IMPLEMENTING AN ENVIRONMENTAL MANAGEMENT SYSTEM

by

Gerald W. Spencer

B.Sc.Eng (Civil), UNB, 1981

A REPORT SUBMITTED IN PARTIAL FULFILMENT OF THE REQUIREMENTS
FOR THE DEGREE OF

MASTERS OF BUSINESS ADMINISTRATION

in the Graduate Academic Unit of Business Administration

Supervisor: Dr.D.Coleman, Management, Faculty of Business Administration

Examining Board: Dr.P.Wright, Human Resource Management, Faculty of Business Administration
                  Dr.H.Whalen, Management Information Systems, Faculty of Business Administration
                  Dr.D.Coleman, Management, Faculty of Business Administration

THE UNIVERSITY OF NEW BRUNSWICK
April, 1998

0-612-35529-2

Canada

ABSTRACT

The September, 1996 introduction of ISO 14000 standards for Environmental Management Systems marked a major shift in the global communities' approach to environmental protection. After years of focusing upon compliance with government regulations as a measure of an organizations' environmental achievement, the ISO 14000 Standards provide a framework for effectively managing the transfer of environmental responsibility from the environmental engineering function to all employees within the organization. The end result is an organization within which environmental awareness becomes an integral part of the corporate culture.

Part A of this report outlines the development of the ISO 14000 standards with a focus upon ISO 14001 "Environmental Management Systems- Specifications with Guidance for Use". The ISO 14001 standard specifies the elements of an environmental management system that organizations are required to conform to if they seek certification. A detailed discussion of the requirements of ISO 14001 and the process involved in implementing each of the required elements is presented.

In Part B, the organizational implications of establishing a Management by Objectives (MBO) program are discussed. MBO theory is discussed and a MBO program failure analysis based upon existing research is presented.

TABLE OF CONTENTS

LIST OF FIGURES

APPENDICES

PART A   ENVIRONMENTAL MANAGEMENT SYSTEMS

1.0   INTRODUCTION

ISO 14000 presents a new approach to environmental protection. The current approach relies upon the threat of repercussions for noncompliance with respect to existing regulations. The new approach relies on positive motivation to do the right thing rather than on punishment of errors. Organizations are challenged to commit themselves to effective and reliable processes and continual improvement by implementing a management system based upon shared and personal responsibility for the environmental performance of the organization. This heightened awareness of the environmental consequences of their work by both management and employees will over time, result in a shift in corporate culture to one that is as sensitive to the environment as it is to production schedules and product design.

The environmental management system (EMS) standard, ISO 14001, provides a framework to direct the use of organizational resources to deal with actual or potential environmental impacts through reliable management processes and a base of educated and committed employees.

The objective of Part A of this report is to provide the reader with an insight as to

the process involved in implementing an EMS conforming to the requirements of ISO 14001. This will be accomplished through the presentation of a model based upon the required elements of an EMS as described within the ISO 14001 standard.

An analogy can be drawn between the implementation process and the building construction process. In building construction, the process follows a set pattern (footing, foundation, floor, walls, roof, etc.) with the end result being a structurally sound building. Similarly, in the implementation process, each element of the model must be properly completed before the succeeding element is added. The end result is a structurally sound EMS. The old adage "A building is only as strong as its foundation" is also applicable to an EMS. A firm commitment to establishing and maintaining an EMS by the organization is the foundation upon which the system is built.

1.1   Background Information

The International Organization for Standardization (ISO) is a non governmental, international organization based in Geneva, Switzerland with over one hundred member bodies or countries. Countries are represented in ISO by designated authorities within those countries. Canada is represented by the Standards Council of Canada which,

although it is a government organization, receives no special membership privileges due to its federal status.

The main focus of ISO is to provide standardization on an international level. The technical product and safety standards developed by ISO over the years have greatly enhanced international commerce and product uniformity.

