purpose was to determine if adopting the system would improve environmental performance and reduce environmentally related costs. An additional goal was to determine the best method to implement the EMS should the decision be made to field it Air Force-wide (Crum, 1997). Likewise, other DoD components were exploring the possibility of piloting an ISO 14001 EMS at selected installations.

To provide a consistent framework for evaluating ISO 14001, the DoD components organized under the DoD Environmental Management System (EMS) Committee. The committee's framework for evaluating ISO 14001 was a two-year pilot study. The primary goal of the study was to determine how ISO 14001 could help DoD organizations reduce risks, improve compliance with environmental regulations using pollution prevention, enhance stewardship of natural and cultural resources, contain costs, and meet emerging regulatory requirements. The installations participating in the pilot study provided data to the EMS Committee on DoD Component ISO 14001 profile surveys every six-months during the time of the study. The surveys, which captured cost and benefit data associated with implementation, were evaluated using a cost-benefit

analysis. The results will be used to develop future DoD policy on ISO 14001 and section 4-405 of Executive Order 12856 "Federal Compliance with Right-to-Know Laws and Pollution Prevention Requirements."

Three Air Force installations (Sheppard, Robins, and Eglin) were chosen to participate in the DoD ISO 14001 pilot study program. As stated earlier, an additional goal of the Air Force was to determine the best method of implementing an EMS. This goal was not sought through the DoD pilot study and cannot be determined by a cost-benefit analysis. Although, there are many handbooks and industry examples outlining how to implement ISO 14001 in the private sector, little guidance exists on how to implement it in a military organization such as an Air Force installation. To fulfill the earlier goals of the Air Force, implementation methods and strategies of these bases should be assessed.

Importance of Research

The DoD cost-benefit analysis approach to evaluating ISO 14001(EMS) will provide meaningful data only if the bases are successful in fully implementing the EMS. However, with the study lasting only two years, costs and benefits will not accurately reflect, in the near term, the impact of ISO 14001. The implementation cost can be accurately captured but the benefits and cost savings of the EMS may be more difficult to separate from previous environmental program actions. Also, the organizational change in culture that ISO 14001 seeks to obtain will take place only after implementation of the EMS. Augmenting the cost-benefit analysis with a qualitative analysis of the

implementation process would provide more depth, breadth, and quality to the DoD pilot study.

Problem Statement

The DoD pilot study does not capture the implementation process of the installations through its method of analysis. Implementation will be different for each installation based upon the goals and objectives established. Factors such as organizational structure, leadership, and external influences should be taken into consideration. In addition to these factors, many other organizational factors that have an influence on the effectiveness of implementing a new management system may not be obvious without on-site investigation. The cost-benefit analysis accompanied by a qualitative analysis of the implementation process will provide more thorough guidance on ISO 14001.

Research Objectives

The purpose of this research is to gain a better understanding of the factors that affect implementation of ISO 14001 EMS, by analyzing the implementation at Sheppard, Robins, and Eglin Air Force Bases. This information will then be used to provide additional insight on specific actions the Air Force environmental leaders can take to promote effective implementation of ISO 14001 at future bases. Specific research objectives are as follows:

1. Identify organizational change factors that affect implementation of ISO 14001 at the base and unit level.

2. Identify similarities and differences in the implementation strategy of ISO 14001 using cross-case patterns of analysis.
3. Propose important organizational change factors in the implementation of ISO 14001.

Scope

The scope of this research will include data collected from Sheppard, Robins, and Eglin on the implementation process of an EMS based on ISO 14001. These installations represent two major commands (MAJCOMs) of Air Education and Training Command (AETC) and Air Force Material Command (AFMC). The data collected were the DoD Component ISO 14001 summaries submitted by each base, open-ended interviews of key personnel to the implementation, and documentation of the implementation process. The DoD Component ISO 14001 summaries were collected during the period of 1 January 1998 to 1 January 2000.

Thesis Overview

This chapter provides a background on the DoD ISO 14001 pilot study program, and outlines the approach that will be used to augment the study with a qualitative analysis. Chapter II, Literature Review, provides an overview of environmental management evolution in the Air Force, ISO 14001 standard for EMS, organizational change strategies and factors that affect organizational change. Chapter III, Methodology, provides an overview of the case study research methodology that was used as the method of analysis. Chapter IV, Results and Analysis, provides the analysis and results of this research through case studies of implementation at each base and

qualitative analysis of the interviews. Chapter V, Conclusions and Recommendations, provides a summary of the results of this research to include general and specific conclusions resulting from the research, limitations of the research and recommendations for future research.

II. Literature Review

Overview

This chapter begins with an overview of the Air Force environmental management program and its recent evolution. The overview provides the background for the reason the Air Force is looking toward an EMS as the backbone of the environmental management program. This chapter also presents organizational change theory related to implementing change. The change theory focuses on strategies for change efforts and the factors that affect change efforts.

Environmental Management

The study of environmental management and its evolution is important in understanding why the Air Force is looking into EMSs. EMS is viewed as the next step forward in environmental management. The Air Force has undergone many program and process changes in conjunction with the change in environmental management. The progression to environmental management systems may be viewed as a natural progression for the Air Force.

Compliance-Based Environmental Programs

Strict compliance with federal, state, and local environmental laws and regulation has been the basis of environmental management for many organizations, including the Air Force. Although this strategy has worked well in protecting organizations from costly fines, it has two fundamental flaws (Crum, 1997). First, it is reactive in nature to the current laws and regulations. The formulation of specific environmental policies and

procedures and the allocation of resources are derived from the current regulatory climate. However, this climate is constantly changing and has become more stringent with time as new chemicals are regulated and discharge limits are decreased. These limitations require organizations to allocate additional resources on a periodic basis for the purpose of environmental program compliance. The second flaw of compliance based programs is that it assumes the right to pollute the environment (Crum, 1997). Environmental laws allow for a certain amount of pollutants to enter the environment. This can foster an attitude that it is acceptable to discharge a pollutant as long as the limit set by the law is not exceeded.

The Air Force Environmental Management Program

In the past, the Air Force environmental management program was centered almost exclusively around compliance. Bases established environmental management offices (EM) to ensure compliance with laws and regulations were maintained. To ensure the program was functioning properly, the Air Force used a strict compliance auditing system entitled Environmental Compliance Assessment and Management Program (ECAMP). Audits were conducted annually using the ECAMP criteria.

In 1994, the Air Force formulated a more proactive approach to environmental management through the adoption of the four pillars (cleanup, compliance, conservation, and pollution prevention) of the environmental quality process. This was established by Air Force Policy Directive (AFPD) 32-70. From this process, the Environmental Protection Committee (EPC) was established as the primary executive steering group for all environmental cleanup, compliance, conservation and pollution prevention. The EPC

was established by Air Force Instruction (AFI) 32-7005 to ensure a systematic, interdisciplinary approach to achieving and maintaining environmental quality was integrated into installation planning and decision-making.

In the environmental quality process, the EPC manages the environmental program at the installation level, ECAMP audits have been expanded to cover all aspects of the four pillars, and pollution prevention (P2) has been adopted as the primary means of achieving and ensuring compliance (Crum, 1997). Periodic P2 opportunity assessments are performed to identify areas where compliance through P2 can be achieved.

The resulting management action plans from the P2 opportunity assessments have led to significant reductions in hazardous materials use and hazardous waste generation in the Air Force. The combination of ECAMPs and P2 opportunity assessments have significantly increased Air Force environmental performance and has saved millions of dollars. The mission and environmental benefits already achieved through the adoption of the four pillar environmental quality process spurred Air Force leaders to seek additional ways in which they could advance the organization's approach to environmental management (Crum, 1997).

The next step forward in environmental program management is the environmental management system. An EMS is "a process that explores environmental concerns in every aspect of an organization's operations, and then links them together into one integrated program" (Crum, 1997:1). The underlying goal of an EMS is to emphasize elements necessary to prevent noncompliance and to detect and correct noncompliance issues before they become a significant problem (Lindhorst, 1997).

An environmental management system is designed and implemented to allow an organization to become more 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. A root cause of a problem is defined 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 similar noncompliance in the process which was audited or in any other process" (Marguglio, 1991:116). Thus, a properly established environmental management system becomes a mechanism by which the environmental problems and issues are addressed and permanently corrected.

ISO 14001 Environmental Management System

As the Air Force seeks to continue advancing its approach to the environment, it has begun investigating the feasibility of adopting the ISO 14001-based environmental management system as the underlying backbone of its environmental program (Crum, 1997). The International Organization for Standardization (ISO) is a non-governmental, worldwide federation of national standard bodies from over 100 different countries. Its purpose is to promote internationally accepted standards to facilitate the exchange of services and products between nations. In 1996, the ISO published the 14001 standard aimed at identifying the crucial elements necessary for organizations to develop and field an effective environmental management system (EMS).

The EMS defined by ISO 14001 consists of five core elements or steps: environmental policy, planning, implementation and operation, checking and corrective

action, and management review. These core elements along with sub-sections are presented in Figure 1. These core elements define the minimum requirements that must

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

be met in designing and documenting an effective EMS. The intention is to integrate all environmental considerations within the overall management activity. The core elements of ISO 14001 are defined to identify specifically what is required of an organization to comply with the standard.

Environmental Policy. The environmental policy element states that an environmental management policy must be defined and endorsed by management. This policy should be appropriate to the nature of the organization, and it should include a commitment to continual improvement, as well as compliance with environmental regulations (ISO, 1996).

Planning. The planning element includes sub-sections on environmental aspects, legal and other requirements, objectives and targets, and environmental management programs. The planning element requires a procedure to be established and maintained by the organization to identify the environmental aspects of activities and services that can be controlled and significantly impact the environment. A procedure must be established to identify environmental requirements by which the organizations must abide. Objectives and targets must be defined at every functional level within the organization and a program to attain environmental objectives and targets must be established and maintained (ISO, 1996).

Implementation and Operation. The implementation and operation element includes sub-sections on structure and responsibility; training, awareness, and competence; communication; EMS documentation; document control; and emergency preparedness. This element requires management to assign roles, responsibilities, authorities, and resources to ensure sound environmental management. Training needs must be identified and appropriate training must be provided to all personnel having job activities that could potentially impact the environment. Procedures must be established and maintained for in-house communication between various departments and functions. Information must be established and maintained to describe the core elements of the EMS

and their interaction and to provide guidance to related documentation. All documents must be controlled and procedures established to ensure that they are controlled. Operations and activities associated with significant environmental impacts and the organization's policy, objectives and targets must be identified. Finally, procedures must be established and maintained to identify potential emergency situations (ISO, 1996).

Checking and Corrective Action. The checking and corrective action element includes sub-sections on monitoring and measurement, nonconformance and corrective and preventive action, records, and EMS audit. This element requires procedures to be established and maintained for the purpose of monitoring and measuring operations and activities that may pose potential environmental impacts. Procedures defining the responsibility and authority for handling and investigating a nonconformance, taking action to lessen the impact of nonconformance, and initiating corrective and preventive action must be established and maintained. Procedures must be established and maintained for the identification, maintenance, and disposition of environmental records. Finally, procedures must be established to determine whether the EMS conforms to the requirements of the standard and any requirements of the organization, and whether the EMS has been properly implemented and maintained (ISO, 1996).

Management Review. The management review element requires top management to review the EMS to ensure its ongoing effectiveness. The purpose of these reviews is to identify opportunities for continuous improvement to the organization's policy, procedures, objectives, and targets, and the EMS itself (ISO, 1996).

ISO 14001 does not lay down specific environmental or operational performance criteria. Rather, it focuses on the protection of the environment and the prevention of

conflict with regulations. It requires that organizations formulate their own policies and objectives, taking into account relevant information concerned with significant environmental effects, resulting directly or indirectly, from their processes and/or products. The resulting formalized documentation should form part of an integrated management system that shares policies and procedures with quality assurance functions.

The Air Force and ISO 14001 EMS

A comparison of the ISO 14001 based EMS and the existing Air Force environmental management program indicated that the major components of the EMS already exist in the Air Force's program (Crum, 1997). The environmental targets and goals established by the Air Force leadership, and the management action plans and programs in use for environmental restoration, compliance, conservation and pollution prevention are all components of an EMS. It appears that for the Air Force to fully implement an ISO 14001 based EMS, it simply needs to link these components together at all levels of the organization and to more fully integrate the concept of environmental management into its various training programs (Crum, 1997).

An analysis of Air Force ECAMP data collected from fourteen installation audits performed from 1995 to 1997 has indicated that a large portion of the systemic areas of vulnerability of the existing Air Force environmental management program could be eliminated by an environmental management system based on ISO 14001 (Lindhorst, 1997). Weaknesses in the existing Air Force environmental management program were identified as systemic areas of vulnerability. 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 (Lindhorst, 1997).

The systemic areas of vulnerability found from the research identified communication between all organizations as a primary weakness of the current environmental management program. Insufficient knowledge and awareness of procedures and process due to lack of training, lack of corrective action, insufficient documentation, and inadequate resources made up the rest of the finding (Lindhorst, 1997). Due to the similarities between the ISO 14001 elements and the areas of vulnerability, research 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 (Lindhorst, 1997). This lends support to the idea that the proper implementation and operation of an environmental management system will strengthen the environmental posture of an organization.

Organizational Change Theory

Planned organizational change is defined as "any alteration in the environment, technology, structure, management process, or decision process designed to help achieve organizational goals" (Brown, 1980:610). Change originates with the identification of a problem or opportunity. The change may be what is needed for the organization to improve. If the change is conducted without regards to the impact on the organization then the benefits may not be fully realized. Few organizational change efforts are complete failures, but few tend to be entirely successful. Most efforts at changing

organizations encounter problems; they often take longer than expected, sometimes hurt morale, and often cost a great deal in terms of managerial time or emotional upheaval (Hackman, 1983).

As the Air Force investigates the feasibility of adopting the ISO 14001-based EMS, it should also investigate the impact the implementation effort will have on the base organizations. In order for the Air Force to successfully implement ISO 14001, there should be some awareness of the strategies for implementing change and the factors that may impact the change effort. This can be accomplished by following strategies for implementing change and considering the organizational factor that may impact the implementation of ISO 14001.

Strategies for Change Efforts

Organizational change has two dimensions that require attention by management. They are the technical and the social dimensions of change. The technical is the goal redefinition and/or reorganization that needs to be implemented and the social is the feelings, values, and attitudes of people involved in its implementation and impact (Garson, 1990). Strategies that managers apply should be sensitive to both dimensions of the change effort. Kotter and Schlesinger (1979) outline four managerial approaches to change sensitive to both dimensions (Hackman, 1983). The four managerial approaches are education and communication, participation and involvement, negotiations, and authoritative determination.

The education and communication approach is where change is effected through the force of information. This strategy assumes that an organization is aware of the need

for change but is not convinced that the change effort will work until information is provided and misinformation dispelled. Communication of ideas helps people see the need for and the logic of a change (Hackman, 1983). The education process can involve one-on-one discussion, presentations to groups, or memos and reports. Dissemination of studies and model regulations is an example of this type of strategy.

The participation and involvement approach is where change is effected on the basis of the commitment, which results from participation in decision-making. This approach assumes that a large number of actors can reach a mutually acceptable compromise if they are allowed to interact on a face-to-face basis. If potential resistors to change are involved in some aspect of the design and implementation, resistance is often forestalled. With a participative change effort, the initiators listen to the people the change involves and use their advice (Hackman, 1983). Conferences with a working agenda are an example of this type of strategy.

The negotiation approach is similar to participation, but only a few actors are involved. The approach assumes there are distinct points of view about the change in question and those powerful interests must be directly represented and reconciled. Retreats of top management may illustrate this strategy.

The authoritative determination approach is where directives from the top effect change. This strategy assumes that consensus is so obvious or, at the other extreme, so impossible, that participation and negotiation are inappropriate. This strategy suggests a plan involving efforts directed toward top management levels.

Organizational change efforts require managers to make strategic choices regarding the speed of the effort, the amount of preplanning, the involvement of others,

and the relative emphasis they will give to different approaches. Successful change efforts are those where the choices both are internally consistent and fit the given situation (Hackman, 1983). Organizational change efforts that are based on inconsistent strategies tend to run into predictable problems.

Factors that Affect Change

There are many factors that effect change efforts. The factors of focus in this research were directly related to the DoD pilot study and the implementation of ISO 14001 on an Air Force base. These factors were funding, manning, leadership, time organizational complexity, gap analysis, participation, responsibility, education and training. Funding was identified as a factor because the DoD pilot study did not provide funding resources to the installations. Manning was identified as a factor because the environmental management manning levels at the bases are different. Time was identified as a factor based on private sector case studies showing its importance to implementation of ISO 14001. The remaining factors were identified based on strategies for implementing change in an organization. Those factors were leadership, organizational complexity, gap analysis, participation, responsibility, and education and training.

Resources (Funding-Manning). Resources in this context include funding and manning. These resources are important to a change effort because human energy and activity are required to bring about change and most change efforts go beyond ordinary budget allocation and require special funding (Daft, 1995).

Change efforts require time and energy, for both planning and implementing a new idea. Someone must develop a proposal and provide the time and effort to implement it. The required human energy and activity are the man-hours required for the change effort. For change efforts to occur, organizations must increase their man-hours above normal operations. Re-prioritizing personnel or increasing manning levels for the change effort can accomplish this.

One of the goals of the DoD pilot study was to determine how well costs are contained by ISO 14001. ISO 14001 has generated costs savings in private sector organizations in the form of improved operational efficiency (i.e. energy efficiency, savings of material and water use, waste reduction), reduced environmental risk, and possibly reduced liability expenses (van der Veldt, 1997). However, upon initial implementation there are up-front costs that can be high depending on an organization's experience with EMS.

> The greater the lack of experience, the more the majority of the costs—up to 90 percent—will be internal costs (i.e., management time involved, identifying and evaluating environmental aspects and impacts, setting up the required documentation, and training employees) (van der Veldt, 1997:16).

The major components of ISO 14001 currently exist in the Air Force environmental management program. However, actual base-wide implementation of ISO 14001 has not occurred in the Air Force. Organizations may discover that the required infrastructure is not in place to promote implementation of ISO 14001. Special funding may be required initially to establish the necessary structure. Also, the man-hours, training, and ISO 14001 expertise required to bring about the change may require

contractor support. Whatever the potential need, special funding may be required to promote successful implementation of ISO 14001.

Organizational Complexity. Organizational complexity refers to the number of activities or subsystems within the organization and how they relate in the organizational structure. Complexity can be measured along three dimensions: vertical, horizontal, and spatial. Vertical complexity is the number of levels in the hierarchy. Horizontal complexity is the number of job titles or departments existing horizontally across an organization. Spatial complexity is the number of geographical locations (Daft, 1995).

An Air Force base has all three dimensions of complexity. The vertical complexity is not only within the base organizational structure but also within the base organizations themselves. The horizontal complexity on an Air Force base refers to the number of different Groups and Squadrons in the base organizational structure. Horizontal complexity is increased when there are many other DoD tenant units on the base. Spatial complexity on a base refers to how collocated the organizations are on the base. Although a base can be seen as one entire organization, the organizations on a base are not co-located. Most organizations occupy their own geographical location on a base.

The Air Force bases in this study have varying levels of complexity due to the requirements of their primary missions. The differences are apparent in the missions of organizations, the number of organizations, the number of tenant organizations, and the environmental management office position in the structure.

Organization complexity increases the barriers to communication. If a change effort is to occur within and across organizations, mechanisms must be established that facilitate the flow of communication. Horizontal communication overcomes barriers

between organizations and provides opportunities for coordination among employees to achieve unity of effort and organizational objectives. "Horizontal linkage refers to the amount of communication and coordination horizontally across organizational departments" (Daft, 1995: 195). Horizontal linkage mechanisms often are not drawn on the organization chart, but nevertheless are part of organization structure.

Another aspect of organizational complexity is organizational power. Power in an organization is often the result of structural characteristics. Air Force bases can be viewed as large, complex systems that contain many organizations and people. These systems have a formal hierarchy in which some tasks are more important regardless of who performs them. Organizational power is usually vested in the position, not in the person (Kanter, 1979). In addition, some positions have access to greater resources, and their contribution to the organization is more critical (Daft, 1995).

Gap Analysis. Most organizational change efforts, regardless of their focus, begin with a diagnostic process of one kind or another, for this diagnosis provides the information necessary to understand the strengths, weaknesses, and underlying problems of the organization (Levinson, 1972). There are many approaches to diagnosing a management system and for this purpose it is defined as "an overt process of gathering valid information which is aimed at developing a shared understanding among the members of the organization about the common problems they face" (Berg, 34). The diagnosis process for implementation of ISO 14001 is the performance of a gap analysis.

An ISO 14001-gap analysis is a comparison of the existing environmental management program with the requirements stated in the sub-sections of the five core elements of the ISO 14001 standard. The five core elements are environmental policy,

planning, implementation and operation, checking and corrective action, and management review. The end result of the gap analysis is the identification of the areas that the existing environmental program does not conform to the standard. Basewide implementation of ISO 14001 requires a gap analysis be performed in all organizations on the base.

An organization beginning the process of ISO 14001 implementation, would be well advised to perform a gap analysis and then build on the existing system:

> An initial review should be performed resulting in an outline of: how an organization is currently environmentally positioned; how an EMS system may be managed; the degree of commitment by senior management; the resources available; and what operational standards have been set (von Zharen, 1996:78).

By identifying areas of nonconformance, an organization is able to focus on the problems and correct them.

Upper Management Leadership. Successful change requires the support of upper management. The primary responsibility of upper management is to determine an organizations goals and strategy, therein adapting the organization to the intended change (Daft, 1995). Middle managers do the same thing for major departments within the guidelines provided by upper management (Daft, 1995). For a single large change, such as structural reorganization, upper management must give their blessing and support (Daft, 1995). For smaller changes, the support of upper management in relevant departments is required. For the Air Force, upper management support refers to senior leadership at the Center and Wing level. The senior leadership must show support for a large change effort like the basewide implementation of ISO 14001 and articulate the goals of the change.

Not only must there be upper management support but that support must also be continuous throughout the change effort. "If top management is to be the central motivator in a management system implementation, it must be more than a mere initial blessing—it must be a strong, continuing direct involvement by the senior leadership" (Vasu, 1990: 293).

Time Constraint. A risk of implementing change is in attempting too much too quickly. " It is of little importance if there is a grand design for implementing change efforts if there is not enough time to oversee them all" (Berg, 1977: 143). Organizational change is a process, which requires a longer time frame than does a technical change requiring only a solution (Vasu, 1990). It takes time and energy to nurture organizational changes and the power to push them. If a management system is implemented in a short period of time then adequate organizational development programs, adequate training programs, and adequate negotiation of coordination of the new system with old arrangements may not be fully addressed (Berg, 1977).

Case Studies. At Formosa Plastics Corporation, Texas, which has nine operating units and 1,300 employees, it took three years to complete the implementation and certification process of ISO 14001. However, at two Texas Instruments (TI) sites in Germany and Taiwan, it took only six months to complete the whole process, even though the Taiwan site has 2,300 employees (van der Veldt, 1997). One of the reasons behind the large time difference was that both TI sites were ISO 9000 certified and were already registered to Eco-Management and Audit Scheme (EMAS). Therefore, ISO 14001 implementation was easily obtainable because the ISO 14001 standard is based on the ISO 9000 quality management and quality assurance standard and an EMS was

already in place. Formosa was ISO 9000 certified and, although it already had certain elements of an EMS in place, it still needed to devote a significant amount of time and money to identifying and addressing all environmental aspects and impacts, setting environmental policy, training all employees, and setting up the documentation end of ISO 14001 (van der Veldt, 1997).

The time period allotted by DoD for implementation of ISO 14001 was two years. In comparing the private sector organizations to the Air Force bases involved in the pilot study, there are differences in the number of employees and in the existing environmental management program. For example, Robins AFB has 19,650 employees and Eglin AFB has 13,000 employees, compared with 2,300 employees at TI. These numbers are considerably higher than the private sector organizations. Although there may not be a direct correlation with the number of employees and implementation time, the training of employees alone will increase the time. The existing Air Force environmental management program has many of the elements of an EMS but the time required to link the elements into the ISO 14001 structure cannot be predicted. Also, none of the bases are ISO 9000 certified which tends to make implementation of ISO 14001 easier. Therefore, the amount of time that is required for implementation of ISO 14001 at an Air Force base is difficult to predict without examples of full implementation.

Participation. One of the most consistent findings in the research on change is that participation in the change tends to reduce resistance, build ownership of the change, and thus motivate people to make the change work (Hackman, 1983). Participation also facilitates the communication of information about what the change will be and why it has come about. Participation may also lead to obtaining new information from those

participating, information that may enhance the effectiveness of the change (Hackman, 1983). "Participation may involve work on diagnosing the present situation, in planning change, in implementing change, or in combinations of the above" (Hackman, 1983:557).

An effective way of allowing participation is the forming of an ad hoc team or task force to focus energy on implementation of a change (Daft, 1995). A team can be created to see that implementation is completed. The team can be responsible for communication, involvement of users, training, and other activities needed for change (Daft, 1995). For each situation, varying the degree of participation may be most effective.

Roles and Responsibilities. The roles and responsibilities refer to an individual's role in a group to help reach its goal. For any major change effort, someone should be designated as the manager of the transition. This person may be a member of management or a chief executive, someone who has the power and authority needed to make the change effort happen (Hackman, 1983). For the implementation of ISO 14001 this would be an EMS coordinator responsible for leading the EMS implementation effort.

Each individual involved in a change effort has a role to play, in facilitating success. Whether that role is as a leader, manager, or at the working level, additional workload may come with the change role. Role overload occurs when expectations for the role exceed the individual's capabilities (Griffin, 1996). Role overload can occur when a manager gives an employee more responsibility while the person's regular workload increases. Role overload can also occur when managers accept too much responsibility, thus increasing their own workload. Role overload can be avoided simply

by recognizing the individual's capabilities and limits. Since there were no increases in manning levels for the DoD pilot study, the key personnel that are implementing ISO 14001 will do so while still performing their primary duties. This could lead to role overload and negatively impact the implementation effort.

Education and Training. Education refers to efforts to prevent false rumors, misunderstandings, and resentment of the change effort (Daft, 1995). Training refers to all planned organizational efforts aimed at increasing members' abilities or modifying their behavior (Brown, 1980). Both of these factors are important because the personnel must know the reason for the change and what is required of the change.

One of the first and most critical steps for managing change efforts is to develop and communicate a clear image of the future state through education and training (Hackman, 1983). The future state is how the organization should be functioning after the change. Resistance and confusion frequently develop during an organizational change because people are unclear about what the future state will look like (Hackman, 1983). Through education and training, a clear image of the future state needs to be developed to serve as a guideline. It is important to communicate information to those involved in the change, including what the future state will look like, how the transition will come about, why the change is being implemented, and how individuals will be affected by the change. This communication can be accomplished in a variety of ways, ranging from written communication to small-group meetings, briefing sessions, videotaped presentation, etc. (Hackman, 1983).

Summary

This chapter provided background on the evolution of the Air Force environmental management program and organizational change theory. The evolution of environmental management shows that the pilot test of an EMS is the natural progression of environmental management in the Air Force. The literature review summarized two recent studies that indicated in theory that an ISO 14001 EMS should not be difficult to implement and it should make the Air Force environmental management program more integrated with all base activities. The organizational change theory indicated that identifying the need to change is only part of the process. Implementing the change is equally important. Several change strategies are identified that could be used for implementation. However, there is no literature on implementing ISO 14001 at an Air Force installation that can provide insights on how to implement successfully. Several factors that affect change efforts are presented due to their relevance to the DoD pilot study. This research will focus on providing a comparison between the implementation process of ISO 14001 at Sheppard, Robins, and Eglin AFBs. The methodology for analysis will be presented in Chapter III.

III. Methodology

Overview

This chapter covers the methodology used to objectively analyze the ISO 14001 implementation process at Sheppard, Robins, and Eglin AFBs. This research used data from the DoD Component ISO 14001 profile surveys; archival records; documentation associated with the implementation of ISO 14001, and open ended interviews of key personnel. A background overview of each base is presented along with the development of the interview questions and the associated method of qualitative analysis of the interview responses.

Data Sources

The data sources for this research are DoD Component ISO 14001 data surveys, open-ended interviews, archival records, and implementation documentation. The DoD Component ISO 14001 data surveys, archival records, and implementation documentation were used to provide background information on the history of the implementation process at the bases. The open-ended interviews were then analyzed within the context of the implementation process at the respective base. Other sources such as environmental pamphlets, training books, and ECAMP audits were used to provide background on the environmental programs at the bases. These sources together provide breadth and depth into the implementation process.

Field Investigation

Field investigations were performed at each installation to conduct interviews and collect data on the implementation process. The interviews were conducted with key personnel at the working level of the implementation process at each installation. The first trip was made to Sheppard, followed by Robins and Eglin AFBs. The field study at Sheppard Air Force Base, Texas was performed from 13-16 Sep 99. The data collected during the investigation are presented in Appendix A, Sheppard Interviews. The field study at Robins Air Force Base, Georgia was performed from 7-10 Dec 99. The data collected during the investigation are presented in Appendix B, Robins Interviews. A field study at Elgin Air Force Base, Florida was performed from 13-18 Dec 99. The data collected during the investigation are presented in Appendix C, Eglin Interviews. Background information on the primary mission and major organization for each base is presented.

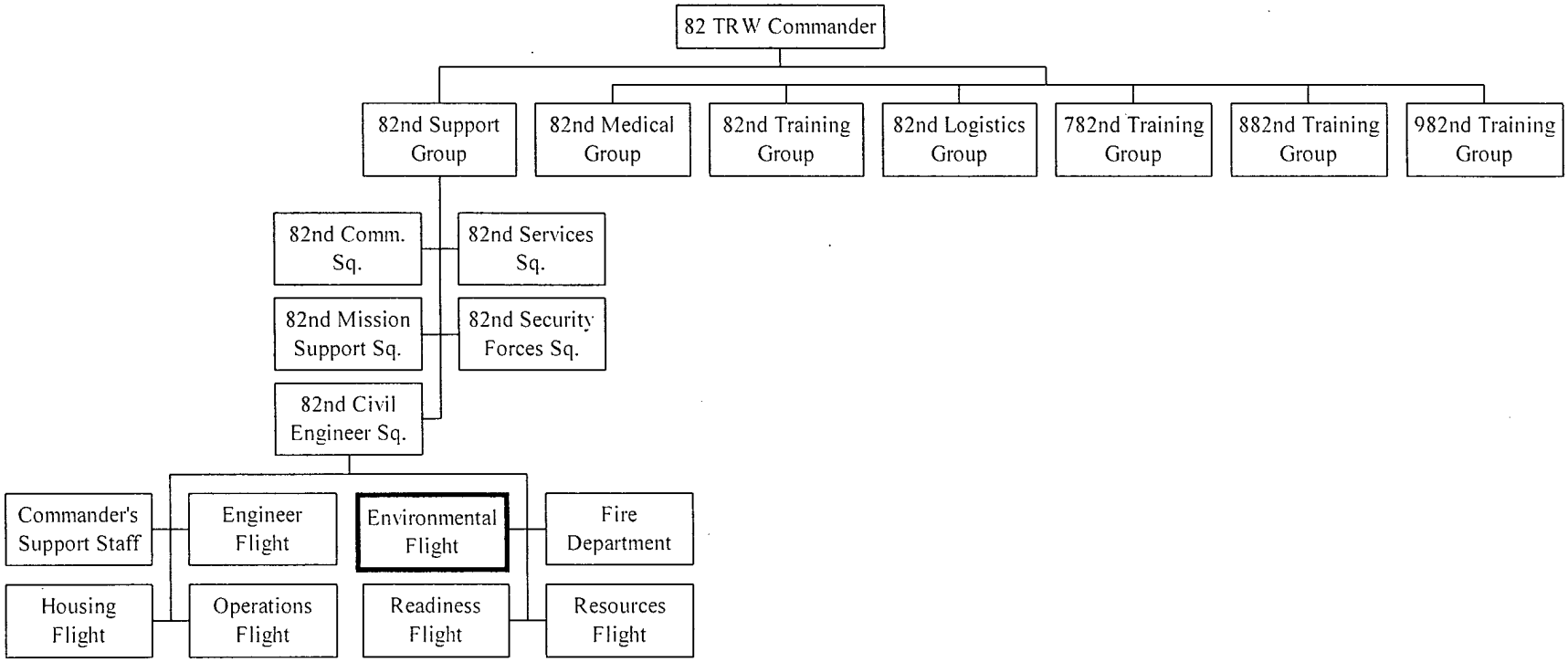
Sheppard AFB, TX. Sheppard AFB is located in the northern portion of Texas. Sheppard AFB is one of six training centers providing classroom and hands-on technical training, undergraduate pilot training, pilot instructor training, and follow-on flight training. The major units are the 82nd Training Wing and the 80th Flying Training Wing (82 CS/SCS, 1999). An organizational chart for Sheppard AFB is presented in Figure 2, Sheppard AFB Organizational Chart.

The 82nd Training Wing is comprised of the 82nd Training, Logistics, Medical, and Support Groups, and the 782nd, 882nd, and 982nd Training Groups. The 82nd and 782nd Training Groups provide resident technical training in the major academic areas of aircraft maintenance, aircraft structural maintenance, civil engineering, comptroller,

telecommunications, and education training career fields. The 882nd Training Group provides training in biomedical sciences, dentistry, health services administration, clinical sciences, medical readiness, and nursing. The 982nd Training Group serves as the headquarters for various off-site courses at several Air Force installations. The group provides administrative and curriculum management for aircraft maintenance training (82 CS/SCS, 1999).

The 80th Flying Training Wing is comprised of four Squadrons, the 80th Operations Support Squadron and the 88th, 89th, and 90th Flying Training Squadrons. The 80th Operations Support Squadron is comprised of six flights. The flights are the Air Traffic Control, Airfield Support (Weather and Base Operations), Personnel, Operations, Quality Assurance, Scheduling, and Student Operations. The 88th Flying Training Squadron is responsible for Pilot Instructor Training and Introduction to Fighter Fundamental course for students going to fighter aircraft. The 89th Flying Training Squadron is responsible for primary jet pilot training in the Cessna T-37B. The 90th Flying Training Squadron is responsible for T-38 Talon flying and advanced flight training of fighter pilot candidates for 13 nations participating in the Euro-NATO Joint Jet Pilot Training program (82 CS/SCS, 1999).

82nd Training Wing (82 TRW) - Sheppard Air Force Base, Tx.



Tenant Organization – 80th Flying Training Wing

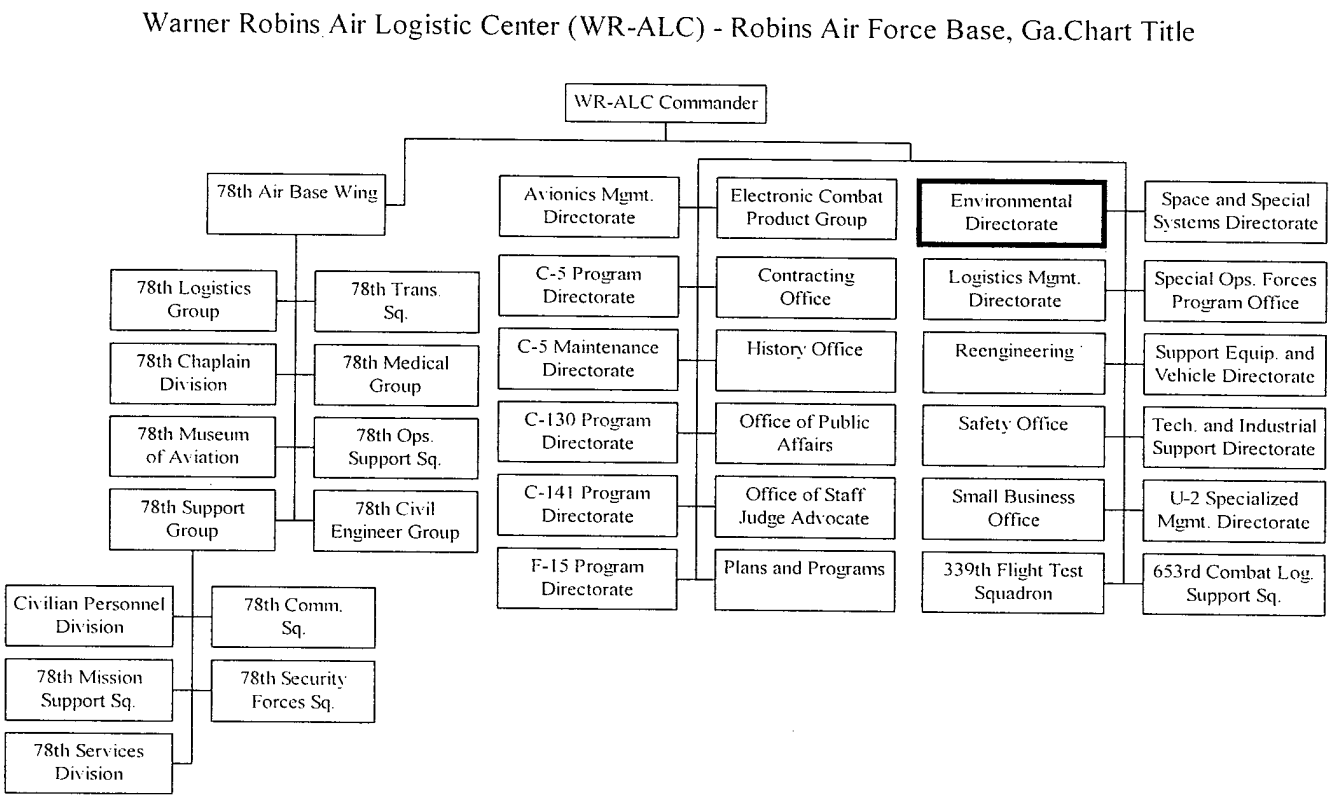
80th Operations Support Sq.	88th Flying Training Sq.
89th Flying Training Sq.	90th Flying Training Sq.

Figure 2. Sheppard AFB Organizational Chart

Robins AFB, GA. Robins Air Force Base (AFB) is located in central Georgia, east of the city of Warner Robins and west of the wetlands of the Ocmulgee River. The main operable organization on Robins AFB is the Warner Robins Air Logistics Center (WR-ALC). The main function of the ALC is to provide major aircraft and weapon system maintenance and overhaul support (referred to as Depot Level Maintenance) to the U.S. Air Force (USAF) and auxiliary organizations such as State Air National Guard Units. The mission of the WR-ALC is to provide affordable combat superiority, readiness, and sustainability to the war fighters. Currently WR-ALC provides depot level maintenance for the C-5, the C-130, the F-15, and the C-141 aircraft weapon systems (Earth Tech/Rust E&I, 1999). An organizational chart for Robins AFB is presented in Figure 3, Robins AFB Organizational Chart.

The ALC determines the spare parts, supplies, and equipment needed to support the weapon systems and commodities for which it has management responsibility. The ALC budgets for purchases, and distributes, maintains, repairs, and disposes of these systems and commodities. The primary workload consists of the repair and maintenance of the various types of aircraft (Earth Tech/Rust E&I, 1999).

Robins AFB is home to the 78th Air Base Wing, which operates the airfield, the Aviation Museum, and various support services on the base. Robins AFB is also the main U.S. operating base for the aircraft, including the 116th Bomber wing (B-1), the 19 ARW Air Refueling Wing (KC-135) and the 93 Air Control Wing also referred to as Joint STARS (KC-135) (Earth Tech/Rust E&I, 1999).



Tenant Organizations

5th Combat Comm. Group	19th Air Refueling Group	93rd Air Control Wing	94th Aerial Port Sq.	116th Bomb Wing	367th Recruiting Group
DET 6 373 TRS	Defense Automated Printing Service	Defense Distribution Depot	Defense Information Sys. Agency	Electronic Combat Support Flight	Robins Area Audit Office

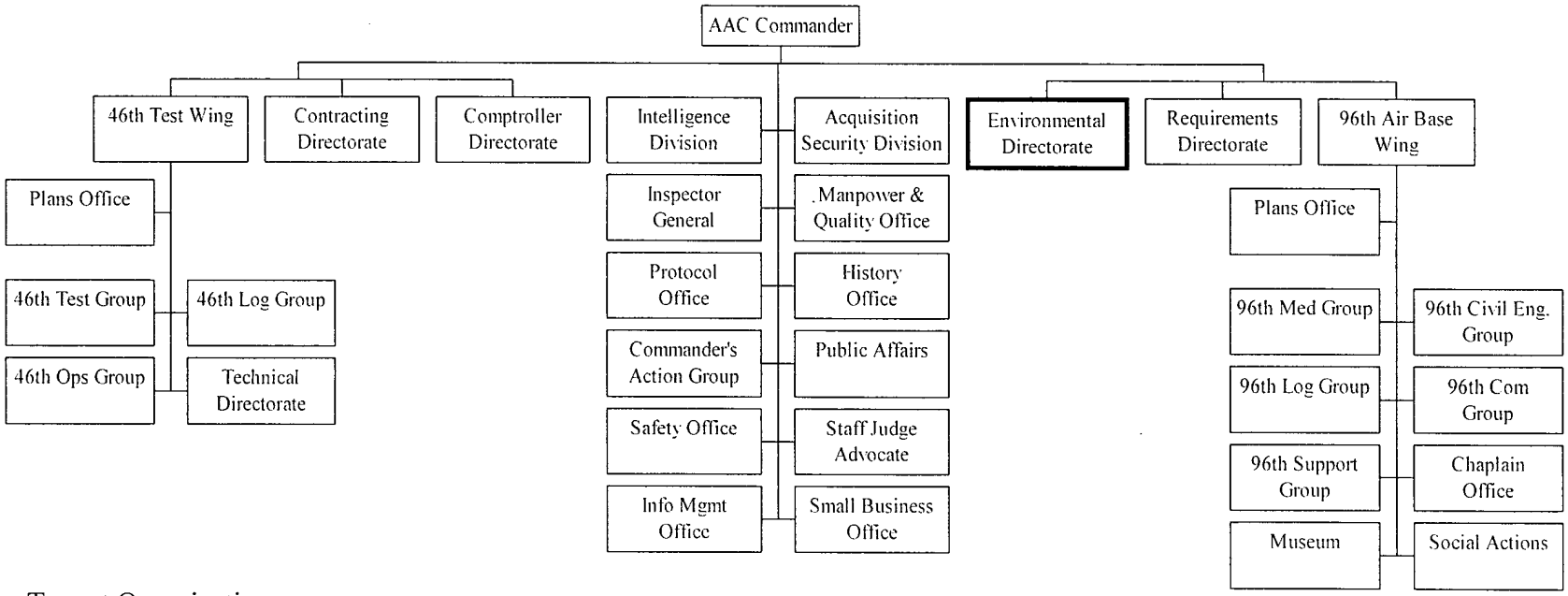
Figure 3. Robins AFB Organizational Chart

Eglin AFB, FL. Eglin is located west of the city of Ft. Walton Beach on the Gulf of Mexico. The main operable organization on Eglin AFB is the Air Armament Center (AAC). The AAC is responsible for development, acquisition, testing, deployment, and sustainment of all air-delivered weapons. The Center plans, directs, and conducts test and evaluation of U.S. and allied armament, navigation/guidance systems, and Command and Control (C2) systems. AAC accomplishes its mission through four components: The Armament Product Directorate, 46th Test Wing, 96th Air Base Wing, and 377th Air Base Wing (Kirtland AFB, NM.) (96 CG/SCTXC, 1999). An organizational chart for Eglin AFB is presented in Figure 4, Eglin AFB Organizational Chart.

The Armament Product Directorate is a system of program offices performing the business of acquiring, sustaining and retiring assigned weapon systems and equipment. The 46th Test Wing provides a national capability for test and evaluation of defense weapons. It plans, conducts, analyzes and reports on flight and ground developmental tests with uniquely modified aircraft and facilities for non-nuclear weapons and Command, Control, Communications, Computers and Intelligence (C4I) systems. It supports all DoD components, numerous allied nations and contractors during tests and exercises. It is responsible for managing and stewardship of America's largest test and training range (96 CG/SCTXC, 1999).

The 96th Air Base Wing's (ABW) primary function is to provide civil engineer, chaplain, communications-computer systems, logistics, medical, mobility, personnel, recreation, security, services, supply, transportation, and other support to two centers, three wings, and more than 45 associate units on Eglin – the largest Air Force complex.

Air Armament Center (AAC) - Eglin Air Force Base, Fl.



Tenant Organizations

53rd Wing	919th Special Ops Wing	20th Space Surveillance Sq.	DET 3 366th Training Sq.	Naval School EOD	DET 4 372nd Training Sq.
DET 1 HQ AFMC Stan/Eval	9th Special Operations Sq.	U.S. Small Business Administration	33rd Fighter Wing	Air Force Audit Agency	AFLSA Judiciary Area Defense Council
Camp J. E. Rudder U.S. Army	All Service Combat ID Eval Team	Defense Commissary Agency (DECA)	Air Intelligence Agency Liaison	DET 104 AFOSI Region 1	American Red Cross
DET 5 Aeronautical Sys. Center	DET 2 AFOTEC	Federal Prison Camp	602nd Training Support Sq.	Defense Reutilization/ Mkting Office DLA)	

Figure 4. Eglin AFB Organizational Chart

Data Collection

DoD Component ISO 14001. The DoD Component ISO 14001 data profiles were collected via electronic mail from Sheppard, Robins, and Eglin AFBs. A blank DoD Component ISO 14001 data profile survey is presented in Appendix D, DoD Component ISO 14001 Pilot Projects Cost Profile. The information from the surveys was used to provide insight into the environmental management program at each installation.

Interview Questions. The factors identified in the Chapter II – Literature Review as important to organizational change efforts were developed into interview questions. These factors were funding, base organizational complexity, gap analysis, manning, leadership of upper management, pilot study time constraint, responsibilities of key personnel, environmental leadership, level of participation, and ISO 14001 training.

The type II interview method was chosen as the technique for interviewing. This interview method, often called open-ended or free-response interviews, was chosen because it allows for specific questions, but leaves the character of the response open to the interviewee (Bouchard, 1976). The interview questions were written in a manner to allow for the interviewee to expand on the questions. Also, the type II interview method allows for the interviewer to expand on the questions to probe for deeper meaning from the interviewee. The interview responses were recorded in note form during the interviewing process.

Interview of EMS Coordinators. The EMS coordinators had primary responsibility of planning and overseeing the implementation of EMS. The Sheppard coordinator was the environmental flight chief of the 82nd Civil Engineer Squadron. The coordinators at both Robins and Eglin were in the compliance section of the EM

directorate. As the coordinator, they had insight into the issues and problems that impacted the implementation. The coordinators were questioned in the categories of funding, base organizational complexity, gap analysis, manning, leadership of upper management, and the pilot study time constraint. The interview questions are presented in Table 1.

Questions on funding were used to determine the impact of the lack of funding from DoD to conduct the pilot study. The questions provided insight on what areas of the ISO 14001 standard could be completed without funding and the areas that cannot be completed without funding. Also, insights into how much funding would be adequate to implement an EMS were addressed along with ideas on how to adequately cover cost.

Base organizational complexity refers to the organizational structure of a typical Air Force installation and how each organization interacts in order to accomplish the base mission. The lines of communication between environmental management and the base organizations are addressed to determine if there are hindrances to implementation. It also takes into account, whether the environmental management position in the structure has had an impact on the implementation and the degree of impact of the EPC within the base structure.

Questions on gap analysis were used to gain insight on whether a gap analysis was performed and if so, how it impacted implementation. The purpose of a gap analysis is to identify the areas of the current system that are not meeting the ISO 14001 standard. Once they are identified, measures to meet the standard can be taken. However, there were no funds provided for the bases to conduct a gap analysis. The measures the bases took to identify the gaps were investigated.

Table 1. Interview Questions for EMS Coordinator (All Bases)

Funds
1. Has the lack of funds from the Air Staff/MAJCOM constrained or limited the implementation in any way?
2. Are there any parts of ISO 14001 that you can complete without funding?
3. Are there any parts of ISO 14001 that you cannot do without funding?
4. How much funding from Air Staff do you think would be adequate to implement an EMS at this installation? How much have you spent on complying with ISO 14001?
5. How are you currently covering the cost of implementation?

Base Organizational Complexity
1. How many organizations do you interface with environmentally?
2. What has been the impact of the number of different organizations on the base?
3. Has the base organizational structure helped or hindered implementation?
4. How has the environmental flight position in the base structure impacted the implementation?
5. What has been impact of the EPC on implementation?

New Responsibilities
1. Have previous environmental responsibilities been passed on to other organizations?
2. Have there been any violations as a result of new responsibilities being delegated?

Gap Analysis
1. Was an adequate gap analysis performed before implementation?
2. What has been the impact of having/not having a gap analysis?
3. Did it have an effect on the establishment of goals and objectives for the implementation?

Resources/Manning
1. Has environmental flight manning limited or hindered implementation in any way?
2. What has been the impact of unit environmental coordinators on implementation?
3. Has the environmental management office manning level had an effect on implementation?

Upper Management Leadership
1. What has been the involvement of Wing Leadership in the implementation process?
2. Has that involvement been continuous throughout implementation?
3. What has been the involvement of Group and Squadron commanders in the implementation process?
4. Has their involvement been continuous throughout the implementation?
5. Have you had the power to fully comply with ISO 14001?

Time Constraint
1. What has been the effect of having a time constraint on implementation?
2. Has the pilot study provided adequate time to fully implement an EMS?
3. Have you had the time to oversee and nurture all the changes required for the EMS?

Manning describes the size of the environmental management shop in terms of personnel. The questions were used to determine if the size of the environmental staff

had an impact on the implementation. Also, questions on whether key personnel outside of the environmental shops were utilized to help in implementation were assessed.

The upper management leadership is defined as the Center or Wing commander and the Group and Squadron commanders. The leadership involvement in the implementation of ISO 14001 was illustrated through incorporating implementation into the organization strategic goals, championing the implementation on the base or in their organization, or requesting updates on implementation status from EM. The questions captured the involvement of the leadership in the implementation process and whether it was continuous throughout the pilot study.

The time constraint refers to the two-year time period allotted for the pilot study. Since this is the first time that ISO 14001 has been implemented on an Air Force installation, knowledge of the number of months it takes to implement an EMS are not known. Questions were asked to determine if the time period had an effect on implementation, and if the time period provided enough time to implement ISO 14001.

Interview of Unit Environmental Coordinators (UECs). The UECs were interviewed due to their role as environmental liaisons between EM and the base organizations. The UECs are individuals appointed by each organizational director/unit commander to operate as the chief liaison between EM and the organization concerning hazardous waste management, disposal issues, and other environmental issues. As liaisons, the UECs have insight into the issues and problems that have impacted the implementation at the organizational level.

At Sheppard AFB, the UECs were not directly involved with the implementation process. At Robins AFB, the UECs were the implementers of the EMS within their

organizations. At Eglin, the UECs were not directly involved in implementation. Instead, Eglin formed an implementation core team (ICT) to carry out the implementation effort. The ICT was a six-person team made of members from key management functions of the AAC. The ICT members were trained on ISO 14001 and used that knowledge to plan and carry out the implementation strategy at Eglin.

The UECs were questioned in the categories of environmental responsibilities, environmental leadership, level of participation, and training on ISO 14001. The interview questions are presented in Table 2. These questions were used in interviewing the UECs at Robins. The Sheppard UECs were interviewed with different questions due to the method of implementation at Sheppard. The Sheppard UEC questions are presented in Appendix A. At Eglin, the ICT members were interviewed with slightly modified questions based on the EMS coordinator and UEC interview questions. This was because the ICT members had more responsibility in the implementation planning than the UECs. The ICT interview questions can be found in Appendix C.

Responsibilities refer to the duties of the UECs and ICT required as part of the implementation process. These duties are explored in reference to the time involved to accomplish them, the amount of responsibility placed on them, and the support received for accomplishing them. Some UECs work part-time, while others are full-time. Some have different levels of environmental expertise and experience, which may affect the time required to accomplish tasks and the amount of responsibility that can be handled.

Organizational and environmental leadership/support refers to the amount of support given to the UECs to perform their environmental duties. This was based on specific questions asked of the UECs to obtain their perception of the support from

management. This support is provided in the form of allotting the time, providing funds, providing assistance, and providing positive visibility of the necessity of the UEC job. This support is analyzed in how it may affect implementation.

Table 2. Interview Questions for Unit Environmental Coordinators (Robins)

UEC Responsibilities
1. What is your responsibility as UEC of your organization?
2. Is it your full time job? How much time per week do you spend doing UEC duties?
3. How do you feel about your UEC responsibilities?

Organizational and Environmental Leadership
4. How much contact do you have with your commander concerning environmental issues?
5. Does your organization have any goals for the environmental program? Do you know what they are?
6. How much support do you get from your commander on the importance of your responsibility as UEC? From the environmental flight?

ISO 14001
7. Were you educated/made familiar with ISO 14001 for Environmental Management Systems?
8. Are you aware of the reason for changing to such a system?
9. Have you been made aware of any weakness in the previous way that environmental management was conducted that prompted the implementation of the EMS?

Participation
10. Did you play an integral part in the implementation process?
11. How much contact do you have with the Environmental Flight? Do you attend regular meetings with them? Do you get documentation and guidance from them? How would you describe you relationship with them?

Increased Responsibility
12. How has implementation impacted your operations? Has implementation increased the cost of operations in your organization? Has it increased the burden on your personnel?
13. Has more environmental responsibility been directed to you as a result of implementation or in the past two years? What has been the affect of the increased responsibility?
14. Were your organization's key workers at the lowest levels made aware of the EMS? Was this process up to the Environmental Flight or did each organization have the responsibility to handle the awareness aspect?

Benefits
15. Have you seen any benefits/improvements in your operations in the past two years? If so, can they be attributed to the implementation of the EMS or were the processes already in place to provide the benefit?

Training refers to the training received on ISO 14001. Questions were asked to determine if training was received, if it was adequate in providing knowledge, and whether or not there were ways to improve the training. An understanding of ISO 14001 and what an EMS will do for an organization should assist in its implementation.

Participation refers to the role the UECs played in base environmental management and the role they played in the implementation planning process. Questions were used to gain an insight into how involved they are in base environmental management as far as attending environmental related meetings, how much contact they have with EM, and the working relationship with EM. The UEC participation in the EMS implementation was analyzed in light of the role they play in the base environmental management.

Archival Records and Implementation Documentation. The archival records used for this research included audits of the EMS performed during the time of the pilot study. Also, it included ECAMP reports from the bases during the time of the pilot study. The implementation documentation included any record of meeting minutes, briefings, or memos that provided insight into the implementation process, status, or directives that emanated from the DoD, Air Staff, MAJCOM, or base.

Data Analysis

The data collected for this research was analyzed using the case study research method. This method was used to accomplish the research objectives presented in Chapter I, Introduction. This method called for the development of case studies for each installation, which provided background information on base mission and on how they

implemented ISO 14001. It allowed for the comparison of the case studies to determine the impact of the factors that affect implementation.

Case Study Research. "The case study is a research strategy which focuses on understanding the dynamics present within single settings" (Eisenhardt, 1989:534). Case studies typically combine data collection methods such as archives, interviews, questionnaires, and observations. The evidence for case studies may be qualitative (e.g., words), quantitative (e.g., numbers), or both (Eisenhardt, 1989). Case studies can be used to accomplish various aims: 1) to provide description, 2) test theory, and 3) to generate theory. The aim of this research was to provide descriptions of the implementation process undergone at each installation and to generate propositions to improve ISO 14001 implementation at Air Force bases.

The first step used in the case study research strategy is a within-case analysis. Within-case analysis involves detailed case study write-ups for each installation. The write-ups are purely description, but they are central to the generation of insight into the large amount of collected data (Eisenhardt, 1989). The overall idea is to become familiar with each installation as a stand-alone entity. This process allows the unique patterns of each case to emerge. The write-ups covered the background information of the primary mission of the bases and the background of the implementation process of ISO 14001.

Coupled with the within-case analysis is the cross-case pattern analysis. This analysis method allows for evaluating data in many divergent ways. There were three cross-case patterns of analysis that were used to compare the bases. The first was to take the interview categories, and then look for within-group similarities for each base coupled with inter-group differences. The second was to select pairs of the bases and then list the

similarities and differences between each pair of bases. This tactic looked for more subtle similarities and differences between the cases (Eisenhardt, 1989:541). The third was to divide the data by data source. Patterns from one data source were used to determine if it corroborated evidence from another. Conflicting evidence was probed deeper to comprehend the meaning of the differences.

Finding Description Analysis

Once the interview responses were transcribed and compiled, the information needed to be grouped together to determine the relative importance and the essence of the findings. For each interview category, the interview responses from the three bases were combined. The combined responses from each interview category were then analyzed using qualitative techniques commonly referred to as coding. There are three forms of coding used to analyze data. The coding techniques are performed in light of the theoretical sensitivity of the researcher.

Theoretical Sensitivity. Theoretical sensitivity is a personal quality of the researcher. "Theoretical sensitivity refers to the attribute of having insight, the ability to give meaning to data, the capacity to understand, and capability to separate the pertinent from that which is not" (Corbin, 1990:42). It indicates an awareness of the subtleties of meaning of data. Varying levels of awareness are dependent on the researchers previous reading or experience in the area of study. It can also be developed further during the research process. All of this is done in a conceptual manner rather than in concrete terms. Theoretical sensitivity comes from literature, professional experience, and from the analytical process itself. Literature includes readings on theory, research, and documents

of various kinds. These publications provides a rich background of information that "sensitizes" what is going on with the phenomenon under study (Corbin, 1990). Through professional experience, the researcher has an understanding of how things work in the area of research, and why, and what will happen under certain conditions. The analytical process provides an additional source of theoretical sensitivity. Insight and understanding about a phenomenon increases as you interact with the research data. This comes from collecting and asking questions about what you see, making hypotheses, developing small theoretical frameworks about concepts and their relationships. In turn, the researcher uses these to look again at the data (Corbin, 1990).

Open Coding. Open coding is the part of analysis that pertains specifically to the naming and categorizing of concepts through close examination of data. During open coding the data are broken down into discrete parts, closely examined, compared for similarities and differences, and questions are asked about the concepts as reflected in the data. Through this process, one's own and others' assumptions about the concepts are questioned or explored, leading to new discoveries (Corbin, 1990).

Axial Coding. Open coding fractures the data and allows the researcher to identify some categories and their properties. Axial coding puts the data back together in new ways by making a connection between the category and its sub-categories. In axial coding, the focus is on specifying a category in terms of the conditions that give rise to it; the context in which it is embedded; the strategies in which it is handled, manage, carried out; and the consequences of those strategies (Corbin, 1990).

Selective Coding. "Selective coding is the process of selecting the core category, systematically relating it to other categories, validating those relationships, and filling in

categories that need further refinement and development" (Corbin, 1990). The core category is the central phenomenon around which all the other categories are integrated.

Summary

In this chapter, the data gathering techniques and method of analysis were identified and defined. The data used in the research includes qualitative data from the DoD Assessment sheets; open-ended interviews of key personnel; archival records; and implementation documentation from Sheppard, Robins, and Eglin AFBs. This information was collected during the field investigations to each base. The data was then organized and analyzed using case study research methods and open coding techniques described in the data analysis and finding description analysis sections. Chapter IV, Results and Analysis will provide the analysis of the collected data using this methodology.

IV. Results and Analysis

Overview

This chapter starts with an overview of the implementation effort at each of the three bases. The overview starts with pre-pilot actions that occurred before the DoD pilot study and continues with ISO 14001 implementation, which representative of the pilot study time frame. This is to provide the necessary background to understand the analysis of the data using the case study research methods. Two constructs are presented that were developed from the open-ended interviews. Comparisons between the three bases of the interview responses are made using the case study research methods. The three methods of cross case pattern analysis are combined into the narrative for each interview category. For each interview category, variables were developed that allowed for deeper analysis of the interview responses. The analysis and results information is presented in a table format. The tables identify the variables used to simplify and operationalize the categories. Each base's general responses to the variables of the categories are presented in a bullet format.

Sheppard AFB Background

Pre-Pilot Actions. Sheppard's implementation of ISO 14001 was a continuation of an existing effort by the 82nd Civil Engineer Squadron Environmental Flight (CEV) to develop an environmental management system. The development of the management system was started in response to the FY95 external ECAMP at Sheppard. The external ECAMP produced 77 negative findings. The root causes of the findings were categorized

into five problem areas of communication, accountability, manpower, procedures, and training. As part of the corrective actions of the ECAMP findings, the Environmental Protection Committee (EPC) and CEV agreed on a policy to maintain an environmentally sound installation with the primary objectives of closing 100% of ECAMP findings.

The EPC and CEV organized the Environmental Development Team to develop a strategic plan to address the root causes from the ECAMP. The team methodology was to devise options that might correct the root causes of the findings, propose action plans for each option, and determine action plan goals and ways to measure them.

The team addressed each root cause by brainstorming options that would possibly fix the root cause. The positive and negative aspects of each option were identified and then rated on the ability of the option to address each root cause. The proposed options were to (1) incorporate environmental coordinators into each unit, (2) increase CEV manning levels, and (3) elevate CEV to the Wing Level. The options selected were to incorporate UEC into the Groups, Squadrons, and shops and increase CEV manning.

The designation of a UEC by each organization was accomplished by January 1996. The UEC roles and responsibilities were to support the organizational commanders, act as a liaison with CEV, represent organization on EPC sub-committees, and advocate for environmental funding for their organization. The UECs would rectify the root causes in education by becoming the planner for unit environmental training. Communication would improve by the UECs acting as the liaisons between the unit commanders and CEV. Accountability problems would be remedied by providing a responsible UEC in each organization. The UECs would indirectly augment CEV manpower, by allowing CEV to manage programs instead of problems, and procedural

understanding would be improved by giving the commander a point of contact for environmental questions and answers within the organization.

The EPC was reorganized to better handle environmental issues by providing the UECs a voice in the environmental management process. To improve the environmental management process, the EPC added five sub-committees and working groups that would report to the main committee. The five subcommittees were pollution prevention, compliance, restoration, environmental planning, and emergency response. Each subcommittee was responsible for proposing policies for approval, presenting solutions to the EPC when necessary and tracking environmental goals. The sub-committees were chaired by senior officers or civilians and were made up of the group UECs. This provided the UECs with a voice because they were the sub-committee and working group members. The working groups handled technical issues and developed proposals to solve issues, while the sub-committees validated and prioritized actions. The full EPC concurs and directs implementation of actions proposed by the sub-committees.

ISO 14001 Implementation. In 1998, Sheppard was selected to participate in the pilot program. CEV initiated the process by briefing the Wing Commander on their selection and developing an EMS policy statement for Sheppard. The policy statement was developed and signed by the EPC, indicating top management emphasis on environmental stewardship. Since Sheppard had begun their own EMS, there was not an initial emphasis on implementing the ISO 14001 EMS.

The primary emphasis during the early phase of the study was creating the infrastructure to support an EMS, which included an information distribution network for all organizations. This amplified environmental programs already initiated by the Air

Force. CEV developed a general plan concept that identified mission-related environmental aspects and legal requirements for all organizations. In conjunction with the general plan, a contractor developed the National Environmental Policy Act Management System (NEPAMS), which collates all Environmental Impact Analysis Process (EIAP) data (e.g., hazardous waste amounts, noise levels, air and water quality impact data, and infrastructure and utility data). While developing the general plan and the NEPAMS costs approximately $272K, CEV estimated that it would save approximately $600K over the next five years by reducing the number of environmental assessments for projects.

From Jan 98 to Mar 99, Sheppard developed plans and procedures to improve environmental management. In March 1999, CEV initiated a documentation phase of the EMS. This process involved identifying risks that would have otherwise gone unmanaged in their environmental program. In September 1999, an audit team from HQ AETC performed an ISO 14001-gap analysis. The purpose of the gap analysis was to aid Sheppard in identifying the remaining actions left to fully meet the ISO 14001 standard. The audit team's overall observation was that the environmental responsibility for achieving the base environmental objectives and targets appeared to remain focused in CEV. Other units did not appear to share in the responsibility to implement or maintain the objectives and targets. The recommended action was for CEV to begin directing the environmental objectives and target to the unit level through the organization command structure.

The final actions of CEV at the end of the pilot study were the correction of the nonconformances with ISO 14001. The audit team provided a list of action items to

correct in order to meet the standard. However, it was left up to the base whether they wanted to continue with the ISO 14001 EMS.

Robins AFB Background.

Pre-Pilot Actions. Robin's interest in ISO 14001 began in August 1996 when the environmental directorate (EM) queried senior leadership on how to improve the function of the Environmental Protection Committee (EPC) and the installation's compliance posture. As a result, training on environmental compliance requirements and the introduction to ISO 14001 was provided to senior leadership. In April 1997, Georgia Tech performed an ISO 14001-gap analysis of six organizations on the base, identifying where Robins' environmental management program did not conform to ISO 14001 requirements.

The gap analysis performed by Georgia Tech was the first step toward implementation of ISO 14001. The gap analysis was performed only on the six major organizations due to the size of the base and because EM already had an idea of where the major gaps would be in their program. After the gap analysis, the EM decided to focus on the largest gaps of documentation and communication.

ISO 14001 Implementation. In December 1997, Robins was formally notified of its acceptance into the DoD ISO 14001 pilot study. One of the first actions that EM took was to develop and distribute an environmental policy to all base organizations in February 1998. Also, EM developed a web page to provide information on ISO 14001 and to provide access to the most current EM-generated policies and procedures. The

web page was chosen as the most expedient and easily managed means to achieve document control.

As part of the pilot study, Robins began using the new Pollution Prevention (P2) draft instruction AFI 32-7080. Specifically, the requirements for compliance site identification and inventory were used as the primary means for aspect identification. EM distributed an environmental aspect and impacts identification checklist to all base organizations, instructing supervisors to develop shop-specific "smart-books". The intent was for supervisors to begin taking ownership of their environmental liabilities rather than leaving environmental management of the units solely on the UECs. However, this effort was only partially successful because most UECs filled out the checklist for their organizations when the supervisors delegated the task.

This information was loaded into a database that included data on risk, costs, and P2 measures. The information addressed the significant environmental aspects associated with the compliance sites. The data was exported to the base organizations for them to use to identify the environmental concerns within their organizations.

In 1999, EM developed a policy manual that described how the environmental management system (EMS) functions. The EMS manual provided the procedural framework for the entire EMS and direction to all facets of environmental management. Base organizations then took this manual and developed organization-specific EMS continuity books, which were distributed to various levels of supervision.

EM conducted its first ever ISO 14001/ECAMP audit in May 1999 using in-house personnel. Many of the deficiencies of the base implementation to that point centered on the lack of or inadequately documented procedures (outdated plans and policies, scope of

environmental duties for personnel). Sixty-eight ISO 14001 nonconformance findings were identified.

In order to correct the findings, EM funded a contractor to provide "one-on-one" ISO 14001 consulting with individual UECs on a weekly basis. The contractor provided templates for file maintenance, document control, and environmental aspect identification to the UECs to assist them in further developing and refining their organizational EMS. The contractor also helped EM develop organization-specific environmental compliance and ISO 14001 EMS findings tracking database.

The final actions of EM at the end of the pilot study were the continued refinement of the EMS at the unit level.

Eglin AFB Background.

Pre-Pilot Actions. Eglin's interest in ISO 14001 began in August 1997, when the AAC executive council approved new installation strategic target to achieve ISO 14001 certification by the year 2000. Eglin's EM directorate was charged with developing and implementing a plan for ISO 14001 certification. In response to this, an ISO 14001 implementation-working group was formed called the implementation core team (ICT). The team members were from the plans and programs office of the AAC and both Wings, the Judge Advocate General office, and the 96th Civil Engineer Group. The EMS coordinator in the EM directorate chaired the team.

In October 1997, the ICT requested tenant unit participation in the implementation of ISO 14001. There was no positive response from the tenants; therefore, the implementation was only for the AAC. The implementation plan was sent

to the AAC staff and groups for comment in December 1997. Comments were received from the staff and groups on implementation and the final plan was sent to the AAC commander for signature.

ISO 14001 Implementation. In December 1997, the AAC was selected to participate in the DoD ISO 14001 pilot study. The first action of the ICT was ISO 14001 training in January 1998. After receiving training, the ICT established a charter and held weekly meetings. A gap analysis checklist was developed by the ICT to meet Eglin's operations. The checklist was based on a generic ISO 14001 checklist. The gap analysis was conducted by the ICT on all AAC organizations in February 1998. From the results of the gap analysis, the ICT decided to focus their efforts on the largest gaps.

In December 1997 the AAC commander changed. With the new center commander, the certification requirement of the original base goal was no longer a part of the implementation plan. EM suggested that the certification requirement be dropped because of costs. AAC broad-based approach to implementation was then used, which included no external costs to organizations. The initial internal cost to organizations was time spent in training-class time not to exceed 2hr/employee for the entire implementation effort with slightly more for group POC/ICT. The majority of the implementation burden was on EM. The EPC responsibilities were to approve and implement environmental policy, review results of EMS audit annually and direct corrective action as necessary, monitor suitability, appropriateness, and effectiveness of EMS quarterly. Problems were encountered due to the change of command. There was a significant amount of time needed to train new senior level managers.

In August 1998, the implementation plan was final and signed by the AAC commander. A second gap analysis was conducted, which indicated a 47% implementation level. The prioritization of outstanding items focused on defining the EMS structure.

In 1999, the ICT met once a month to review action items. Within the group, the members had various action items that they were working on such as writing procedures for document control, environmental aspect identification, and legal procedure. As action items were completed, others were tackled. The education procedure, communication procedure, and policy flyers were developed and an EMS website was under development by EM. In June 1999, the document control system and the training video status were briefed to the EPC. In August 1999 the procedures were reviewed (legal, communications, education/training) and other procedures were directed to be drafted.

The final actions of EM at the end of the pilot study, were the continued development of plans and procedures. The implementation effort at Eglin will continue until they are fully implemented.

Constructs

In order to gain a complete and full understanding of the implementation of an EMS at Air Force installations, the open-ended interviews were analyzed using coding. Conceptualizing the data was the first step in analysis. Conceptualizing means dissecting an observation, a sentence, a paragraph, and giving each discrete incident, idea, or event, a name, something that stands for or represents a phenomenon (Corbin, 1990). The conceptualization of the data was done in the context of the implementation history built

from the DoD Component ISO 14001 data surveys, archival records, and implementation documentation.

Once the interview responses were grouped into categories, variables were developed to capture the essence of the concepts that seem to pertain to the same phenomena. For example, ISO 14001 training was an interview category. The responses for the training questions from each base were combined and conceptualized in the context of the implementation at each base. At Sheppard, no ISO 14001 training was conducted. At Robins, the training was too vague for the personnel to understand. At Eglin, the training was good but it was geared to the private sector. Although, the bases chose different avenues for training, two variables from the responses were the inadequacy of the training and the need for the training to be tailored to Air Force operations. This form of analysis was performed on all the categories presented in the Chapter III, Methodology.

After analyzing the collected data and conceptualizing all the categories together, two common themes emerged from the results. The two themes will be called constructs. A construct is defined as a concept that is synthesized or constructed from simple elements. The two constructs were organizational support and organizational efficacy. These constructs were based on the factors that affect change.

The interview categories that correspond to the construct will be analyzed in depth by using variables as descriptors for the categories. The variables were developed to further simplify the interview responses and to eliminate the bias of the interviewees in the analysis.

Organizational Support

The organizational support construct is defined as the manner of support that was provided to the implementation process. The organizational support could emanate from DoD, MAJCOM, Base Leadership, or Unit Leadership. The type of support given could be monetary through the funding for various needs, increasing environmental manning level, increasing time duration for implementation, or providing environmental leadership at all levels from DoD to base level.

Five of the interview categories corresponded to organizational support. They were Funding, Manning, Upper Management Leadership, Time Constraint, and Organization and Environmental Leadership. They were grouped under organizational support because the base organizations implementing ISO 14001 did not have any control over the impact of these categories on the implementation process.

Funding. Funding was analyzed to determine how much of an impact it had on the implementation of ISO 14001. It was analyzed closely due to the current DoD guidance stating that no funds are to be used for third party certification of the ISO 14001 EMS.

Two variables for funding were developed from the interviews. The first variable was importance, which addresses the impact of funding on implementing ISO 14001. It describes what parts of the standard could or could not be completed without funding. The second variable identified what programs related to implementation require funding. Table 3 indicates how the variables for funding affected each of the three bases. Each base's general responses to the variables of the categories are presented in a bullet format.

Importance. At the beginning of the pilot study, none of the bases received funding for implementation. Robins and Eglin indicated that the lack of funding hindered implementation but they were not able to quantify how much it impacted the effort. Both bases stated that funding could have been used to contract some of the implementation effort. Some of those contracted efforts would have been for

Table 3. Funding Impact on Implementation of ISO 14001

Variables	*Sheppard*	*Robins*	*Eglin*
Importance	- Did not seek MAJCOM funding due to DoD directive - Used in-house funds totaling $270K since 1996 when the Sheppard EMS started	- HQ AFMC provided $275K for ISO 14001 related projects - Used in-house funds for training, admin. support, and contractor	- HQ AFMC provided $150K for ISO 14001 related projects - Used in-house funds for training, admin. support, and contractor
Programs	- ISO 14001 training - Gap analysis, policy development, document writing, and process reviews	- ISO 14001 training - Contractor support	- ISO 14001 training - Contractor support

implementation planning, document writing and for someone with ISO 14001 expertise. Sheppard indicated that a lack funding did not hinder their implementation efforts. Sheppard did not initially implement the ISO 14001 standard but continued with environmental management changes that had already been set forth and funded before the

pilot study began. It was not necessary for Sheppard to pursue funding for ISO 14001 training or contractor support; therefore, there was no perceived impact.

HQ AFMC provided Robins and Eglin with funding in fiscal year 1999 (FY99) for ISO 14001 related projects. Robins received $275K in funding for an electronic file maintenance project, ISO 14001 audit, and contractor support. Eglin received $150K in funding for a document control project and ISO 14001 training. Sheppard did not pursue HQ AETC funding. However, HQ AETC did provide funds indirectly by performing the ISO 14001 audit/gap analysis in September 1999.

All the bases used their in-house environmental funds for ISO 14001 training, contractor support, and administrative needs. There were many hidden costs in man-hours, administrative supplies, copying contracts, and other administrative support. However, it was the intent for all environmental management offices to implement with no external cost to the base organizations except in man-hours spent in training. Environmental management would be the only organization spending funds on implementation of ISO 14001.

Programs. All the bases indicated that funding was needed to provide training to personnel and to pursue contractor support. Funds required for training included any media used to educate the base personnel on ISO 14001. Most organizations have training funds set aside for in-house use. All the bases used in-house funds to initially meet their ISO 14001 training needs. HQ AFMC eventually reimbursed Robins and Eglin for the training expenses. Robins and Eglin are currently pursuing production of an installation specific training video on ISO 14001 to provide better

training and reduce costs. Whatever training strategy is selected, funding is needed during the implementation process.

Since all of the EMS coordinators are functioning in a part-time capacity, funding for contractor support was needed. Contractor support was for policy development and document writing. This funding is dependent on the current state of environmental policies and procedures at the base. Robins used a contractor to provide assistance to the UECs because the EMS coordinator did not have the available time to do so. Robins and Eglin used contractors for policy development and document writing. However, both bases have an in-house contractor that works within the environmental management office; therefore, they had the contractor means already available. Sheppard did not use a contractor but identified programs that would be more advantageous for a contractor to perform.

Manning. Manning resources put forth toward implementation was considered an important factor in the implementation of ISO 14001. The size of the environmental organization and the manning put forth toward implementation may have an effect on the implementation. Also, the bases involved have different manning levels due in part to the difference in MAJCOMs. The amount of manning also gives some insight into the amount of time required to implement ISO 14001, the amount of time available to implement, and perhaps to the commitment of the base leadership to have an effective EMS.

There were two variables developed from the interview responses. The first variable was the size of environmental management. This was to determine whether a larger staff had an advantage over a smaller staff. The second variable was the impact of

the UECs on implementation. The UECs play an integral role in EM communications with other base organizations. The UECs are the liaison for environmental issues within their organizations; therefore, they augment the EM manning level. Table 4 indicates how the variables for manning affected each of the three bases. Each base's general responses to the variables of the categories are presented in a bullet format.

Table 4. Environmental Manning Impact on Implementation of ISO 14001

Variables	*Sheppard*	*Robins*	*Eglin*
Size of EM	- 9 personnel - EMS coordinator is the EM flight chief (Mid-Mgmt)	- 64 personnel - EMS coordinator is ECAMP Manager of the EM directorate (Mid-Mgmt)	- 90 personnel - EMS coordinator is ECAMP Manager of the EM directorate (Mid-Mgmt)
Unit Environmental Coordinators (UECs)	- The UECs are not actively involved in the implementation.	- The UECs are actively implementing ISO 14001within their organizations.	- The UECs are not currently being trained on EMS because implementation has only made it to the Group level. They will be utilized at the squadron level.

Size of EM. At Sheppard the environmental management office is a flight located within the civil engineering (CE) squadron. There are only seven personnel in the flight with a manning level of nine. The Robins EM directorate has 64 personnel and the Eglin EM directorate has 90 personnel. The difference in size is primarily due to the

difference in the missions of the bases. Sheppard is a training base with only a few organizations impacting the environment. Robins is a depot level aircraft maintenance base with many organizations impacting the environment. Eglin is a test center with many organizations, which also impact the environment. Each base has one person as the dedicated EMS point of contact for the pilot study. The size of the organization may have an impact on implementation depending on how much in-house effort is pursued. Sheppard and Eglin utilized in-house personnel to develop plans and procedures, while Robins contracted many of their efforts. Another aspect of manning that may have an influence is the position of the EMS coordinator. At Sheppard, the flight chief was the EMS coordinator. This position enabled the coordinator to reprioritize other environmental personnel as needed for the implementation process. At Robins and Eglin the EMS coordinators were within the compliance directorate and did not have any position power within the EM directorate.

UECs. At Sheppard and Eglin the UECs were only used indirectly in the implementation process. They were not specifically delegated with implementing ISO 14001 in their respective organizations. Sheppard felt that adding ISO 14001 to the UECs' responsibility would have overwhelmed them; therefore, they did not train UECs on ISO 14001. The UECs were not used at Eglin because the EMS was implemented down to the Group level. They were determining how to incorporate the UECs or some other type of coordinator that would handle the implementation within the base organizations. Elgin realized that the UECs were already extremely busy with their normal environmental duties and adding implementation of an EMS would have

increased their workload. Robins used their UECs to implement the EMS within their organizations. The implementation could not have been accomplished without them.

Upper Management Leadership. Continuous top-down management support for the environment is required for an effective EMS. This support must be continually communicated in order to demonstrate that upper management is serious about implementation of ISO 14001. The amount of leadership provided and the consistency of the leadership involvement will have an effect on implementation.

Two variables were developed from the interviews. The first variable was the involvement of upper management. This describes how much they were involved in the implementation process. This lack of involvement does not mean that the senior leadership does not support EM. This is leadership involvement specifically in the implementation process. The second variable is duration, which describes whether the senior leadership provided continuous leadership support throughout the implementation. Some examples of continuous support are active involvement of the EPC, allocating funds for implementation, or the establishment and tracking of goals. Table 5 indicates how the variables for upper management leadership affected each of the three bases. Each base's general responses to the variables of the categories are presented in a bullet format.

Involvement. The EM office at each base initially started out with selling the implementation of ISO 14001 and its benefits to the base senior leadership. This was done primarily as part of the nomination process for their selection to the DoD pilot study. The Wing leadership at Sheppard and the Center leadership at Robins and

Table 5. Upper Management Leadership Effect on Implementation of ISO 14001

Variables	*Sheppard*	*Robins*	*Eglin*
Involvement	- Low involvement of Wing leadership	- Low involvement of Center leadership	- High involvement of Center leadership
Duration	- Continuous through EPC meetings - EPC meets quarterly	- Continuous through EPC meetings - EPC meets quarterly	- Continuous because of Center goal - EPC meets quarterly

Eglin all support environmental stewardship and implementation of ISO 14001 as evident in their environmental policy.

At Sheppard, the Wing leadership involvement during the pilot study was low. This was primarily due to Wing commander changeover during the pilot study. Prior to the pilot study, the Wing leadership became more involved in environmental management performance after the external FY95 ECAMP. As part of the correction of the negative findings from the ECAMP, EM and the Wing Commander agreed on a policy statement of "Maintain an Environmentally Sound Installation." This set in motion the identification of the root causes of the negative ECAMP findings and brainstorming of options to correct the root causes. The end result was the incorporation of UECs into the base organizations, increase in EM manning levels, and a restructuring of the EPC to accommodate the UECs. During that time the Wing commander was aware of the goals and objectives of EM and provided them the necessary funds to accomplish their goals. Since that time, there has been a change in leadership. The same

environmental policy is still in place but the new leadership has not been briefed on the Sheppard EMS.

At Robins, the senior leadership involvement during the pilot study was low. This has been due to commander changeover. Prior to the pilot study, the involvement of Center leadership in the implementation began in August 1996. At that time senior leadership queried EM on how to improve the function of the EPC and the installation's compliance, in general. As a result, training on environmental compliance and the introduction to ISO 14001 was provided to senior leadership. In January 1998, at the beginning of the pilot study, the senior leadership was briefed on Robins' selection for the pilot study. The senior leadership understood the value that ISO 14001 could provide to the base but they wanted to limit the workload to EM. EM was directed to undertake the bulk of the implementation effort and keep it invisible to the rest of the base. The senior leadership wanted the least amount of interruption to the base organizational missions.

At Eglin, the involvement of senior leadership during the pilot study was high. Prior to the pilot study, the Center commander approved a new installation strategic target to achieve ISO 14001 certification by the year 2000. The Center commander at that time championed quality management initiatives during his time in that position. The commander felt that implementing ISO 14001 would make Eglin's environmental program more internationally accepted, bringing the AAC more contracts from NATO. He charged EM with developing and implementing a plan for ISO 14001. Currently, Eglin is under new leadership and importance of certifying the EMS has been

downgraded. However, the goal has remained to have an EMS, which has maintained senior leadership support.

Duration. At all the bases, the senior leadership involvement was maintained through the EPC. At Sheppard, the senior leadership was involved but only through the EPC. At Robins, the conducting of an ISO 14001/ECAMP audit regained the attention of the WR-ALC commander and the Group and Squadron commanders. This was because the negative findings from each organization were presented to the EPC. This increased the involvement of the senior leadership at that time to correct the negative findings. However, this was a reactive involvement instead of proactive. At Eglin, the senior leadership involvement was continuous because implementation of an EMS was an AAC goal. The AAC commander received regular updates on the status of implementation at Center staff meetings. Also, the AAC commander and the EPC were directly involved in the implementation by approving all implementation policies and plans.

Time Constraint. The period for conducting the pilot study was only two years. This time constraint may have had an effect on the implementation strategy chosen by the bases. Also, two years may not be enough time to fully implement an EMS on an Air Force installation.

Two variables were developed from the interviews. The first variable was effect, which refers to the effect of the two-year time period on the base implementation process. This would provide insight on whether the bases rushed the implementation process to meet the deadline or if they implemented in a manner that allowed for nurturing of the changes. Nurturing the changes may increase the duration of the change but the changes

are more likely to remain ingrained. The second variable was duration, which refers to whether two-years is adequate enough time to implement an EMS. Since there are no case studies on the amount of time required to implement at an Air Force installation, this would provide insight into the length of time needed for implementation. Table 6 indicates how the variables for time affected each of the three bases. Each base's general responses to the variables of the categories are presented in a bullet format.

Effect. The EMS coordinators at Sheppard and Robins viewed the time period as a constraint for implementation. However, Sheppard and Robins did not rush to complete their implementations. They tried to implement as much of the standard as possible in the time period of the pilot study. Eglin did not view the time period as

Table 6. Time Constraint Effect on Implementation of ISO 14001

Variables	*Sheppard*	*Robins*	*Eglin*
Effect	- The time frame was seen as the date for having the EMS fully implemented.	- The time frame was seen as the date for having the EMS fully implemented.	- Eglin never looked at the duration of the pilot study as a time constraint.
Duration	- Two years not long enough	- Two years not long enough	- Two years not long enough

a deadline for implementation. Instead they viewed the two-year time period as a point when DoD would make an observation of the implementation progress. Also, Eglin did not rush their implementation of ISO 14001 because it was a Center goal before the pilot study began and that goal would remain at the end of the pilot study. Therefore, they

implemented the EMS at a level that they felt would allow them to fully integrate the changes into the base environmental management program.

Duration. All three EMS coordinators stated that two years was not enough time to fully implement ISO 14001 at the base. The implementation time period might have been long enough to fully implement if the bases had started out with an implementation plan and adequate resources to execute the plan. Before implementation could take place, ISO 14001 training was needed, a gap analysis performed, and an implementation plan developed.

Organizational and Environmental Leadership/Support. Organizational and environmental leadership/support refers to the amount of support given to the UECs to perform their environmental duties. Leadership within the base organizations is important to the implementation process. The unit organizational leaders provide the vision on how important environmental stewardship is to the organizational goals.

Two variables were developed from the interviews of the UECs. The variables were Supervisor/Middle Management and 1st Line Management/Workers. They were developed based on the support given to the implementation by these two groups. The perspective of the level of support was from the UECs because they interfaced with the organizational managers due to their environmental duties. The Supervisor/Middle Management refers to the support in time and visibility given to the directives from the UECs. The 1st Line Management/Workers refer to the extent of support and enforcing of policies as given by the UECs. Table 7 indicates how the variables for organizational support affected each of the three bases. Each base's general responses to the variables of the categories are presented in a bullet format.

Supervisor/ Middle Mgmt. Robins was the only base that used UECs in the implementation of ISO 14001 within the base organizations. This perspective could not be gained from Sheppard or Eglin because they had not implemented ISO 14001 at the organizational level. At Robins, the organizational commanders supported the EMS in concept but it was not well supported by middle management within the organizations. For example, at Robins when supervisors were to identify their environmental aspects, most of them passed the responsibility on to the UECs, even though they had been

Table 7. Organizational Support Effect on UEC Implementation of ISO 14001

Constructs	*Sheppard*	*Robins*	*Eglin*
Supervisor/Middle Mgmt.	- EM has kept the implementation effort in-house - No support was requested from the organizations	- Organizational commanders are supportive of the UEC - Perceived lack of support of middle management	- Eglin has not yet implemented the EMS down to the organizational level. - No support was requested from the organizations
1st Line Mgmt/Workers	- No support was requested from the organizations	- The lack of middle management support leads to a lack of support by 1st line supervisors and workers.	- No support was requested from the organizations

directed not to pass it on to the UECs. The UECs could gain more influence if they reported directly to the commanders. This would give them more authority to implement changes with the commander's support. In most organizations, the UECs are buried in

the organizations at the lowest levels and serve only as part time duty. At this level they don't receive much visibility and don't have much influence in implementing an EMS.

1st Line Management/Workers. The 1st Line Management/Workers did not provide much support for implementation. Their lack of support did not impact implementation as much because they were not involved in the details of the EMS. They were only required to follow the new procedures that resulted from the implementation. Although there may be resistance to change at this level, it is middle management's responsibility, not the UECs, to enforce the directives. At Robins, 1st Line Management was not held accountable for ensuring proper environmental management was performed and instead responsibility had been placed on UECs to ensure no negative impacts occur to the organization from environmental management related activities. In other words, UECs, not supervisors, were often held accountable for environmental management though they have no control over how the organizations' personnel performed their individual duties.

Organizational Efficacy

The second construct developed from the interview responses was organizational efficacy. The organizational efficacy construct is defined as the organization's power or capacity to produce a desired effect. In this case it is the bases capacity to implement ISO 14001. Five of the interview categories corresponded to organizational efficacy. They were base organizational complexity, gap analysis, responsibilities, participation, and training. They were grouped under organizational efficacy because the organizations

had control over how to overcome the impacts of these categories on the implementation process.

Base Organizational Complexity. Base organizational complexity was looked at in reference to communication effectiveness between environmental management and the organizations they support. There are many organizations on an Air Force installation that perform a variety of different missions that impact the environment. Within some organizations there are many sub-organizations that add to the levels of complexity in communication. One of the purposes of implementing ISO 14001 is to decentralize environmental management down to the organization. The way EM at each base overcame the organizational complexity barrier to communication was addressed.

Two variables of base organizational complexity were developed based on the interviews. The first variable was communication. Communication was defined as the formal communication links that environmental management used to disseminate information to the base organizations. The communication method could already be an established link that was developed in response to the implementation. The second variable was EM position in the base organizational structure. This was to capture the effect of EM organizational power on the implementation process. It gives insight into how the EM position impacts its power. Table 8 indicates how the variables for organizational complexity affected each of the three bases. Each base's general responses to the variables of the categories are presented in a bullet format.

Communication. For the three bases, the base organizational structure has not hindered implementation in any way. The lines of communication between EM and

Table 8. Organizational Complexity Effect on Implementation of ISO 14001

Variables	*Sheppard*	*Robins*	*Eglin*
Communication	- All base organizations participated - UECs are the communication link between EM and the organization	- All base organizations participated - UECs provide the communication link between EM and the organization	- Only the AAC organizations participated - EM has only implemented down to the Group level,
EM Position	- Flight level EM must rely on CE commander to promote their issues	- Directorate level has the position power and direct line with the Center Commander	- Directorate level has the position power and direct line with the Center Commander

the base organizations have been well established. The EPC and UEC structure has aided in bridging the communication between EM and the base organizations. Each organization has a UEC, to include tenant organizations of each base.

At Eglin, the tenant organizations outside of the AAC were not included in the implementation of ISO 14001, which initially reduced the organizational complexity. However, once the AAC fully implements ISO 14001, the tenant organizations will be included. At Robins and Sheppard all the base organizations including tenants participated in the implementation of ISO 14001. The inclusion of the tenant organizations did not increase the difficulty of communicating.

The EPC was another communication channel that limited the negative effects of base organizational complexity. The EPC at the three bases provides an official forum to

discuss base environmental issues. They meet quarterly and include all major organization commanders including the tenant organization. The EPC provided the forum to present the ISO 14001 pilot study to the organizational commanders.

The use of the base Intranet helped in limiting the effect of organizational complexity. At all three bases, EM was able to email environmental guidance to UECs when there was not a scheduled meeting. The EM offices were also developing and utilizing their own webpages to disseminate information and provide publications to the base organizations. However, this requires that all UECs have access to a computer with email and Internet capabilities.

EM Position. At the two AFMC bases, Robins and Eglin, EM is at the directorate level. In this structure, EM has a direct line of communication with the Center commander and the rank of the EM director is either a Colonel or GM15, which is a senior management civilian position. At Sheppard, an AETC base, the EM is located in the Civil Engineering (CE) Squadron at the flight level. The environmental flight commander has the rank of Major, Captain, or GS12. However, the rank is not as important at the flight level as the focus given to EM by the CE Commander. The CE Commander has the direct line with the Support Group Commander, which is another level below the Wing Commander. Therefore, the environmental issues are filtered more and more as the information goes up the chain. At a base like Sheppard where the mission does not involve many environmental aspects, the environmental issues may not receive as much focus from Wing leadership. Sheppard EM had requested for the flight to be moved to the Wing level to give it more position power and emphasis on the base

but this idea was rejected. In Chapter III, Methodology, base organizational charts are presented that highlight the EM position in the base hierarchy.

Gap Analysis. An ISO 14001-gap analysis is performed to identify what standards have been met by the existing system. By identifying what standards have been met, an organization is able to focus on complying with the remaining unmet standards. A gap analysis would aid in goal setting for implementation because the deficiencies have been identified. Without funding, organizations either have to perform the gap analysis in-house or not perform one at all. Whether a gap analysis was performed or not would provide insight into the effects it had on the implementation process.

Two variables for gap analysis were developed from the interviews. The first variable was performance, which described how the gap analysis was conducted despite the lack of funds provided by DoD. The second variable identifies how the gap analysis or lack of one impacted the implementation of ISO 14001. Table 9 indicates how the variables for gap analysis affected each of the three bases. Each base's general responses to the variables of the categories are presented in a bullet format.

Performance. Sheppard AFB used a HQ AETC audit team to perform the gap analysis. Since Sheppard had not fully implemented ISO 14001, the audit was unstructured. The audit team had an ISO 14001 checklist but the extent of implementation did not warrant the use of the checklist. Therefore, the gap analysis consisted of talking with organizational commanders, environmental management personnel, and UECs to get the extent of what standards were currently being met. Also,

Table 9. Gap Analysis Performance Effect on Implementation of ISO 14001

Constructs	*Sheppard*	*Robins*	*Eglin*
Performance	- A HQ AETC audit team performed a gap analysis - Performed 18 months into the implementation	- Georgia Tech Univ. conducted the gap analysis - Performed before start of pilot study and audit at 1 year	- Eglin ICT performed all gap analyses - Performed at start of pilot study and semi-annually
Impact	- Identified the areas of noncompliance - Operationalized the ISO 14001 standards	- Focused direction of the implementation - For each gap, a get-well plan was developed with a timeline	- Focused direction of the implementation - Used to measure implementation progress

environmental plans and procedures were reviewed to determine if they complied with ISO 14001. The gap analysis was performed in September 1999, which was too late for EM to make corrections before the end of the pilot study. However, using a MAJCOM team to perform the gap analysis provided an unbiased analysis to Sheppard at no cost to the unit.

Robins AFB used a Georgia Tech University team to perform the gap analysis. Robin's EM heard about the service because of the many environmental training courses they receive from Georgia Tech. Georgia Tech was providing this free service to build their resume and gain experience on ISO 14001 auditing, which is required for auditing certification by ISO. Robins had their ECAMP contractor accompany the Georgia Tech team, instead of EM personnel, during the audit to provide the team with unbiased

personnel who were familiar with the base environmental operations. The gap analysis was performed only on seven of the major organizations at Robins. This was due to the amount of time it would take to cover the entire base and the lack of access to certain organizations. The major organizations were 7th Civil Engineer Group, Environmental Management Directorate, 93rd Air Control Wing, and the C-5, C-130, F-15, and C-141 directorates, which perform depot level maintenance. The Georgia Tech team performed the gap analysis at no cost to Robins.

Eglin used the ICT to perform their gap analysis. EM was aware of the ability to have free audits performed by contractors but they felt the contractors lacked the knowledge of Air Force base operations to perform an adequate gap analysis. The ICT modified an existing gap analysis checklist to fit Eglin's operations. They developed a scoring system for each checklist item using 0's, 1's, and 2's with 0 indicating nonconformance, 1 indicating somewhat conforming, and 2 indicating conformance. The scoring system enabled the ICT to track their level of conformance to ISO 14001. They performed gap analysis quarterly then semiannually to track their implementation progress and report it to the EPC. The only cost for the gap analysis was in man-hours of the ICT members.

Impact. At Sheppard the gap analysis was performed eighteen months into the pilot study. At the start of the study, EM had already identified processes and procedures that would improve their EMS and that appeared to coincide with the ISO 14001 standards. Some examples were the writing of new base procedures, improving document control, and the development of an environmental website. However, it was not until the gap analysis was performed that EM understood the extent of the ISO 14001

standards. It was evident from the analysis that they did not clearly grasp all the ISO 14001 standards. Unfortunately, the gap analysis was performed too late in the implementation process to correct the deficiencies before the end of the pilot study.

At Robins, the gap analysis provided the starting point for developing an implementation plan. The deficiencies were prioritized, with the largest deficiencies being accomplished first. For each gap, a get-well plan and timeline for accomplishment were established. This was the basis for the implementation plan. This plan was briefed to the EPC. The second gap analysis, which was the ISO 14001/ECAMP audit, had the effect of increasing the awareness of the base upper management (commanders and directors). Up to that point, the UECs and EM were implementing ISO 14001 from the bottom-up at the organizational level. With the deficiencies presented to the EPC, upper management became more involved at the organizational level.

At Eglin, the gap analysis provided the starting point for developing an implementation plan. The deficiencies were prioritized, with the largest deficiencies being accomplished first. The ICT performed the gap analysis once a quarter for the first year and semi-annually the second year. The gap analyses were performed periodically in an on-going effort to check the implementation progress. The periodic performance of the gap analysis provided the continued focus and direction of the implementation by identifying where the deficiencies remained.

ISO 14001 Responsibilities. Responsibilities of the key personnel refer to the duties of the UECs and ICT required as part of the implementation process. The responsibility of the key personnel was used to gain insight on whether they were able to

adequately perform their duties. This category was strictly looking at the amount of time spent on implementation.

Two variables were developed from the interviews. These variables were common themes from the responses from the UECs and ICT. The first variable was frequency, which refers to how often the UECs were tasked with environmental duties per week. This provides an insight into whether the UEC was a full or part time position, what their primary job was, and how much time they were spending on environmental issues. The second variable was burden. Burden referred to how the additional duties of implementation had affected the UECs workload. Table 10 indicates how the variables for UEC ISO 14001 responsibilities affected each of the three bases. Each base's general responses to the variables of the categories are presented in a bullet format.

Table 10. Key Personnel ISO 14001 Responsibilities Effect

Variables	*Sheppard (UEC)*	*Robins (UEC)*	*Eglin (ICT)*
Frequency	- The UECs were not directly involved in the implementation - The UECs are a part of the implementation by performing their jobs	- The UECs are directly involved in the implementation. - Depending on the organization, UEC is either a full time or part time job.	- The ICTs are directly involved in the implementation. - The ICT is a part-time job
Burden	- The UECs were not directly involved in the implementation	- Additional responsibility of implementing is a large load to handle.	- Majority of the effort was planning and strategy, only 4hrs a week

Frequency. Robins was the only base that used the UECs to implement ISO 14001 at the base organizational level. Sheppard and Eglin did not use their UECs for implementation. Eglin formed the ICT to plan the implementation of ISO 14001.

At Robins, the UECs were primarily part-time positions. The part time positions were primarily in the support organizations such as Service, Medical Group, and Communications. The part-time UECs had other primary jobs that took the majority of their time. However, many of the part-time positions became full-time responsibilities during the implementation of ISO 14001. The full-time UECs were either environmental technicians or engineers. The organizations that had full-time UECs were primarily in the depot maintenance organizations. This was due to the large number of environmental aspects within those organizations, which included aircraft painting operations and parts cleaning. The UECs workload increased due to the development of environmental smart books, ISO 14001 training, document control, identification of environmental aspects, and EMS meetings.

At Eglin, the ICT members only performed in a part-time capacity. Except for training and performing gap analysis, the ICT spent approximately four hours a week on ISO 14001 implementation efforts. This included attending meetings and workshops and writing environmental procedures. The ICT had only implemented down to the Group level, which did not require a full-time effort.

Burden. At Robins, many of the UECs were overburdened with environmental responsibilities. In the organizations that have a large amount of environmental aspects, the UEC was a full time position but only because it was required

of their job. They did not have the time to adequately implement an EMS. In the organizations that did not have many environmental aspects, the UECs were part-time and spent the majority of their time doing their primary job. With the implementation responsibility being placed on them, the part-time UECs became full time because of the amount of training and understanding required of ISO 14001 to implement the EMS.

At Eglin, the ICT members were incorporating a new UEC position at the Group level. This position would be strictly for implementation of ISO 14001 down to the organizational level. EM was aware of the current UEC workload and they did not want to place the additional implementation workload on top of their current duties.

Participation. The participation of the UECs, EPC, and Center/Wing leadership is important in the implementation process. By allowing more participation of these individuals in the implementation planning, environmental management may generate more ideas for implementation and achieve greater buy-in by the base personnel.

One variable was developed from the interviews. This variable was planning, which refers to the part the UECs, EPC, and senior leadership played in the implementation-planning phase. It provides insight into whether they had input into the implementation plan developed by EM. Table 11 indicates what the level of participation in the implementation phase was for each of the three bases. Each base's general response to the variable of the categories is presented in a bullet format.

Planning. At all three bases, the EPC and UECs play an active role in the environmental management program. The EPC meet quarterly to review and discuss base environmental issues. The UECs attend regular meetings as part of being a

Table 11. Participation in Implementation Planning of ISO 14001

Variables	*Sheppard*	*Robins*	*Eglin*
Planning	- The senior leadership participated in pre-pilot study EMS - The EPC participated in pre-pilot study actions - The UECs did not participate	- The senior leadership provided direction for EM - The EPC participated in pre-pilot study actions - The UECs did not participate	- The senior leadership approved plans - The EPC provided inputs to plans - The ICT formed specifically to plan implementation.

UEC and have daily interaction with EM on environmental issues. At Eglin, the ICT members did not have an active role in the daily environmental management activities.

At Sheppard, the senior leadership and EPC played an important role in the initial development of the base environmental program in 1996, which was before the pilot study. At the start of the pilot study, EM was still in the process of implementing the programs and procedures that were initiated in 1996. Therefore, EM did not seek the participation of the senior leadership and EPC in the implementation of ISO 14001. The UEC were intentionally left out of the planning process because EM felt that introducing ISO 14001 would confuse them.

At Robins, the senior leadership directed EM to handle the bulk of the implementation effort in-house. Therefore, EM began implementation of ISO 14001 without any participation of the senior leadership or EPC. EM used the UECs to implement ISO 14001 at the organizational level without their participation in the planning process.

At Eglin, the senior leadership and EPC participated in the implementation planning process. The EPC reviewed the implementation plan and provided comments to EM. The Center commander approved the final plan. The implementation has not progressed far enough to warrant the participation of the UECs.

Training. Training refers to the training received on ISO 14001. Training on ISO 14001 is important because it educates all key personnel on the standard and helps eliminate confusion about the standard. Also, the adequacy and relevance of the training should be determined to develop ways to improve the training methods.

Two variables were developed from the interview responses of the UECs and ICT members on training. The first variable was quality, which refers to the type of training received. The factors that affect quality are duration, location, and applicability to the implementation. The second variable was improvements, which refers to how the training could be improved based on the perceptions of the key personnel. Table 12 indicates how the ISO 14001 training affected each of the three bases. Each base's general responses to the variables of the categories are presented in a bullet format.

Quality. At Sheppard there was no training on ISO 14001 provided for the UECs. At Robins, the UECs attended ISO 14001 auditor training. Many of the UECs stated it was not adequate and it served to confuse them more about ISO 14001. The auditor training was for personnel already familiar with ISO 14001, which is not the case for most of the UECs. Also, the training was more focused toward private sector organizations and it was not tailored to an Air Force base.

At Eglin, an understanding of ISO 14001 was important for the ICT because they actively participated in the implementation planning and in the writing of new

Table 12. ISO 14001 Training Effect on Implementation of ISO 14001

Variables	Sheppard	Robins	Eglin
Quality	- UECs did not receive ISO 14001 training - EM deemed it unnecessary for UECs to receive training stating it would confuse them	- The UEC received an initial 2-day ISO 14001 auditor training - The training confused many of the UECs because it was very abstract	- The ICT members had a weeklong off-site training - It was not the best quality training (industry training)
Improvements	- No training provided	- The training should be tailored toward the Air Force	- The training should be tailored toward the Air Force

environmental procedures. The ICT received contractor provided training at the start of the pilot study. The training was more private sector based, instead of public/government focused. However, the ICT members gained a general understanding of ISO 14001. The general perception about the training from the ICT members was that ISO 14001 training was new and the contractors instructing were still trying to find their way on the subject.

Improvements. At Robins and Eglin, the key personnel identified tailoring the ISO 14001 training to Air Force operations as the primary area of improvement. This would facilitate better understanding of the standard. Also, training by Air Force personnel would also help because they have more knowledge about Air Force operations.

Summary

In this chapter, the implementation background for each base was presented. The implementation history and the transcribed responses of the interviews lead to the proposal of two constructs that define the implementation of ISO 14001. The two constructs were organizational support and organizational efficacy. The organizational support construct was defined as the manner of support that was provided to the implementation process. The organizational support could emanate from DoD, MAJCOM, Base Leadership, or Unit Leadership. The organizational efficacy construct was defined as the organization's power or capacity to produce a desired effect. The desired effect was the implementation of ISO 14001 at the base. The implications of these two constructs will be presented in Chapter V.

V. Conclusions and Recommendations

Overview

This chapter reviews the research problem and presents conclusions based upon the constructs of organizational support and organizational efficacy. Propositions are presented that provide insight into the ISO 14001 implementation. 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 that will meet Air Force requirements. In addition, recommendations for future research are presented.

Problem Review

In order to successfully implement an EMS at the base level, the organizational support provided by the Air Force needs to be properly constructed, organized, and applied. The DoD cost-benefit analysis of ISO 14001 provides a way to evaluate this standard but does not provide insight on the factors that affect implementation of the standard. These factors that affect implementation need to be identified to improve the implementation process. Air Force policy-makers can then better analyze ISO 14001 with a cost-benefit analysis once the EMS is fully implemented.

Conclusions

The factors that affect implementation, identified in Chapter II, Literature Review, all had an impact on the implementation efforts at Sheppard, Robins, and Eglin AFBs. These factors were organized under the two constructs of organizational support and

organizational efficacy. The interview categories corresponding to organizational support were funding, manning, upper management leadership, time constraint, and organizational and environmental leadership. The interview categories corresponding to organizational efficacy were organizational complexity, gap analysis, ISO 14001 responsibilities, participation, and training. When the implementation process and interview responses were conceptualized together, a relationship between the constructs became evident. These relationships make up the findings of the conclusions.

There were four findings that had an impact on the implementation of ISO 14001. The first finding was that adequate ISO 14001 training requires external funding. The second finding was that a gap analysis could be performed without external funding. The third relationship was that the position of EM in the organizational structure influences the implementation of ISO 14001. The fourth relationship was that upper management leadership support has a positive impact on participation.

Finding 1. Adequate ISO 14001 training requires external funding. From the literature, training refers to all planned organizational efforts aimed at increasing members' abilities or modifying their behavior. Training is one of the first and most critical steps for managing change efforts (Hackman, 1983).

In Table 3, all the bases identified training as a program that required funding for implementation of ISO 14001. The bases did not receive any funding for training from DoD as part of the pilot study. However, the bases were able to use in-house funds to obtain contractor provided training for their key personnel. The DoD Component ISO 14001 cost profiles indicated that each base spent approximately $20K in training-related expenses. These costs were minimal due to the limited number of key personnel needing

training. At Sheppard only a few individuals received training. At Robins, approximately 30 people received training. At Eglin, only six people required training. HQ AFMC eventually reimbursed Robins and Eglin AFBs for their training expenses. However, after training, the EMS coordinators were able provide awareness training to senior leadership and EM personnel. At Robins, EM trained the senior leadership on ISO 14001. At Eglin, the EMS coordinator trained the senior leadership and the environmental compliance division.

From the interview responses, the contractor provided training did not adequately convey the requirements of ISO 14001. The current ISO 14001 training that is available is tailored toward private sector organizations. Also, the standard itself is general so that it can be applied in any organization worldwide. In Table 12, Robins and Eglin indicated that the training should be tailored toward Air Force operations. At Robins, the training confused the UECs because it was too abstract to relate to base operations. At Eglin, the ICT member stated that the training was tailored toward the private sector. At Sheppard, the EMS coordinator did not provide training for the UECs because he felt the training would confuse them.

To provide better training and reduce future training costs, Robins and Eglin are developing ISO 14001 training tailored to their base operations. Their reimbursed training expenses are funding these projects. In-house personnel would perform the training. The ISO 14001 standard expects all employees to be trained and competent in handling the environmental consequences of their work (Cascio, 1996). The training tailored to the base would reduce costs because there would not be a need to obtain

contractor training for all employees. The total costs for training all employees would be in man-hours spent during training.

Finding 2. Gap analysis can be performed without external funding. As stated in the literature, an ISO 14001-gap analysis is a comparison of the existing environmental management program with the requirements stated in the sub-sections of the five core elements of the ISO 14001 standard. The end result of the gap analysis is the identification of the areas that the existing environmental program does not conform to the standard. For most private sector implementation of ISO 14001, a contractor performs a gap analysis for the organization at a cost. This is due to the knowledge and experience needed to adequately assess an organization's environmental program.

In Table 3, Sheppard identified a gap analysis as requiring funding. From the DoD Component ISO 14001 profile, contractor performance of a gap analysis would have cost Sheppard $35K. Since Sheppard did not pursue MAJCOM funding a gap analysis was not performed by contract. However, an ISO 14001 audit was eventually performed by HQ AETC, 18 months into implementation, which served as Sheppard's gap analysis.

At Robins, EM was able to obtain a gap analysis at no cost through Georgia Tech University. The gap analysis only covered six of the major organizations but EM was still able to identify the largest gaps and develop plans to fix the gaps. EM also performed an ISO 14001/ECAMP audit a year into the implementation effort. This audit did not require external funding because it was performed in conjunction with the ECAMP.

At Eglin, the ICT performed the gap analysis. The ICT was aware of the ability to have free audits performed by contractors but they felt the contractors lacked the knowledge of Air Force base operations to perform an adequate gap analysis. The ICT modified an existing gap analysis checklist to fit Eglin's base operations. They performed gap analysis quarterly then semiannually to track their implementation progress and report it to the EPC.

It is not possible to determine if a contractor gap analysis is better than an in-house gap analysis. The only difference between the two is the amount of experience with ISO 14001. However, with ISO 14001 auditor training, in-house personnel can gain the knowledge to perform the gap analysis at the same level of detail as a contractor performed analysis. In-house personnel also have the experience with auditing through the ECAMP audits, which is similar to performing a gap analysis.

Finding 3. The position of EM in the organizational structure influenced the implementation of ISO 14001. EM's ability to coordinate the implementation effort was increased at the higher organizational levels.

By comparing the information in Table 8, the EM at Sheppard is at the flight level of the CE Squadron. The EM at Eglin and Robins is at the directorate level. The directorate level units are closer to the senior leadership in the organizational structure. The directorate level organizations at Robins and Eglin have a direct line of communication with the Center commander and the Group and directorate level commanders. In this structure, the EM director is either a Colonel or a civilian equivalent rank of GM15. In contrast, the flight level offices are four levels removed from the Wing commander at Sheppard. The EM flight must communicate through the CE commander.

The CE commander has the direct line with the Support Group commander, which is another level below the Wing commander. At Sheppard, the environmental flight commander has the rank of Major, Captain, or GS12.

The literature states that power in organizations is often the result of structural characteristics. Air Force bases can be viewed as large, complex systems that contain many organizations and people. These systems have formal hierarchy in which some tasks are more important regardless of who performs them. Organizational power is usually vested in the position, not in the person (Kanter, 1979). In addition, some positions have access to greater resources, and their contribution to the organization is more critical (Daft, 1995).

The reason that Robins and Eglin are at the directorate level is due in part to the many environmental aspects that are a part of their base operations and also to raise the level of environmental awareness at the depots and product centers. This requires more personnel oversight to reduce the possibility of noncompliance with regulations. This increased level of oversight receives more attention from the senior leadership.

EM at both Robins and Eglin felt that their organizational position provided the access to the senior leadership and more influence on the other base organizations. At Sheppard, EM perceived that environment management was not important to the base senior leadership unless there were environmental emergencies. Sheppard felt that if they were at the Wing level, then the environmental management program would get more attention and focus on the base.

Whether the position power was actual or perceived, Robins and Eglin implementation efforts were more assertive than Sheppard's. Robins and Eglin had

noticeable starting points in their implementation efforts beginning with a gap analysis and training. At Sheppard, EM was not assertive in their implementation of ISO 14001. The transition was not as evident because they continued with the existing EMS and made small modifications through in-house efforts.

Finding 4. The upper management leadership support has a positive influence on participation. It is evident that upper management leadership in the implementation effort influenced the amount of participation in the implementation effort.

By comparing the information in Table 5, Sheppard and Robins indicated that upper management involvement in the implementation effort was low. At Eglin, upper management involvement in the implementation was high. The literature stated that successful change requires the support of upper management. Upper management has the primary responsibility of determining an organizations goals and strategy, therein adapting the organization to the intended change (Daft, 1995).

Comparing the information in Table 11, Sheppard and Robins did not have any participation in the implementation planning from the senior leadership, EPC, or UECs. The implementation plan and strategy was developed in-house without any input from these members. At Eglin, the senior leadership and EPC were involved in the implementation planning and strategy. The ICT developed the implementation plan and the senior leadership approved the plan. The literature on participation in change stated that the most consistent findings in the research on change is that participation in the change tends to reduce resistance, build ownership of the change, and thus motivate people to make the change work (Hackman, 1983).

At Sheppard, upper management felt that policy would not come from the pilot study. Therefore, EM's implementation was primarily focused in-house to reduce the impact on the base organizations. The UECs were not trained on ISO 14001 and implementation was not promoted outside of EM. It was not necessary to impact the base organizations if after the pilot study, the ISO 14001 EMS would not be used.

At Robins, upper management did not want to impact the directorates and Groups with implementing ISO 14001; therefore, they directed EM to make the implementation invisible to the base. This led EM to primarily use the UECs to implement and promote ISO 14001, instead of gaining the support of the organizational commanders. The UECs never received full support from middle management, which affected their implementation performance. An example was that the UECs could not get supervisors to identify environmental aspects. The attention of the organizational commanders was gained only after the ISO 14001 audit, which occurred 18 months into the implementation.

At Eglin, upper management supported the implementation. This was due to the implementation of ISO 14001 being made a goal of the base. The goal identified the level of importance of ISO 14001 to the base upper management, and EM subsequently had support for implementation from the base organizations. The ICT core team was formed with members from EM, plans and programs office, legal office, and civil engineering. The team developed all implementation plans, policies, and procedures. The plans and policies developed were commented on and approved through EPC and Center commander. The level of participation in the implementation process at Eglin was much more involved than at Robins and Sheppard.

Propositions

The propositions are the result of the conclusions identified from the constructs. The propositions correspond to the conclusion presented. The propositions are measures that Air Force environmental leaders can take to promote successful implementation of ISO 14001.

ISO 14001 Training. Based on the interviews, the training provided by contractors was vague and served only to confuse the UECs about the requirements of ISO 14001. The primary observation about the training was that it was difficult to relate ISO 14001 to Air Force operations. One of the first and most critical steps for managing change efforts is to develop and communicate a clear image of the future state through education and training (Hackman, 1983). Resistance and confusion frequently develop during an organizational change because people are unclear about what the future state will look like (Hackman, 1983). The future state is how the organization should be functioning after the implementation of ISO 14001. The ISO 14001 standard provides only vague guidance so that it can be implemented in any type of organization around the world. It allows for organizations to tailor the standard to meet their mission requirements.

It is not only important to provide training on ISO 14001, it is equally important to educate the people involved in the change on the implementation plan. It is important to communicate information to those involved in the change effort, including what the future state will look like, how the transition will come about, why the change is being implemented, and how individuals will be affected by the change (Hackman, 1983). This

information is not provided through broad-based ISO 14001 training. This training is specific to the implementation plan at each base.

Tailoring the ISO 14001 training to the impacts that it would have on the Air Force or at the installation and then conveying that understanding during training would help the implementation effort. This could be accomplished at each base by developing training specific to their operations. Robins and Eglin AFBs are already developing an ISO 14001 training video.

Gap Analysis. Based on the interviews of the EMS coordinators, the performance of a gap analysis is important in establishing goals and focusing the ISO 14001-implementation effort. The gap analysis identified the areas that the environmental management program did not meet the ISO 14001 standard. These areas of non-conformance were then established as goals to be accomplished in order to meet the standard. The Sheppard EMS coordinator stated that because of the lack of a gap analysis at the start of the pilot study, he did not fully grasp the requirements of the ISO 14001 standard.

At Eglin, the ICT members performed the gap analysis once they became knowledgeable about the ISO 14001 standard. The ICT used a generic ISO 14001-gap analysis checklist and modified it to Eglin's operations. Since they had their own gap analysis checklist, they were able to perform an analysis on a periodic basis to determine their level of implementation without having to fund a contracted effort. At Robins, a Georgia Tech University team performed the gap analysis, but it only covered six major organizations at Robins due to the time and lack of knowledge about Air Force operations. It was not until Robins performed their own audit, that they were able to

audit the entire base. At Sheppard, a HQ AETC team that was trained on ISO 14001 auditing performed the gap analysis.

The performance of a gap analysis is important in establishing goals for implementing ISO 14001. A gap analysis performed by in-house personnel who have knowledge of ISO 14001 is efficient and inexpensive. The gap analysis could be performed by a MAJCOM team or by a base team, just as long as it was a team knowledgeable about Air Force environmental management. Also, outside contractors may not have the knowledge of base operations to perform a useful gap analysis to the base, although there could be some contractor exceptions such as a contractor who assists in ECAMPs.

Leadership Focus. The lack of top management support is one of the most frequent causes of implementation failure of management systems (Daft, 1995). Top management support refers not only to the base level involving the senior leadership but also at the organizational level. Top management support may be lost when there is commander turnover. If top management support of the environment is required for an effective environmental management system, then it requires that the senior leadership remain focused on the environment in spite of frequent commander turnover.

Based on the interviews, commander changeover had a large impact on the implementation effort. Sheppard and Eglin stated that it takes time to train senior leadership on the bases environmental management program in order to garner support for implementation of ISO 14001. All bases initiated the implementation of an EMS before the pilot study began through the support of the senior leadership. However, after

commander turnover, each base experienced a change in environmental focus that affected implementation.

At Eglin, the affects of commander changeover were reduced because the implementation of ISO 14001 had been established as a base goal. The goal was slightly changed but that was by EM request. The goal was established in 1997 and still remains despite the changes in installation commanders.

If the establishment of an EMS is important to the senior leadership of a base, then making it a strategic goal of the base will convey its importance to upper management without having to continuously promote the EMS. This would help reduce the effects of commander turnover.

Use of UEC. The implementation of ISO 14001 requires the diffusion of environmental responsibilities out of the environmental management office and into the base organizations. To accomplish this requires the establishment of mechanisms to ensure that the horizontal communication between EM and the base organizations is maintained. Creating a special liaison role is an alternative for achieving horizontal communication. A liaison is located in one department but has the responsibility for communicating and achieving coordination with another department. Many Air Force installations have already established that environmental liaison role with the creation of UECs at the organizational level.

Based on the interviews, the part-time UECs stated that the added task of ISO 14001 implementation has increased their workload to the point where it has become a full-time duty. This has impacted their implementation effort because it interferes with their primary jobs; thus they are not able to devote the time necessary to implement ISO

14001. The full-time UECs have also indicated that there has been a workload increase, however, they are able to prioritize it with their other environmental duties.

Some of the UECs may be experiencing role overload as a result of implementing ISO 14001. Role overload occurs when a manager gives an employee more responsibility while the person's regular workload increases. Role overload can be avoided simply by recognizing the individual's capabilities and limits.

If an organization pursues the UECs as the mechanism to implement at the organizational level, they should allow for some level of UEC participation in the implementation planning process. Participation may lead to obtaining new information from those participating and this information that may enhance the effectiveness of the change (Hackman, 1983). For example, UECs that participate in the planning could relate to the planners that the part-time UECs cannot carry the additional workload or that they would need more time to implement ISO 14001. With the amount of time the UECs spend working environmental issues within their organizations, their participation may provide insights into developing an implementation plan that is feasible. Also, if they are allowed to participate, their views on the time required of them can be expressed before they are delegated additional work.

The UECs provide the horizontal communication link with the base organizations that will allow for the diffusion of environmental responsibilities away from EM and into the base organizations. However, the use of UEC in the implementation of ISO 14001 requires their input in the planning process in order to develop a implementation plan that is feasible.

Limitations of Research

There were several limitations to this research. The first limitation was the number of Air Force bases in the study. Only three installations participated in the DoD pilot study. Also, the bases only represented two MAJCOMs (AFMC and AETC). No operational bases were included and so the cases were not representative of the Air Force. Although this research did not involve statistical testing, more bases would have provided additional strength to the constructs.

The second limitation was the number of different variables that affect implementation efforts. For this research only a few variables were looked at as having a significant impact on the implementation effort. These variables were relevant to the pilot study but other variables could have been chosen.

The final limitation was time. For qualitative research efforts such as this, more time is necessary to investigate the implementation process. The field investigation provided only a snap shot of the efforts of the three bases. This research requires more field investigation to use all grounded theory techniques to develop theory.

Recommendations for Future Research.

Now that the constructs have been identified, the results of this research need to be applied to future research. The implementation of ISO 14001 needs to be investigated in light of the findings of this research to determine if it will improve Air Force environmental management. This can be accomplished by performing an ISO 14001 pilot study Air Force wide or for a specific MAJCOM. This would provide an opportunity to observe ISO 14001 performance with a larger sampling of bases. The Air

Force or MAJCOM should provide the organizational support in the categories identified in the research and the bases would apply the recommendations identified in the proposition section of this chapter.

Summary

In summary, Chapter V has presented the conclusion, propositions and recommendations of the research. The purpose of the research and problem statement has been restated. Conclusion and propositions were made from the results presented in Chapter IV, Results and Analysis. Finally, recommendations for future research were made to further study in this area.

Appendix A: Sheppard Interviews

Interview Questions for EMS Coordinator

Funds
1. Has the lack of funds from the Air Staff/MAJCOM constrained or limited the implementation in any way?
2. Are there any parts of ISO 14001 that you can complete without funding?
3. Are there any parts of ISO 14001 that you cannot do without funding?
4. How much funding from Air Staff do you think would be adequate to implement an EMS at this installation? How much have you spent on complying with ISO 14001?
5. How are you currently covering the cost of implementation?

Base Organizational Complexity
1. How many organizations do you interface with environmentally?
2. What has been the impact of the number of different organizations on the base?
3. Has the base organizational structure helped or hindered implementation?
4. How has the environmental flight position in the base structure impacted the implementation?
5. What has been impact of the EPC on implementation?

New Responsibilities
1. Have previous environmental responsibilities been passed on to other organizations?
2. Have there been any violations as a result of new responsibilities being delegated?

Gap Analysis
1. Was an adequate gap analysis performed before implementation?
2. What has been the impact of having/not having a gap analysis?
3. Did it have an effect on the establishment of goals and objectives for the implementation?

Resources/Manning
1. Has environmental flight manning limited or hindered implementation in any way?
2. What has been the impact of unit environmental coordinators on implementation?
3. Has the environmental management office manning level had an effect on implementation?

Management
1. What has been the involvement of Wing Leadership in the implementation process?
2. Has that involvement been continuous throughout implementation?
3. What has been the involvement of Group and Squadron commanders in the implementation process?
4. Has their involvement been continuous throughout the implementation?
5. Have you had the power to fully comply with ISO 14001?

Time
1. What has been the effect of having a time constraint on implementation?
2. Has the pilot study provided adequate time to fully implement an EMS?
3. Have you had the time to oversee and nurture all the changes required for the EMS?

Sheppard – EMS Coordinator

Funds

1. Funding did not limit implementation. DoD directives stated that there would be no funding provided for implementation. There was intent not to use extra funds for implementation of ISO 14001, only in-house funds on an as needed basis.
2. Any program can be implemented with sufficient funds. Sheppard looked at how to use funds the best manner and not have a contractor come in and do it.
3. The only part of ISO 14001 that requires funding is third party certification. Unfortunately, the implementation without funds takes considerably longer.
4. For a normal base, implementation requirements are a gap analysis ($40K), policy development ($10K), document writing ($30K), training ($10K), process reviews ($100K) for a total of around $200K per base. This includes in house man-hours. This does not include actual implementation of pollution reduction activities, which a minimum would cost $50K annually.
5. Majority of cost is from in-house man-hours. There was one cost of a Gap Analysis where part went to a contractor for about $5K and this was paid for out of HQ AETC funds.

Complexity

1. The organizational complexity did not hinder implementation. Sheppard focused on all organizations.
2. Each organization had the same review procedures to meet so the complexity pretty much went away above the squadron level.
3. After, implementing Unit Environmental Coordinators (UECs), the organizational structure did not have an effect on communication. There were some problems with the Chain of Command, but that was attributed more to changes in commanders and new personalities, rather than actual organization structure.
4. We could have had an easier time if located just below the wing, but again it was based on changes in commanders not actual commitment or attempts to hinder implementation
5. Absolutely essential as well as the Quality Council, same membership, different objectives

New Responsibilities

1. Many environmental responsibilities have been passed down to the base organizations. However, there needs to be an understanding that the responsibilities were always intended to be outside the environmental function. The fast pace of environmental issues prevented a decentralized environmental management. Now that the pace is slower, environmental management can be decentralized.
2. There have been no compliance violations since responsibilities have been passed down. Even if there were, the personnel in the field with matched authority and

responsibility can adapt far faster than the environmental flight when non-compliance is identified.

Gap Analysis

1. Sheppard did not accomplish a gap analysis until well into the implementation process (September 1999).
2. Because of the delayed gap analysis, CEV did not clearly grasp the magnitude of the documentation of environmental impacts for each process.
3. However, the gap analysis did not really affect the establishment of goals and objectives of implementation.

Resources/Manning

1. The CEV flight manning hindered implementation. At the start of the study, they had a staff of 21, midway through the test; 16, and current manning is at 13 including restoration.
2. The UEC have had a large impact on implementation. Having an environmentally knowledgeable person in an organization makes it far easier to incorporate environmental risk reduction into mission processes. The stability for the squadron environmental direction has increased since Sheppard began using UECs. In some organizations, the UECs are full-time while in others they are part-time.
3. The CEV flight manning hindered implementation. At the start of the study, they had a staff of 21, midway through the test; 16, and current manning is at 13 including restoration.

Management

1. Upper management has been fully supportive of the implementation from wing to flight level. The support has been given by providing resources when needed.
2. The emphasis on the environment and pilot study has not continuous in the total sense of the word. Personality changes and style of management when new leadership comes in takes requires time to learn about the environmental process. Once the commanders understand the process, they are very supportive. However, upper management does not perceive there will be implementation guidance after the pilot study; therefore, a lack luster effort has been put into meeting the tenants of ISO 14001.
3. The true support comes from the shops at the working levels.
4. Once they learned that pollution reduction meant an easier job, CEV in some cases received fanatic support.
5. CEV does not have the power to implement ISO 14001 changes, the organizations that own the processed do. But, CEV did have the power to lead the implementation but have not succeeded in fully implementing the EMS.

Time

1. The time constraint had an impact on implementation.

2. Implementation will take a considerable more amount of time without an overall Air Force directive, and of course an overall Air Force directive will prevent implementation. It would take approximately five years to fully implement and realize significant results.
3. CEV has not had time to oversee and nurture all the changes because too many other priorities come up that need management attention.

Interview Questions for Unit Environmental Coordinators at Sheppard AFB

1. Where you trained on ISO 14001?
2. How much contact do you have with the environmental flight (CEV)? Do you attend regular meetings with them? How would you describe your relationship with them?
3. Were you integral to the implementation planning process?
4. How has the implementation impacted your operations? Has it increased the burden on your personnel?
5. Have your training needs required by ISO 14001 been identified and documented? Has training taken place?
6. Have you seen any benefits from implementation in your organization? If so, are these benefits directly attributed to ISO 14001 implementation?
7. Have you noticed a difference in CEV activities and procedures? Have you seen a change in the environmental program?
8. How well was the EMS implementation indoctrinated at the base? Was this process up to the environmental flight or did each organization handle the awareness aspect themselves?

Sheppard – UECs

Organization: 366 TRS (CE Training)

1. Heard of the ISO 14001 but not familiar with it. It is in the ECAMP Program? EUC receive training at AFIT
2. Has contact with the environmental flight about 4 times a month. Calls CEV for environmental guidance
3. Has not played apart in the EMS implementation
4. Has not implemented in the organization
5. Training needs have not been identified
6. Has not implemented in the organization
7. Relearning on their part of the change over to the new environmental programs
8. There has not been a base wide implementation

Organization: Bio Environmental

1. Knows about ISO 14001 (sent members to training at Brooks)
2. Attends every EPC subcommittee and working group committee (2hrs a day)

3. Attended off-site formulation to get upper level support.
4. Has not seen much of a change. Has not changed any drivers.
5. Has not changed training process. Addressed somewhat but is a typical Air Force
6. Have not seen any benefits yet from EMS.
7. Have not noticed a difference in activities. No change in program.
8. Not much talk about EMS. Not much done by CEV. Nothing worth passing on to key workers.

Organization: 882nd Training Group (Medical)

1. Aware of EMS that was started in 1995. Not the same as the pilot study
2. Works closely with CEV. He is on all working groups and subcommittees. Works closely with CEV due to some the hazardous materials involved in their training.
3. Did not play a part in the EMS implementation process
4. Increased impact to operations due to pollution prevention initiatives. Increased workload UECs because they are part timers. The UECs are training instructors. Feels the group should have a full time EUC
5. Training needs have been identified. Orientation includes environmental process as part of their program already.
6. No new benefits that had not already been identified
7. Better communication and conversation with CEV
8. UEC meeting have made processes aware through email

Organization: Civil Engineer Readiness Flight

1. Does not know about the standard although they are a part of the CE squadron
2. They have regular contact with CEV.
3. Did not have a role in implementation
4. Have not seen an impact in their operation
5. Training needs are identified as part of their SOP. Provides HAZMAT training to all disaster preparedness members. Newcomers are made aware that they need training
6. Have not seen any benefits
7. Has noticed a difference in CEV. Subcommittees meetings, better communication and more involved. Much better EMAS. EMAS provided funds for the Readiness flight to by computers
8. More people are made aware of environmental issues.

Organization: 82 SFS/SFTC (CADAM)

1. New UEC since May/June but has not had training since as of September. Continuity folder has information needed. Very busty with little time to devote to UEC duties
2. Interface with MAJCOM on new environmental programs (Security Forces Chief at the MAJCOM). Interfaces with CEV mainly due to bullet trap purchased 2 or 3 years ago but it has not been installed.
3. Was not around at the start of the pilot study.

4. Cannot see how the EMS has impacted squadron
5. UEC training has not been met. All cops receive HAZMAT Training.
6. No continuity book. Is developing a continuity book.
7. Cannot see a change in CEV activities
8. New UEC; therefore, he can't tell what is different

Organization: Public Affairs

1. Does not know about ISO 14001
2. Works closely with CEV. Works closely with Restoration. Makes information readily available to the community. No RABS due to commander but they have a technical review committee with a community representative
3. Did not play a part in the implementation process
4. Community relations for ERP plan published 1 Aug 99. Public affairs is being more proactive
5. Received some training from ENV. However, she is being more proactive about pursuing environmental training.
6. Has not seen any benefits
7. Has not noticed a difference in environmental activities
8. Cannot answer the question

Organization: Fire Department

1. Does not know of ISO 14001
2. Very involved in all subcommittees of EPC, mainly due to the financial resources available.
3. Was a part of the process initially.
4. Some of the tasks are better done by the Fire Department.
5. The training needs are being met.
6. The EMS has identified that the fire department is not documenting all processes. This is a continuous process improvement built into the process. There is great communication between organizations.
7. There is no difference in CEV operations.
8. EMS implementation was not indoctrinated on the base.

Appendix B: Robins Interviews

Interview Questions for EMS Coordinator

Funds
1. Has the lack of funds from the Air Staff/MAJCOM constrained or limited the implementation in any way?
2. Are there any parts of ISO 14001 that you can complete without funding?
3. Are there any parts of ISO 14001 that you cannot do without funding?
4. How much funding from Air Staff do you think would be adequate to implement an EMS at this installation? How much have you spent on complying with ISO 14001?
5. How are you currently covering the cost of implementation?

Base Organizational Complexity
1. How many organizations do you interface with environmentally?
2. What has been the impact of the number of different organizations on the base?
3. Has the base organizational structure helped or hindered implementation?
4. How has the environmental flight position in the base structure impacted the implementation?
5. What has been impact of the EPC on implementation?

New Responsibilities
1. Have previous environmental responsibilities been passed on to other organizations?
2. Have there been any violations as a result of new responsibilities being delegated?

Gap Analysis
1. Was an adequate gap analysis performed before implementation?
2. What has been the impact of having/not having a gap analysis?
3. Did it have an effect on the establishment of goals and objectives for the implementation?

Resources/Manning
1. Has environmental flight manning limited or hindered implementation in any way?
2. What has been the impact of unit environmental coordinators on implementation?
3. Has the environmental management office manning level had an effect on implementation?

Management
1. What has been the involvement of Wing Leadership in the implementation process?
2. Has that involvement been continuous throughout implementation?
3. What has been the involvement of Group and Squadron commanders in the implementation process?
4. Has their involvement been continuous throughout the implementation?
5. Have you had the power to fully comply with ISO 14001?

Time
1. What has been the effect of having a time constraint on implementation?
2. Has the pilot study provided adequate time to fully implement an EMS?
3. Have you had the time to oversee and nurture all the changes required for the EMS?

Robins – EMS Coordinator

Funds

1. The lack of funding initially hampered the implementation process. The MAJCOM gave the impression of not being interested in ISO 14001 because they did not tell Robins about the pilot study after EM indicated that they were interested in trying ISO 14001.
2. ISO 14001 can be completed without funding if the structure is in place.
3. Over a year into the pilot study, Robins received $275,000 for two projects that would help with the implementation. The money was for audits and contractor support but the bulk of it ($140,000) was for an electronic files management system. They could not perform training without funding because they used contractor facilitators because the in-house personnel lacked the expertise.
4. They received $275,000 for funding.
5. Costs were covered using in-house and MAJCOM funding.

Complexity

1. Robins has 41 different organizations including tenant units that are all participating in the implementation.
2. This increases the complexity of communication because EM not only has to disseminate policy but also oversee the changes.
3. However, the complexity of the base organizational structure has not hindered implementation. The EPC and the utilization of UEC in the environmental program have helped in complexity not being a factor in the implementation. The EPC meets quarterly to discuss environmental issues and the UECs are active in the environmental program. The IPTs also meet regularly, which provides a forum for EM to disseminate policy to the base organizations.
4. Since EM is a directorate, the director has a direct line of communication with the Center Commander. This gives EM the ability to enforce policies through the Center leadership.
5. The EPC has directed base-wide participation in the implementation and data gathering efforts required as a result of Robin's participation in the pilot study. Although, some organizations have expressed doubt as to what would be gained by participation in the pilot study, no organizations asked to be excused from participation nor have nay refused to cooperate in any of the various tasks required to implement. Other than directing participation in the pilot study, the EPC has only provided an official forum to discuss environmental issues. It has not had a large impact on implementation. The EPC members support the environmental program but they may or may not attend meetings, for which they send a representative.

New Responsibilities

1. Previous environmental responsibilities have been passed on to other organizations. Now more of the implementation tasking has been passed on to the organizations.

Organizations are now examining the cost of environmental management in terms of personnel required, material and disposal costs, and liability issues with regulations. Within the major base organizations, environmental compliance related activities and cost have been identified as a necessary part of the organization's cost model.
2. The responsibilities for violations have always been delegated or fallen on the organization.

Gap Analysis
1. Yes, Georgia Tech University performed the gap analysis at no costs.
2. The gap analysis performed provided a good starting point for Robins. It established the groundwork for what should be accomplished first.
3. For each gap, a get well plan and timeline was established. This get-well plan was briefed to the EPC. Without the gap analysis, this initial start could not have been as smooth.

Resources/Manning
1. The environmental directorate manning has not had an impact on implementation because only one person was tasked as the EMS manager. The use of the contractor has provided the most impact.
2. The UEC have the largest impact because they are the ones that are implementing the EMS.
3. Manning level has not had an effect on implementation.

Management
1. The Center Commander has not had much involvement. He wanted to make sure that no extra effort was required of his directors. He felt that ISO 14001 would make the WR-ALC more business competitive but he wanted all the benefits without the cost. EM was directed to carry the bulk of the implementation effort within their directorate. The Center Commander wanted the implementation to be invisible to the commanders of the other organizations. He didn't want them complaining that the implementation was taking time away from their primary mission; therefore, EM sought to tweak the system without changing the program. The organizational commanders were made aware of the program but most of the effort was directed through the UECs. The new commander has not been briefed on the progress of the ISO 14001 pilot study.
2. The involvement of the Center Commander has not been continuous.
3. The Group and Squadron Commanders have not provided any involvement except in support of the concept of an EMS.
4. Their involvement also has not been continuous. Basically, the Vice-Commander says, "this is good program" and the EPC says, "yes, sir". There has been no real championing of the system or implementation.
5. Initially EM was not getting the response to implementation that they had hoped for to fully comply with ISO 14001. After obtaining an official audit with nonconformance findings in May 1999, which were briefed at the EPC, the bases organizations began to focus more effort on implementation. The UECs were initially

not getting much support in implementation within their organizations but after the audit more support was given. The audit was given power because commanders do not want the embarrassment of having uncorrected negative findings briefed at the EPC. The commanders did not actually try and force people to do the implementation prior to the audit. An example is that the supervisors, not the UEC, were supposed to do EMS continuity books for their organizations. The Vice-Commander signed this off, however, there was no real action and 90% of the UEC did the work. The supervisors now see the importance. EM trained over 400 supervisors on base environmental issues and ISO 14001.

Time

1. The two-year time period of the pilot study provided an impetus to get the implementation process underway quickly. The initial start was slow because there was no firm game plan on how to implement an EMS nor was there any plan provided from MAJCOM or the Air Staff. A lot of the initial time was spent trying to figure out what needs to be done. A base-wide gap analysis and funding at the start of the study would have provided a better start. EM did not feel rushed but they wanted to be fully implemented within two years. MAJCOM took the two-year time period seriously. EM put in for more funding in FY2000 to aid in the implementation but it was denied by MAJCOM because the pilot study was ending in Dec 99.
2. Two years is not long enough to fully implement at Robins.
3. The things that have been done, EM has not personally had the time to nurture. EM has used an environmental contractor to help support the UEC in accomplishing implementation within their organizations, since EM does not have the time for this effort. A files management system would help. Files maintenance has been haphazard in the past. EM has recently obtained approved files maintenance plans and has begun implementing organization-wide file maintenance procedures in accordance with accepted Air Force regulation. In addition to abiding by the new procedures, EM has been utilizing more electronic means to ensure maintenance and dissemination of environmental policies and procedures.

Interview Questions for Unit Environmental Coordinators (UECs)

UEC Responsibilities
1. What is your responsibility as UEC of your organization?
2. Is it your full time job? How much time per week do you spend doing UEC duties?
3. How do you feel about your UEC responsibilities?

Organizational and Environmental Leadership
4. How much contact do you have with your commander concerning environmental issues?
5. Does your organization have any goals for the environmental program? Do you know what they are?
6. How much support do you get from your commander on the importance of your responsibility as UEC? From the environmental directorate?

ISO 14001
7. Were you educated/made familiar with ISO 14001 for Environmental Management Systems?
8. Are you aware of the reason for changing to such a system?
9. Have you been made aware of any weakness in the previous way that environmental management was conducted that prompted the implementation of the EMS?

Participation
10. Did you play an integral part in the implementation process?
11. How much contact do you have with the Environmental Flight? Do you attend regular meetings with them? Do you get documentation and guidance from them? How would you describe you relationship with them?

Increased Responsibility
12. How has implementation impacted your operations? Has implementation increased the cost of operations in your organization? Has it increased the burden on your personnel?
13. Has more environmental responsibility been directed to you as a result of implementation or in the past two years? What has been the affect of the increased responsibility?
14. Were your organization's key workers at the lowest levels made aware of the EMS? Was this process up to the Environmental Flight or did each organization have the responsibility to handle the awareness aspect?

Benefits
15. Have you seen any benefits/improvements in your operations in the past two years? If so, can they be attributed to the implementation of the EMS or were the processes already in place to provide the benefit?

Robins - UECs

Organization: 93 ACW/LGSS

1. The UEC is also the environmental engineer therefore his responsibilities as UEC are enhanced.
2. Although he is the environmental engineer, he is also the civil engineer; therefore, UEC is not his full time job. Since there are four people working in the office, the total amount of time spent on UEC duties is approximately 40hrs per week.

3. The UECs see the job as their duty as a full time engineering flight.
4. The contact with the commander is whenever there is a concern that requires his attention. Other than that, once a quarter at the ELC, the commander is informed of environmental concerns. The commander is open to all concerns and gives the UEC 100% support.
5. The goals of the environmental program are spelled out in the OI. They are called quality process measurements and are representative of all the aspects of the organization.
6. He gets support from the commander and EM.
7. The UEC received training on ISO 14001. The training was a two-day course. The UEC did not feel it was necessary for him to attend the second day because of his experience. He felt that the training was not conducted well, because the contractor who taught did not tailor the training to the Air Force or any DoD organization. The contractor did not put enough effort into the training.
8. The reason for going to ISO 14001 is to fix the overall management that the Air Force was missing. It also makes the depots more competitive with contractors when bidding for work.
9. Played an integral part of the implementation for the 93rd ACW.
10. The UEC attends the EPC meeting on the base for the wing commander, attends IPT meetings, and participates on the ECAMP teams.
11. Implementation has improved the organization because it has eliminated the confusion and now the personnel know what to do as far as the environmental aspects are concerned. It has not increased the cost but has decreased it if anything. It has not put a burden on the personnel.
12. The 93rd ACW has its own environmental shop and the UEC is the flight chief. He handles all the environmental responsibilities for the 93rd ACW.
13. The key workers at the lowest levels were made aware of the EMS through actual work procedures.
14. The UEC feels it is not necessary for the workers to know ISO 14001 but they must now what their environmental responsibilities are, which is what ISO 14001 has brought to the organization. The Environmental Management Self-Assessment Test (EMSAT) is an excellent tool to inform the commander of the environmental aspects of the organization. It is a tool used by ACC. It shows the commander what he does not know about his program; therefore, creating an education and communication process of informing the commander. It would be a good tool to use for the WR-ALC.
15. The benefits of ISO 14001 are that there are no conflicting policies. It ensures that everyone is reading from the same page. In order for it to work for the Air Force, it must have specific actions.

Organizations: Industrial Products Division (TINPV)

1. This responsibility of the UEC is to provide training when required and support to production on being compliant. Provide support to entire division (supervisor,

section, branch) and technical areas. They receive daily inputs from production shops.
2. It is not the full time job but it has become a full time responsibility. It is time consuming and has become a burden.
3. It should become a full time job and also should have more UEC because it is a 24-hour operation.
4. There is not many interfacing with the commander or director, but the deputy director is most accessible. The UEC uses the chain of command when it comes to presenting environmental issues.
5. The goals of the organization are those of EM.
6. The UEC has the full support of the commander because the UEC is the environmental watchdogs.
7. UEC has received training on ISO 14001.
8. The reason for changing to ISO 14001 is for certification and continuous process improvement.
9. The weaknesses in the previous way of doing EM were in documentation.
10. UEC did not play a role in implementation on the base level, only in the their organization. The most important part was in the filing system.
11. They have daily contact with EM. They attend IPT meetings. They have a good working relationship and the EM personnel are accessible and willing to answer any questions.
12. Implementation has increased the responsibility of the UEC.
13. The responsibilities have not been passed down yet but it should be passed on to supervisors. It has increased the burden on the UEC because it is just more work on top of the UEC duties.
14. The key workers at the lowest levels have not been made aware yet, because implementation is still at the middle management level.
15. There has been a noticeable change in TI. The previous UEC was an industrial engineer. She brought TI into compliance because of her knowledge and work ethic. The change was not necessarily because of ISO 14001. TI also made a change three years ago by creating an their own environmental office. Environmental issues became more important; therefore, it was given more time to work the issues.

Organizations: LFP/LFM

1. The UEC responsibility is to take EM guidelines and implement them. Ensure organization is following regulatory guidelines. UEC training is not enough to provide adequate job knowledge. It only provides half the picture; therefore, they cannot do the job on their own without always calling EM.
2. It is a full time job for both UEC because all of the processes and aspects provide a need.
3. The job is not a burden because it is their job.
4. The contact with the commander varies when there is a need. They are not a part of the staff meetings but there is a need. They attend regular IPT meetings within their organization, which is separate from the base.

5. They do have goals set for their organizations, which is zero findings and zero notices of violation.
6. They get pretty good support from the commander. They feel like the commander has a lot on his plate. Middle management in the organization provides very little support. An example was when they were directed by EM to identify the environmental aspects. The supervisors were told that they not the UEC were to identify. Instead, it was passed on to the UEC anyway, because middle management did not enforce it. The UECs have no authority or EM because the work areas are union. Only time there is any real environmental awareness is when the General and EM go out and perform no notice inspections.
7. They received training on ISO 14001. It was good training that was conducted for the second time. The training was only auditors training they received. Without training you do not know what to ask or do.
8. The reason for going to ISO 14001 is because EM directed it.
9. The ECAMP/EMS audit last year looked at areas to improve because of ISO deficiency. But the audit occurred before adequate direction was given to the organization. Initially the UEC were mandated but did not have adequate training or direction; therefore, when the audit occurred they did not know that they were doing things incorrectly.
10. They did not play a role in the implementation strategy. They were initially directed to implement but without direction or training. The only training given was auditors training. Then they had the ECAMP/EMS audit that pointed out all the deficiencies. Then they had auditor training again but this time they had better trainers so they learned more.
11. They have daily contact with EM or more. They have a good relationship with EM but it depends on the person (personality).
12. Implementation has not impacted the organization much yet. There will be changes as operating instructions (OI's) are completed and site specific plans. Implementation has increased the burden on the UEC. They feel there is a need for administrative assistance at least in the initial start up because ISO requires document maintenance and control and a good file management system. It is also production division specific because they all have different environmental aspects.
13. The environmental responsibilities have remained the same except for implementation.
14. Key workers at the lowest levels were made aware but 1st line supervisors do not care. Workers have awareness but it does not make them care. No motivation to comply. No rewards to motivate workers. Change is difficult because of the Union.
15. The benefits have not been apparent because it is too early to tell. The OI will produce benefits but it would have occurred anyway. The UEC were familiarized with the processes of the organization by completing the SMART books on environmental, which was directed as part of the implementation. The production force sees the UEC as unnecessary overhead. The UECs want the personnel to care. They like ISO 14001 and its intent but it requires a lot of work to implement. They think that it is too complex and it goes too far for the Air Force.

Organizations: 5CBCSS (Combat Communications)

1. The main job is to track, order and control all hazards in and out. Ensure all personnel receive the proper training. Perform inspections on work centers (ask question). He informs people of his job at inprocessing into the squadron. Runs chemical storage site and ensures logs on refrigerants is maintained and that the reconditioners are certified.
2. UEC is a full time job in his organization.
3. He likes his responsibilities and feels they are fair.
4. He is quit a bit of contact with the commanders. He meets every other week with commander but they do have weekly staff meetings. He gets lots of support for the program from the commander.
5. There are goals set for the program.
6. He gets all the support he needs from EM.
7. He received ISO 14000 training. He likes to attend any training that is environmental related. He felt the course was good and about time.
8. The reason for going to ISO 14001 is because it is the right thing to do. Private organizations are going to it and that is why the Air Force is looking at it. The things that ISO should provide would help EM.
9. He was not made aware of any problems or weaknesses in the system that prompted the move to ISO 14000.
10. He did not play a part in the base implementation but definitely in his organization.
11. He has regular meetings with EM and has a good working relationship with them.
12. The implementation has not impacted the organization in cost or burden on personnel.
13. More environmental responsibility has been passed on to the UEC. He feels like the added responsibility makes him feel more like a team player. Especially during ECAMPS and when the base receives environmental awards, he feels like he was a part of the team.
14. The key workers at the lowest levels were made aware because he put out an email about ISO 14001 and on all environmental issues. Upper mgmt became more aware because of the internal ECAMP/EMS audit. Awareness in the organization is enhanced because he is down with the workers so he is able to interface with them and he is more accessible to them when they have questions.
15. The benefit he has seen is that they had to outline their environmental responsibilities. They finally had a full time UEC dedicated to the organization. Management made a commitment to the environment as indicated by the establishment of a full time UEC. He has a technician and is given full control and support to spend funds required for environmental operations. He spends approximately $4000/yr.

Organizations: 116 BW/EMO

1. The responsibilities as UEC are encompassed by his job as environmental engineer. He is the UEC for the entire 116th Bomb Wing. Does all the environmental work

from air to NEPDES. Responsible for training. He works for the guard bureau and obtains funding from them.
2. This is his full time job.
3. UEC is not a burden.
4. He attends base EPC meetings and back briefs his commander on the meeting. He attends weekly staff meeting and brings up any environmental issues at that time. He feels the commander has an interest in environmental issues.
5. They have the same goals as the base EM.
6. He has 100% support from EM.
7. He received training. He did not attend the general awareness training (ENV 101). He initially felt like the auditor training was a waste of time. He feels like the Guard did not want to burden the troops with ISO 14000; therefore, he has not really tried to implement the EMS. He feels like it would have a positive effect if you get the support. Monetary support is required or extra personnel to help with implementation.
8. They changed because they volunteered for the program.
9. He was not made aware of any weaknesses in the way EM was being done.
10. He didn't play a part in the implementation and has not done so in his organization.
11. He has regular contact with EM and has a good working relationship.
12. Implementation has not impacted the organization because he has not fully implemented.
13. He is the environmental engineer for the guard unit and does not rely on EM.
14. Key workers at the lowest levels will be made aware once he writes the EMS. Plans on creating a website for EM in order to make aware the environmental issues. Not all at the lowest levels will be made aware.
15. He has not seen any benefits because they are not fully implemented (nothing he can attribute to the EMS). He does not feel 2 years is long enough. Does not have faith that ISO will happen so they have not burdened their personnel or the managers. It has been indicated to him that the Guard Bureau will not fund implementation on a Guard Base. There will be no funds or additional personnel. There do not want day-to-day operations to be effected. The 116th would continue implementing ISO 14001 if it was working but they would not certify the EMS.

Organizations: 78 CEB

1. UEC responsibilities are to be in charge of all the pillars of EM. Conduct annual training of 500 people in the group.
2. Since they have their own flight then it is a full time job.
3. The UEC wanted to job in environmental; therefore it is not a burden.
4. They do not have regular meetings or contact with the group commander. They have contact with the squadron commanders only when issues that effect him come up.
5. They are setting annual goals as a result of the EMS.
6. They get a lot of support because it keeps the commander out of trouble. They get 50/50 support from EM (it depends on the person). Overall they get good support but some do not do their job.

7. For training, a contractor came and spent an afternoon (one-on-one) with the UEC. They have had a hard time implementing because they are too busy trying to stay in compliance. The training received was too fuzzy. Wanted training that was more specific than the fluff training that was received. They were told to develop a smart book by EM as part of the implementation about a year ago and then it was never mentioned. Now they were told to identify aspects. ISO 14001 training was totally inadequate. Implementation should be done in a step-by-step basis for all units indicting goals and a timeline. Audit reports says that the only write-up was the date on the document control but the contractor, who came a second time said they had not started. The first inspection for them was worthless.
8. The reason for changing to the systems is that it provides for document control. Other than that it was mandated and they gave a concept.
9. They were not made a ware of any previous weaknesses in the previous way that environmental management was conducted.
10. They did not play an integral part in the implementation process.
11. They have daily contact with EM and attend quarterly hazardous waste meetings.
12. Implementation has not really impacted operations because not much has been done.
13. It has increased the workload by 25% because of the document procedures and the program for identifying environmental aspects. This has increased the time at the office.
14. They have made the lowest levels aware of the EMS.
15. No benefits have been seen. They did not see any problems before the EMS. Maybe if they had full implementation then maybe they would see benefits. The benefits can be seen in the continuity that the documentation provides. There is a lot of up front work but if it is done right then it should work.

Organizations: LCS (C-5 Maintenance Directorate)

1. The UEC responsibilities are to comply with AF hazardous waste and material regulations, published guidelines, and implement, enforce, and manage those aspects.
2. UEC is a full time job but also does safety work. He is actually an environmental specialist.
3. He feels like someone must do the UEC duties in the organization. He may not agree with some of the directives from MAJCOM.
4. Has daily contact with the commander. He works directly for him and receives day-to-day direction.
5. The goals of the organization are those that are set forth by MAJCOM and ALC.
6. He gets total support from the commander. He gets good support because of the way the program is presented. It is a proactive program in their organization.
7. He received training, both contracted training and the EM training. He did not learn much because the initial training was very nebulous. There was no meat to the program. ISO does not match AF regulations as written.
8. The reason for changing to the system is because industry does not have a prescribed method like AF and DoD.

9. He is not aware of any significant weaknesses that prompted the move to ISO 14001. It is only attractive because it makes us more competitive.
10. He did not play a part in the base implementation. He was told to implement. He is not devoting more time than what is needed. He only has time for the basic program.
11. There is daily contact with EM at the worker level. Management attends weekly and monthly meetings. EUC talk with EM daily and meets with them weekly. He has a good relationship.
12. Implementation has impacted operations by detracting from man-hours, which would have been spent doing work. The cost has been in the development of the smart book for supervisors, recordkeeping, and administrative details.
13. There has been no more responsibility directed because they already had a full fledge program. There has been no reduction in requirements. The only change is the added responsibility of EMS, which has produced overtime for workers.
14. The workers at the lowest levels were made aware. The directorate levies it on the organization and the organization provides training.
15. There have been no improvements in the operations. Any improvements had nothing to do with ISO 14001.

Organizations: 19 ARG

1. The responsibilities of the UEC are to make sure the organizations stay in compliance with all regulations. He is the liaison between the unit and EM. Initially the duties were IAP and recycling, but now it has been expanded to air issues and then ISO 14001.
2. This is not the primary job. He spends approximately 10hrs a week but could spend more time but there is not enough time in the day.
3. He has been a UEC for 3 years but the job is getting old and burdensome because of the increase in workload.
4. He has contact with the commander about once a month and more around ECAMP.
5. He is working on developing goals in the group O-Plan.
6. He gets full support from the commander and EM.
7. He had classes on ISO 14001. The training was boring. He does not understand the reason for a DoD effort to implement ISO 14001 because of the lack of profit. Therefore, it is difficult to get enthusiastic because it doesn't make sense.
8. The reason for moving to such a system is just to improve the management of the environmental issues.
9. He was not made aware of any weaknesses that was a cause for the change.
10. He did not play a role in the implementation.
11. He has weekly contact with EM and has a good working relationship.
12. Implementation has put more of a workload on the UEC and also on ECAMP. The UEC would rather get written up for compliance rather than ISO 14001.
13. More environmental responsibility has been directed to the UEC.
14. Key workers at the lowest levels were made aware of the EMS. It was up to the organization to put awareness in the organization.

15. The only benefit seen is in documentation, which in general is better and file plans that can be attributed to ISO 14001.

Organizations: TIPE

1. The responsibility of the UEC is to act as the focal point between EM and actual workers. Responsibility is to support back shops, electrical shops, and power distribution. It is very much like CE has PMEL contractor, ground support contract, sheet metal, carpentry shops, and it has a staff of 20 engineers and manages all their own MILCON.
2. It is not a full time position but it could be. He does not have enough time to do everything he wants to do but spends about 15-20% of his time a week and he delegates the rest of the duties.
3. The responsibilities are not a burden because it identifies what you are doing or what you should be doing or could be done better.
4. He has almost no contact with the director. If there is an issue then he has access to the director.
5. He has not developed any goals but he primarily does not want any environmental write-ups.
6. He gets a lot of support from the Center commander. He does not have much from the first line supervisors because they have a lot more responsibility, people problems, and parts. Management is where the breakdown in support occurs. He has good EM support. EM and Bio look at ways not to shut down mission.
7. They had a course in ISO 14001, which was okay.
8. He is not aware of the reason for changing to ISO 14001.
9. No weaknesses were made aware to the UEC
10. He did not play a role in the base implementation but will play one in the organization once he is up to speed.
11. He has contact with EM about 2 or 3 times a week. He attends regular IPT meetings and has a very good relationship with EM.
12. There has been negligible impact on the organization since implementation. This is due to a lack of implementation.
13. Once implementation has started then it will impact UEC but does not anticipate that it will increase cost or put a burden on the workers.
14. He wants management to be more aware of environmental requirements. If they are then it should bring about the changes.
15. The problem on the ALC side is that part time UEC is a problem. The Air Force way of changing is a reduction in funding and manning. ALC level is a lack of manpower. An ALC commander who doesn't have it as a responsibility then it is not going to be done. The attitude is more important than your actions.

Organizations: 78 SPTG/SV

1. The responsibilities are to answer all environmental concerns of the organization.
2. It is not a full time job but spends approximately 50% of the time during UEC duties.

3. Sometimes the UEC responsibilities are overpowering and sometimes they are not. She is working with personnel that may not understand because they are functionally illiterate. They are resistant to change because they cannot read or write(3 housekeepers).
4. She can get face time with commander whenever needed.
5. The organization has goals for the environment.
6. The new commander is supportive. The EM support may not be immediate but she has no problem being aggressive about what she wants. The commander before did not want to be aggravated by the program.
7. She received training on ISO 14001. Since she is used to administrative form of management, there was no problem with the training even though it was only auditor training.
8. The reason for changing to the EMS is to organize the paperwork and thoughts. She created a smart book for all four functional areas and provides training for the people.
9. EM was new to Robins. The impression was that EM was not going to tell you everything because that would make them obsolete (imperialism). ISO 14001 reduces imperialism because it requires the organization to know all its aspects. The organization has access to all environmental information on the installation.
10. She plays an integral part in the organization but none on the base.
11. Whenever she needs information she can call EM. It depends on what is going on as to how much contact she has with EM. She attends regular meetings and for the most part the relationship with EM is pretty good.
12. Implementation has not impacted the organization. It has impacted administrative work and cost and administrative materials.
13. She wants her workers to be more responsible.
14. The smart book developed has helped the first line supervisors in their jobs.
15. The benefits she has seen is that people are more aware. They tend to ask more questions and are more aware. ISO 14001 makes you keep sending the personnel things.

Organizations: LGTV (Baker Support) Vehicle maintenance contract

1. The UEC responsibility is to keep the organization in compliance.
2. Since she is the environmental technician, she spends a lot of her time doing UEC duties. She spends approximately 30 hours a week.
3. She has no problem with her duties because it is her job. The biggest problem she has is that being a contractor operation, they don't always get the word. She finally has email, which is EMS main mode of communication to the UECs. Also, contractors do not get the respect that civilians get. She does not wear her contractor uniform during ECAMP inspections.
4. She has close contact with her immediate supervisor on environmental issues.
5. The organization has goals outside from the EM directorate. They are the only contractors to voluntarily take on the pharmacy system at the base.

6. She gets full support from her commander because it is her job. EM gives full support. She is an inspector for the ECAMP team and was the only contractor on the team.
7. She received ISO training. The first training confused personnel more because of the presentation. The second training was good. Initially they did not state or say where they were going with the implementation. The audit helped and she rewrote the smart book. The second training helped clarify ISO 14001 and what they were doing.
8. The reason for changing to the EMS is to have better control over compliance.
9. The weaknesses in the previous system where in the records, file system, and being consistent. This is mainly due to experience on the ECAMP team.
10. She played an integral part in her organization implementation. They have four locations that she is in charge of and is implementing.
11. She has quit a bit of contact with EM. She attends regular IPT meetings. She has a good working relationship with EM.
12. The impact has been increased man-hours of the UEC. There has been no effect on cost. She spends more time ensuring that training is being met.
13. No more responsibility has been directed because the UEC already had the responsibilities.
14. The workers at the lowest levels have been made aware through monthly and annual training. UEC works on the floor, which enables more interactions with the workers.
15. The benefits of ISO are making supervisors more aware of their environmental responsibilities. Hopefully with the pharmacy it will add benefits but it is outside of ISO. ISO may have helped push getting the pharmacy because they have been trying to obtain the pharmacy for years. ISO may have provided the impetus to let them have their own pharmacy. Operations were running smoothly before; therefore, they have not seen a change or improvement.

Organizations: QLT (Specialized Management – very secret assets)

1. The responsibilities as UEC are all environmental issues. Design stage of projects she does review.
2. UEC is not the full time job but she spends about 60% of her time doing it.
3. She likes her responsibilities and has no problems with it.
4. She has regular contact with commander on a monthly basis. She must report tactical plans on recycling and hazardous materials.
5. They have goals set in the organization.
6. The commander gives her full support. EM provides support.
7. She received training and it was adequate. A lot of the training was done with CD-ROM, which she liked. A field trip would have helped.
8. She is not aware of a reason for changing to an EMS.
9. She was not made aware of any problems but she assumes that it is going to fix them. The EMS does increase paperwork.
10. She didn't play a role in the base implementation.
11. She will participate on the ECAMP and IPT. She is not able to attend all the meetings that come with her UEC job because of other responsibilities.

12. There has not been an impact because she has not implemented yet. She does not see an increase in cost. It requires more work of the UEC.
13. She anticipates that more environmental responsibility will be passed down after she implements.
14. The workers do not know yet, but they do not have a need to know about ISO 14001.
15. If the EMS is implemented properly then it should have an impact but within her organization it won't be significant.

Organizations: DDWG

1. The UEC responsibilities initially were just waste portion form AFMC directive in 1994. Now they handle all environmental aspects. She is in charge of HMMS for her office. She tried to get her job upgraded. DLA headquarters said that they pay EM to do what the UEC are doing so they want to know why she is doing it.
2. UEC is not her full time job, but she spends 50% of the time doing them and could do more. She is also supply so all hazardous waste comes through the shop.
3. She feels that the UECs do to much work because EM program managers call UECs as the focal point for the organization. UECs have bitter taste because of how EM manages. There is no continuity among the grade structure of UECs. Since EM sends suspenses directly to UEC so issues do not get visibility of supervisors.
4. The commander has an open door policy.
5. The organization has goals set.
6. She gets a lot of support from commander. EM uses Internet for communication but the servers is down approximately 50% of the time. Since she is a tenant, it is difficult to access the email. The email system is constantly changing because of changes in the server. It makes it hard to keep up communication. The industrial areas do not have computers, but cannot access computers. Email is not a good form of communication for tenants. The divisions have work leaders who do not have access to the latest computers, so they do not have all the programs or access to the internet.
7. She received training. When it first came on line they talked to supervisors about ISO 14000 and passed it on to UEC. After first audit, then additional training was done. It was not adequate on the front side. The second training was good.
8. The reason for going to an EMS is because it is a way to be sure of one person is not micromanaging.
9. No weaknesses were identified but it was because the base volunteered.
10. They did not ask the UEC for inputs on implementation. EM dictated it. They were told that the audit was information gathering only but it was shown at the EPC as the same importance as the ECAMP.
11. She has daily contact with EM. She has a good relationship with EM and they are very cooperative and she can voice her opinion.
12. It has not impacted operations as much as it should have been. There have been no cost and no burden on the workers. Process does not allow workers to take it serious. She wants UEC to be more thorough in the program at all levels of the mission. Not a large increase because she has not taken anymore action. Time or knowledge is not a

problem. There are too many changes on base for ISO to work. Multiple missions hinder work. The 93rd has a full time environmental engineer that took 6 month to implement. EM has hired a contractor to do their work yet EM expects the UEC to do the same job. Her job has not documented her increase in workload. The Colonel signed off on policies and it is disseminated to each manager, who then passes it on down to the workers.

13. Environmental responsibilities were already in the organization.
14. Key workers at the lowest level have not made aware yet.
15. She has not seen any benefits.

Organizations: 78 CS/SCML

1. UEC responsibilities are to make sure unit is aware of its impact on the environment. Make aware of reporting responsibilities of ISO.
2. It is not a full time job and is only able to devote only 2 hours a week.
3. The UEC responsibilities are important and he wishes he could devote more time to do it well.
4. The commander has an open door policy and if there are issues then he can present them.
5. He intends on establishing goals because the commander wants goals.
6. The commander just arrived so he does not know what kind of support he will get.
7. He has not been able to attend the ISO 14001 class but he has attended Env 101. EM felt he should attend ENV101 before ISO training. ENV 101 did cover ISO a bit.
8. He was not made aware of a reason for going to ISO 14001.
9. He was not made aware of any weakness in the previous environmental management program.
10. He did not play a part in implementation.
11. He attends monthly and bimonthly meetings. He has a good working relationship with EM.
12. The hazardous waste management plan was the only continuity passed on to him. He has only been doing the job for 4 months and his commander has been there only 6 months. He feels that there is not much info from the Support Group UEC as far as job description for UEC or responsibility. AF should look into training for UEC or actual employee training. The EMS could eventually just be maintenance to keep it going but it is initially front-loaded.
13. He is new to the UEC position and cannot tell what the impacts to the organization are.
14. Does not know if the key workers at the lowest levels were made aware of the EMS.
15. Has not seen any benefits because he is new to the position.

Appendix C: Eglin Interviews

Interview Questions for EMS Coordinator

Funds
1. Has the lack of funds from the Air Staff/MAJCOM constrained or limited the implementation in any way?
2. Are there any parts of ISO 14001 that you can complete without funding?
3. Are there any parts of ISO 14001 that you cannot do without funding?
4. How much funding from Air Staff do you think would be adequate to implement an EMS at this installation? How much have you spent on complying with ISO 14001?
5. How are you currently covering the cost of implementation?

Base Organizational Complexity
1. How many organizations do you interface with environmentally?
2. What has been the impact of the number of different organizations on the base?
3. Has the base organizational structure helped or hindered implementation?
4. How has the environmental flight position in the base structure impacted the implementation?
5. What has been impact of the EPC on implementation?

New Responsibilities
1. Have previous environmental responsibilities been passed on to other organizations?
2. Have there been any violations as a result of new responsibilities being delegated?

Gap Analysis
1. Was an adequate gap analysis performed before implementation?
2. What has been the impact of having/not having a gap analysis?
3. Did it have an effect on the establishment of goals and objectives for the implementation?

Resources/Manning
1. Has environmental flight manning limited or hindered implementation in any way?
2. What has been the impact of unit environmental coordinators on implementation?
3. Has the environmental management office manning level had an effect on implementation?

Management
1. What has been the involvement of Wing Leadership in the implementation process?
2. Has that involvement been continuous throughout implementation?
3. What has been the involvement of Group and Squadron commanders in the implementation process?
4. Has their involvement been continuous throughout the implementation?
5. Have you had the power to fully comply with ISO 14001?

Time
1. What has been the effect of having a time constraint on implementation?
2. Has the pilot study provided adequate time to fully implement an EMS?
3. Have you had the time to oversee and nurture all the changes required for the EMS?

Eglin – EMS Coordinator

Funds

1. The lack of funding has impacted implementation at Eglin. The extent of the impact is difficult to quantify but funding could have been used to contract some of the implementation effort.
2. However, one of the implementation goals of EM was for all organizations to implement with no external costs to them. EM would be the only organization spending money on implementing. The only cost to organizations would be in man-hours spent in training. If funds were provided for the pilot study, EM would have spent more on training. Developing implementation strategy for Eglin and ISO 14001 training of the ICT has been substantial, with hidden cost in the man-hours required by individuals implementing as part of the ICT.
3. The total amount spent by EM has been approximately $250K including the $150K from MAJCOM.
4. If funding were provided, EM feels that $300K would be a minimal amount with $500K being a good start. Project costs as a result of implementation were provided by MAJCOM in the amount of $110K for document control and $40K for training.
5. EM has determined since the start of the study in Jan 98 that there has been approximately $150K spent in man-hours and other hidden cost in line items such as office supplies and printing contracts.

Complexity

1. The complexity of the base organizational structure caused EM to exclude some of the tenants until they got a handle on the Center organizations. There was a decision as to whether they would certify AAC or AAC and tenants.
2. They requested associate unit participation on 10 Oct 97 and received no response. The implementation effort focuses on AAC, which includes 46 TW and 96 ABW and staff. So far the implementation has only made it done to the group level and stopped there. The 46 TW has 4 groups and the 96 ABW has 6 or 7 groups.
3. Since the tenants are not participating the base structure has not hindered the implementation.
4. The main reason that EM has had an impact is because having an EMS is a goal of the Center Commander. The EM director has a direct line with the Commander due to the EM position as a directorate. The EMS has become a center goal rather than a CE goal.
5. The EPC has played a major role in the implementation. They were required to review/approve the EMS policy. They received initial training on EMS structure and their responsibilities. AAC/CC approved the implementation plan. Annual management review. The early General had a quality effort identified a lot of goals. EPC has only been a receptive and supportive but not championing. Environmental performance review brings more visibility but not EPC. EPC approval is all that is needed. Plans are already in place.

New Responsibilities/Training

1. Environmental responsibilities have always been dependent on the organizations. They have requirements to pay all environmental material cost, maintain spill capabilities, waste disposal, movement of drum, etc.
2. There have been some violations but nothing the EMS would have fixed.

Gap Analysis

1. A gap analysis was performed before implementation. A checklist was developed by the ICT in Jan 98 and was conducted in Feb 98. The ICT focused on the largest gaps. Another gap analysis was conducted in Jul 98, utilizing a new checklist tailored to the Eglin mission. A gap analysis was performed once a quarter but now it is performed semi-annually. The gap analysis is seen as an on-going effort to see progress. They have expanded the question by making them broader and more detailed. The ICT performed the gap analysis because the contractor who perform them for free are trying to get lead auditor experience but EM felt that they lacked experience to perform an adequate analysis. The contractors perform gap analyses for free because they are trying to build their resume on ISO 14001 auditing in order to gain certification.
2. The impact of having a gap analysis is that they can focus the attention and direction of the program.
3. It highlighted where the largest gaps where and what needs to be done but did not identify the environmental aspects of the organizations.

Resources/Manning

1. Although EM is a large directorate, the personnel are busy doing their jobs. Directorate has changed in structure but there is still the same number of personnel. Work is done out of the compliance section but there still is not a full time EMS person.
2. The ICT is performing the bulk of the work at this stage. The UEC are doing the work and operation plans because of the job. UEC are not training on the EMS. They are a part of it for the simple fact that they are doing their job.
3. The compliance section has received ISO 14001 training. They have helped in writing new environmental procedures.

Management

1. The EPC and AAC/CC have approved all plans and policies on implementation. There involvement has been passive but an EMS is a Center goal. This has relieved bureaucratic pressure and enables EM to cultivate the system.
2. The involvement has been continuous. The General has (EMIS) Executive Management Information System, which allows him to review his goals that include environmental goals. The EMIS is color coded by severity so if he sees an area that needs attention then he can focus on that area.
3. The involvement has been continuous whether they know it or not because it is a goal and objective.

4. The Group commanders have continuous involvement because the EMS is a goal. They have received awareness training and approved plans and have provided inputs.
5. EM cannot determine whether they have had the power to fully comply because they have not had any real issues yet. They have met a little resistance but the EMS is in place whether the organizations know it or not. Maybe funds and resources have limited EM's power.

Time

1. The time has never been looked at as a constraint because they didn't look at the pilot study as the end of implementation. It was needed to provide a framework for review.
2. The two years has not provided adequate time for Eglin to fully comply because they provided no resources. Two years is a short time to get a large organization into an EMS and sell the awareness to other organizations (next to impossible). The previous Center commander was pushing quality because he wanted to get the SECAF quality award. Quality has been very well ingrained at Eglin. It helped with the acceptance of the EMS goals.
3. If they were trying to accomplish implementation in two years they would not have the time to nurture all the changes.

Interview Questions for Implementation Core Team (ICT)

1. What is your responsibility as an ICT member?
2. Why were you or your organization chosen to be on the ICT?
3. How much time per week/month do you spend doing ICT duties?
4. How do you feel about your ICT responsibilities?
5. How would you describe your relationship with the environmental flight?
6. How much contact do you have with your commander concerning environmental issues?
7. How much support do you get from your commander concerning environmental issues?
8. What has been the involvement of Group commanders in the implementation process?
9. Has the involvement been continuous throughout the implementation?
10. What has been the impact of the EPC on implementation?
11. What role did you play in the strategy/implementation process? How much input did you have in the process?
12. Are you able to devote the amount of attention that you would like to the implementation process?
13. Were you educated/made familiar with ISO 14001 for Environmental Management Systems? Do you feel the training was adequate?
14. Could you have been an effective ICT member without the training?
15. Are you aware of the reason for changing to such a system?
16. Have you been made aware of any weakness in the previous way that environmental management was conducted that prompted the change to an EMS? Was there anything highlighted during training?
17. Did you perceive any environmental problems within your organization or on environmental aspects before the pilot study?
18. How do you feel about the EMS?
19. What do you think it will add to your organizations?
20. What factor(s) do you think is (are) most restrictive to implementation (hardest to get over)?
21. Have you seen any benefits/improvements in your operations in the past two years? If so, can they be attributed to the EMS or were the processes already in place to provide the benefit?

Eglin – Implementation Core Team (ICT)

Organization: 96 CEG

1. The ICT member was a UEC before; therefore the responsibilities are the same as that of a UEC. As an ICT member, he is the liaison for the Civil Engineer Group (CEG).
2. He was chosen to be on the ICT because the CEG was a major environmental player on the base. Also, the CEG wanted to make sure that their interests in the EMS were being considered in the planning.
3. He spends about 2hr per week doing ICT duties.
4. It is difficult being on the ICT mainly due to the scale of the operations they are trying to implement ISO 14001. Since they are looking at an EMS on a macro level instead of within the organization it is difficult to comprehend exactly what the organizations will be doing to implement.
5. He has a good working relationship with EM.
6. He has regular contact with the squadron commanders concerning environmental issues.
7. It was difficult for him to keep support for being on the ICT. His commander tried to reprioritize him because he did not feel it was important but the commander did not know that it was one of the base goals.
8. The Group commander was not really involved with the ICT.
9. No involvement of the Group commander.
10. The EPC was good for the ICT because they signed off on the EMS policy and implementation plan. It was also good for keeping continuity of responsibility as the members of the EPC changed.
11. All ICT members worked on the implementation process. The EMS coordinator was the main person who developed the strategy but everyone had a hand in the process.
12. He would like to devote more time and attention to the implementation process. Unfortunately, he is unable to reprioritize his current duties. The ICT is still an additional duty for him.
13. The ISO 14001 training was contractor provided. He said one of the drawbacks of the training was that it was not tailored to focus on DoD or the Air Force operations. Also, the training is more private company based, instead of public/government oriented. Maybe if the contractors first tried to understand Air Force operations and then provide the training, it would enhance the learning process.
14. He could have been an effective ICT member without the training because of his previous experience in the Air Force and EPA has given him enough environmental management background. He knows of the various operations in the shop and how things work in the military. He still thinks it was good training and would be needed if he came into the team with no experience.
15. He is aware of the reason for changing to an EMS.
16. He was not made aware of any weakness in the previous way that EM was conducted, but he feels it is just better management practices. He feels the system was good before.

17. He still understood that there were some environmental problems before but the system was still good. Training, communication, document control, and roles defined were all problems of the previous system. EMS seeks to correct these problems.
18. The EMS is a good idea.
19. It is still in the macro stage, so they are still unable to see any effects yet. Once the rubber hits the road then he feels it will be a good system. If things are done right then it will work. There maybe some tweaking involved before the EMS is properly functioning. It took awhile to sell the idea of an EMS to him but now he sees where it can do some good.
20. Factors that are most restrictive to implementation are the changing of attitudes and manpower. It will be difficult to change the old school ways of doing things and unless implementation is done right then there will be resistance. Also, manpower is a problem because there is not always enough time to devote to the ICT duties.
21. No benefits yet because it is still in the macro stage.

Organization: 96 ABW/XPQ

1. As a member of the ICT, her responsibilities are to keep the commander informed and the group commanders. The office she works in is plans and programs for the Wing. She is the quality analyst for the Wing.
2. Since the EMS is a plan and it is quality related it is important to have someone on the ICT from XP.
3. Her time with the ICT varies. Initially when they started she spent approximately 4hrs/week but now it has not been much. She was charged with writing the procedure for training in which she was spending a lot of time on that. Once it was finished, her time commitment diminished. The time lessened in October after the last audit. Also, at that time the ICT chairperson left for maternity leave and some key members changed positions and were transferred.
4. She feels that here ICT duties are important and that it is important to have an XP on the team. It keeps the commander informed because she has an open door policy with him.
5. She has a good relationship with environmental flight because the ICT is the only relationship she has with them.
6. She has an 'as required' contact with the commander concerning environmental issues. She briefs him if things change on the ICT or if he request to have an update.
7. She receives total support from the commander.
8. There has not been much involvement of the Group commanders as this point. The wing commander has directed them support the EMS. She feels that the commander should know what is going on but they do not do the work. The work should and will go to the lower levels where the work is actually getting done. At the base there is a strong urge to empower the lower levels.
9. She has had continuous support from the commanders. The ABW/CC is active and proactive. He is interested and active in all things. Eglin already had a lot of emphasis on the environment before the EMS, which is passed on to the commanders when they come in.

10. The EPC has not had a lot of impact. The ICT just feed them information so that the commanders will know what is going on. They do not provide much feedback but at the same time she does not go to any of the EPC meetings.
11. The role she played in the implementation process is bringing a Wing perspective to the team. She has training experience and brought that to the team. The biggest role is in quality and process improvement experience and knowledge.
12. She is not able to devote the amount of attention that she would like to the program. If she had the time she would devote more because she is interested.
13. She received training on ISO 14001. She had off-site training in Ft. Lauderdale for a week, which was not the best. She thinks the training should be more military focused. She understands that quality training is new and that the people instructing are still trying to find their way on the subject. Hillary has been providing training to the ICT members as needed.
14. She could not have been effective without the training to the ICT. You must have the training to understand.
15. The reason for changing to such a system is to find better ways to do business that are more efficient and improve the current system.
16. The weakness is in the way it was done before was not highlighted. It was presented more of a natural evolution to the EMS. It was time to take the next step to fix the systemic problems. The EM was already doing well so in order to improve the EMS was needed. It was a proactive look by the EMS coordinator because she could see it due to her oversight of ECAMP.
17. She did not perceive any real environmental problems. Except the occasional repeat findings and the corrections to the findings were done differently. One organization may pencil whip a correction, while another may actually change the process.
18. She thinks the EMS is awesome but she is looking from a quality stand perspective. It gives guidance and a path on how to do things. It ensures consistency and it is more cost-effective.
19. It will add cost efficiency and effectiveness; it will cause you to work smarter because you will have document passed experiences, and it will help in doing the right thing for the right reason.
20. The factors most restrictive to implementation are cost and resistance. If they had the funds they could do more, and organizations could do more. Cost in manpower is also a factor to organizations. The resistances to change because the compliance is already being met so why change attitude. Going to an EMS causes the breaking of old paradigms. The people are used to doing things the way they have been. The base also had the quality program shoved down its throat under previous command so now there is a resistance to any program that emphasizes quality. Also, there is the perspective that any change requires money from the organization. Job security of the personnel is also a factor in the resistance.
21. Have not seen any benefits yet.

Appendix D: DoD Component ISO 14001 Pilot Projects Cost Profile

General Information
Name of Facility

Address

Date

Telephone Number
Fax Number
Email Address
Point of Contact

DOD ISO 14001 Pilot Project Number

Date
From ____/____through _____/_____

One-Time Costs
Please respond in dollars for total human resources needs associated with ISO 14001 implementation

	Internal	Contractor
Gap Analysis	$ 0	$ 0
Environmental Policy Development	$ 0	$ 0
Document Redevelopment	$ 0	$ 0
Rewriting Standing Operating Procedures	$ 0	$ 0
ISO Education & New Systems Training	$ 0	$ 0
Management Reviews	$ 0	$ 0
SUBTOTALS:	$ 0	$ 0
	TOTAL:	$ 0

Recurring Costs
Please respond in dollars for human resource needs for out years associated with ISO 14001 implementation

	Internal	Contractor
Environmental Policy Development	$ 0	$ 0
Document Redevelopment	$ 0	$ 0
Rewriting Standing Operating Procedures	$ 0	$ 0
ISO Education & New Systems Training	$ 0	$ 0
Management Reviews	$ 0	$ 0
SUBTOTALS	$ 0	$ 0
	TOTAL:	$ 0

Implementation Costs
Please list in dollars any additional operating expenses due to ISO 14001 implementation.

	Internal	Contractor
N/A*	$	$
	$	$
	$	$
SUBTOTALS:	$	$

Please list the total cost of any capital expenditure associated with ISO 14001 implementation.

	Internal	Contractor
N/A*	$	$
	$	$
	$	$
SUBTOTALS:	$	$

Please list the total cost of any supplemental training expenditures associated with ISO 14001 implementation.

	Training Costs	Total Man-hours for Participation and Staff Level
	$	
	$	
SUBTOTALS:	$	

IMPLEMENTATION COSTS $ 0

* Sheppard AFB has not reached the point where implementation costs for ISO 14001 can be segregated from the normal environmental management system currently in place. This will happen once documentation of processes is complete.

DoD ISO 1400 Pilot Project Number | Date

Environmental Funding Provide current dollar amounts for each category for the six month time period,

	Operating Expenses for Current Six Month Period*	Capital Expenses for Current Six Month Period*
Restoration	$ 0	$ 0
Pollution Prevention	$ 0	$ 0
Compliance	$ 0	$ 0
Conservation	$ 0	$ 0

* Does not include Civilian Pay funds

Please break down funding costs for the below elements into total man-hours using local rates for the current six-month period.

Internal Policy Development	Education & Training	Drills, Assessment & Management Reviews
Departmental Budgeting	Consultation, Negotiations, & Coordination with Federal & State Regulators	Contractor Management
Reporting & Document Management	New Initiative Program Development	Mitigation Measures
Testing, Monitoring, Labeling & Inspection	Tracking & Analyzing Environmental Performance	NEPA Preparations
Community Involvement & Outreach	Permitting	Planning & Management Plan Development

Facility Information
(1st Half CY98/2nd Half CY98)

Total Facility Operation and Maintenance Expenditure

Total Number of Employees Permanently Stationed at Facility

Average Personnel at Facility each Month (PP & Students)

Evaluation Parameters

Please list three production, workload, or operation parameters as an indication of facility-level activity (e.g., flight hours, number of aircraft/vehicles overhauled, labor hours dedicated to depot activities.)

Parameters	Quantity (1st Half CY98/2nd Half CY98)

Environmental Regulatory Findings Please list the number of regulatory findings in the first half of the box and the number of findings that affected the facility's mission performance in the second half.

	Open	Unresolved	New	Closed
Internal Assessments	0 0	0 0	0 0	0 0
Federal	0 0	0 0	0 0	0 0
State	0 0	0 0	0 0	0 0

DoD ISO 1400 Pilot Project Number

Environmental Violations

Please list all environmental financial penalties assessed for State & Federal violations for the current six-month period.	Please list root causes of penalties incurred during the six month time period.
_____ $	_____
_____ $	_____
_____ $	_____
_____ $	_____
_____ $	_____
_____	_____
_____	_____
_____	_____

Spills Please report the number of spills occurring within the current six month time period.

Oil Related Spills		Hazardous Substance Related Spills	
Smaller than 25 gallons	0	Smaller than 25 gallons	0
Smaller than 500 gallons	0	Smaller than 500 gallons	0
Between 500 and 1000 gallons	0	Between 500 and 1000 gallons	0
Between 1000 and 10,000 gallons	0	Between 1000 and 10,000 gallons	0
Over 10,000 gallons	0	Over 10,000 gallons	0

DoD ISO 1400 Pilot Project Number	Date 15 Jan 99

Water

Total number of NPDES permitted waste water systems: 0

Total number of systems meeting NPDES permit standards: 0

Air

	Yes	No
Has your operations submitted a Title V operating permit?		

Total number of air permits: 0

Total number of systems meeting air permit standards: 0

Pollution Prevention (Previous/Current Six Month Time Period)

Total quantity of hazardous waste generated: 0 lbs*

Total quantity of solid waste generated: 0 lbs

Total quantity of solid waste recycled: lbs

* Due to Increased Maintenance on Aircraft Fleet caused by Damage from Severe Hail Storm

TRI REQUIREMENTS

	CY96 (1K lbs)	CY97 (1K lbs)	CY98 (1K lbs)
On-site release to water	0.0	N/A*	N/A*
On-site release to air	0.0	N/A	N/A
On-site underground injection	0.0	N/A	N/A
On-site land	0.0	N/A	N/A
Off-site transfer to POTW	0.0	N/A	N/A
Off-site transfer to treatment	0.0	N/A	N/A

*Sheppard AFB did not have to report for CY 1997 nor CY 1998

CY98	CY96 (1K lbs)	CY97 (1K lbs)	CY98 (1K lbs)
Off-site transfer to disposal	0.0	N/A	N/A
On-site recycling	0.0	N/A	N/A
On-site energy recovery	0.0	N/A	N/A
On-site treatment/destroyed	0.0	N/A	N/A
Off-site energy recovery	0.0	N/A	N/A
Off-site treatment/destroyed	0.0	N/A	N/A

Conservation Plans and Inventories

	Number of required plans	Number of up-to-date plans
Integrated Natural Resources Management Plan	0	0
Cultural Resource Management Plan	0	0

	Number of complete inventories	Number of partial inventories
Biological Resources	0	0
Historic Resources	0	0
Archeological Resources	0	0

Efficiency Please provide information for the previous/current six month time period.

Please provide total energy consumption for your operation: 0 Mbtu

Have you met your 1995 10% energy reduction goal? ☐ yes ☐ no

Please provide total water consumption for your operation. 0 gallons

Superfund

Is your operation listed on the NPL? ☐ yes X no

Is yes, provide the total estimated cleanup cost. $

Is your operation listed on the State Priority List? ☐ yes X no

Number of sites

DoD Component ISO 14001 – Implementation Benefits Questions

1. How has the current EMS changed the public's perception of your operation?
2. How has the current EMS changed the over-all environmental risks associated with your operation?
3. How has the current EMS changed your operations marketability and working capital to other DoD Commands and to other non-DoD operations?
4. How has the current EMS changed your operation's mission support performance?
5. Please describe your ability to identify an area of environmental risk and respond to it.
6. Please describe your ability to respond to new regulatory requirements.
7. Please provide an evaluation of the strengths and weaknesses of the current EMS.
8. Please describe any internal environmental performance metrics that have been developed and their effectiveness in tracking environmental performance.
9. Please describe the management structure of the current EMS and the current state of environmental record keeping and data management. Please provide information on how management processes are standardized to avoid duplication.
10. Please describe the level of support throughout the installation for improved environmental performance. Please provide examples on how this support contributes to decisions about funding and personnel and improved installation function and morale.
11. Please describe the degree to which environmental considerations are incorporated into process improvements made by personnel other than environmental staff.

Bibliography

82 CS/SCS. "Sheppard Air Force Base." Excerpt from Sheppard AFB Major Organizations, n. pag. http://www.sheppard.af.mil. January 1999.

96 CG/SCTXC. "Eglin Air Force Base." Excerpt from Organizations, n. pag. http://www.eglin.af.mil. January 1999.

Berg, David N. and Philip H. Mirvis. Failures in Organization Development and Change. New York: John Wiley and Sons, Inc. 1997.

Bouchard, Thomas J. Jr. Handbook of Industrial and Organizational Psychology. Chicago: Rand McNally, 1976.

Brown, Warren B. and Dennis J. Moberg. Organization Theory and Management: A Macro Approach. New York: John Wiley and Sons, Inc., 1980.

Cascio, Joseph and others. ISO 14000 Guide – The New International Environmental Management Standards. New York: McGraw-Hill, 1996.

Corbin, Juliet and Anselm Strauss. Basics of Qualitative Research: Grounded Theory Procedures and Techniques. Newbury Park CA: Sage Publications, Inc., 1990.

Crum, Captain Jacquelin and others. "Environmental Management Systems and the Air Force Environmental Program." Report to AFCEE/EQ, Brooks AFB TX. 1997.

Daft, Richard L. Organization Theory and Design. Minneapolis/St. Paul: West Publishing Company, 1995.

Earth Tech/Rust E&I. "Environmental Management System Manual." Report to WR-ALC/Environmental Management Directorate, Robins AFB GA, 3 August 1999.

Eisenhardt, Kathleen M. "Building Theories from Case Study Research," Academy of Management Review, 14: 532-550 (1989).

Garson, David G. and others. Organizational Behavior and Public Management. New York NY: Marcel Dekker, Inc., 1990.

Griffin, Ricky W. Management (Fifth Edition). Boston: Houghton Mifflin Company, 1996.

Hackman, Richard J. and others. Perspectives on Behavior in Organizations. New York: McGraw-Hill, Inc., 1983.

International Organization for Standardization (ISO). Environmental Management Systems – Specification with Guidance for Use (ISO 14001). Milwaukee WI: American Society for Quality Control (ASQC), September 1996.

Kanter, R.M. "Power Failure in Management Circuits," Harvard Business Review: 65-75 (July – August 1979).

Lindhorst, Christopher M. An Analysis of the Air Force Environmental Management System. MS thesis, AFIT/GEE/ENV/97D-16. Graduate School of Engineering and Environmental Management, Air Force Institute of Technology (AU), Wright-Patterson AFB OH, December 1997.

Marguglio, B.W. Environmental Management Systems. New York NY: Marcel Dekker, Inc., 1991.

Scrimshire, David. "What's Involved in Implementing ISO 14001," Modern Casting, 86: 32-34 (December 1996).

Swiss, James E. Public Management Systems-Monitoring and Managing Government Performance. Englewood Cliffs, New Jersey: Prentice Hall, 1991.

van der Veldt, Danja. "Case Studies of ISO 14001: A New Business Guide for Global Environmental Protection," Environmental Quality Magazine, 7: 1-19 (Autumn 1997).

von Zharen, W. M. ISO 14000: Understanding the Environmental Standards. Rockville MD: Government Institutes, Inc., 1996.

Yin, Robert K. Case Study Research – Design and Methods. London: Sage Publications, 1994.

Vita

Captain Rodney C. Harris was born on 10 November 1969 in Houston, Texas. He graduated from Mirabeau B. Lamar Senior High School in Houston, Texas in June 1988. He entered undergraduate studies at the United States Air Force Academy in Colorado Springs, Colorado where he graduated with a Bachelor of Science degree in Civil Engineering in May 1992. He was given a Regular Commission upon graduation.

His first assignment was at Robins AFB where he worked in the 78th Civil Engineer Group in July 1992. While there he served as a civil engineer section leader. In July 1995, he was assigned to the 611th Civil Engineer Squadron, Elmendorf AFB, Alaska where he served as an environmental project officer. While stationed at Elmendorf, he deployed overseas in September 1996 to spend three months at Al Jaber Air Base, Kuwait as the civil engineer commander. In August 1998, he entered the Graduate Engineering and Environmental Management program, Graduate School of Engineering and Management, Air Force Institute of Technology. Upon graduation, he will be assigned to Headquarters Air Education and Training Command.

Permanent Address: 1956 W. Lamar
Houston, TX 77019

REPORT DOCUMENTATION PAGE	Form Approved OMB No. 074-0188

1. AGENCY USE ONLY (Leave blank)	2. REPORT DATE	3. REPORT TYPE AND DATES COVERED
	March 2000	Master's Thesis

4. TITLE AND SUBTITLE

ANALYSIS OF THE AIR FORCE ISO 14001 PILOT STUDY CONDUCTED BY DoD

5. FUNDING NUMBERS

6. AUTHOR(S)

Rodney C. Harris, Captain, USAF

7. PERFORMING ORGANIZATION NAMES(S) AND ADDRESS(S)

Air Force Institute of Technology
Graduate School of Engineering and Management (AFIT/EN)
2950 P Street, Building 640
WPAFB OH 45433-7765

8. PERFORMING ORGANIZATION REPORT NUMBER

AFIT/GEE/ENV/00M-07

9. SPONSORING / MONITORING AGENCY NAME(S) AND ADDRESS(ES)

HQ AETC/CE
Attn: Capt. Tay Johannes
266 F Street West
Randolph Air Force Base, Texas 78150-4319 DSN: 487-3422

10. SPONSORING / MONITORING AGENCY REPORT NUMBER

11. SUPPLEMENTARY NOTES

Major Michael T. Rehg, DSN: 785-3636, ext. 4711 e-mail: Michael.Rehg@afit.af.mil

12a. DISTRIBUTION / AVAILABILITY STATEMENT

APPROVED FOR PUBLIC RELEASE; DISTRIBUTION UNLIMITED.

12b. DISTRIBUTION CODE

ABSTRACT (*Maximum 200 Words*)

The Department of Defense (DoD) conducted an ISO 14001 pilot study with the primary goal of determining how ISO 14001 could help DoD organizations reduce risks, improve compliance with environmental regulations, enhance stewardship, contain costs, and meet emerging regulatory requirements. This thesis analyzed the pilot study, specifically looking at the ISO 14001 implementation at three Air Force installations participating in the study. The research objectives were to identify factors that affect implementation of ISO 14001, compare the implementation strategies used by the bases, and develop propositions for Air Force managers to consider when implementing ISO 14001. Interviews of key personnel, DoD Component ISO 14001 surveys, and implementation documentation served as the data. The data was analyzed and grouped according to the factors that affected implementation. The factors were conceptually grouped into two constructs. The constructs were compared and relationships developed that identified the impacts on the implementation. Propositions were made to reduce the impacts on implementation. For managers seeking to implement ISO 14001, the factors that effect implementation should be identified and strategies developed to minimize their effects. The recommendations from this research can be used in the development of future Air Force guidance on ISO 14001.

14. SUBJECT TERMS

ISO 14001, Environmental Management Systems, Environmental Management, Management Systems

15. NUMBER OF PAGES
147

16. PRICE CODE

17. SECURITY CLASSIFICATION OF REPORT	18. SECURITY CLASSIFICATION OF THIS PAGE	19. SECURITY CLASSIFICATION OF ABSTRACT	20. LIMITATION OF ABSTRACT
UNCLASSIFIED	UNCLASSIFIED	UNCLASSIFIED	UL