All ISO standards are voluntary, consensus, private-sector standards developed by technical experts from the member bodies representing the views of various stakeholders. Although ISO has no authority to impose its standards on any country or organization, government bodies may elect to convert an ISO standard to a required or legal standard. However, if these legal standards become conditions of doing business in commercial transactions, they can no longer be viewed as strictly voluntary.

Standards are developed by various technical committees established by ISO's Technical Management Board (TMB) through a process of extensive discussion, negotiation, and international consensus.

1.2   Development of ISO 14000 Standards

During the 1980's, ISO attempted to standardize one aspect of organizational management, specifically, quality management. The

resulting standards, the ISO 9000 series, were completed in 1987 and have become the most successful standards in ISO's history. The standards have been adopted and recognized worldwide as adding value to organizations quality management programs. In some areas, certification to the standard has become a requirement for trade.

During the time period in which the quality standards were becoming popular, environmental issues such as ozone depletion and global warming were being recognized as global problems. An international desire for better environmental care led to national and regional environmental standards being developed which were inconsistent with one another. "The existing inconsistencies resulted in marketplace bias between nations, product discrimination, and major harmonization problems for international enterprises. Another factor which became obvious was the absence of a universal indicator to assess an organization's effort to achieve reliable and consistent environmental protection. This indicator could be used, in conjunction with an independent third-party evaluation of conformance that confirms an organization's commitment to comply with applicable regulations, to assess significant impacts of its activities and to develop or improve its EMS." (IISD,1996,p.25)

In 1993, encouraged by the success of the ISO 9000 series, technical committee TC207 was empanelled by TMB to develop environmental

management systems and tools in a number of environmental areas. Specifically, the mandate of TC207 was to develop international environmental standards which would serve to:

- ► Promote a common approach to environmental management similar to that for quality management

- ► Enhance an organization's abilities to attain and measure improvements in environmental performance

- ► Facilitate trade and remove trade barriers

(IISD,1996,p.27)

One key concept from ISO 9000 quality management standards was integrated into the scope of work for TC207. That concept was that management standards were process standards and, as such, were not to specify end goals. This would allow organizations, anywhere in the world, to consistently meet their environmental obligations on all fronts - regulatory, community, employee and stockholder. This consistency in meeting environmental obligations is similar to the consistency of producing the same quality product under ISO 9000.

The culmination of the efforts of TC207 was the introduction in 1996 of the ISO 14000 series of environmental standards.

5

2.0 ELEMENTS OF ISO 14000

The subjects covered under ISO 14000 can be divided into two separate areas, as shown in Figure 2.1. The first deals with an organization's management and evaluation systems; the second area deals with environmental tools for product evaluation. The product evaluation area consists of environmental aspects in product standards, environmental labelling, and life cycle assessment. The general focus of this paper is on the area of organization evaluation, which consists of environmental management systems, environmental auditing, and environmental performance evaluation.

Specifically, this report will focus on the area of environmental management systems and its related documents, ISO 14001 and ISO 14004. Figure 2.2 indicates the documents related to each of the three components which are included in the area of organization evaluation.

```
┌─────────────────────────────────────────────────┐
│ ISO 14000                                        │
│ ENVIRONMENTAL MANAGEMENT STANDARDS               │
└─────────────────────────────────────────────────┘
                        │
        ┌───────────────┴───────────────┐
┌───────────────────────┐       ┌───────────────────────┐
│ ORGANIZATION          │       │ PRODUCT EVALUATION     │
│ EVALUATION            │       │                        │
└───────────────────────┘       └───────────────────────┘
            │                               │
┌───────────────────────┐       ┌───────────────────────┐
│ Environmental Management System │   │ Environmental Aspects  │
│                         │       │ Product Standards      │
├───────────────────────┤       ├───────────────────────┤
│ Environmental Auditing  │       │ Environmental Labeling │
├───────────────────────┤       ├───────────────────────┤
│ Environmental Performance │     │ Life Cycle Assessment  │
│ Evaluation              │       │                        │
└───────────────────────┘       └───────────────────────┘
```
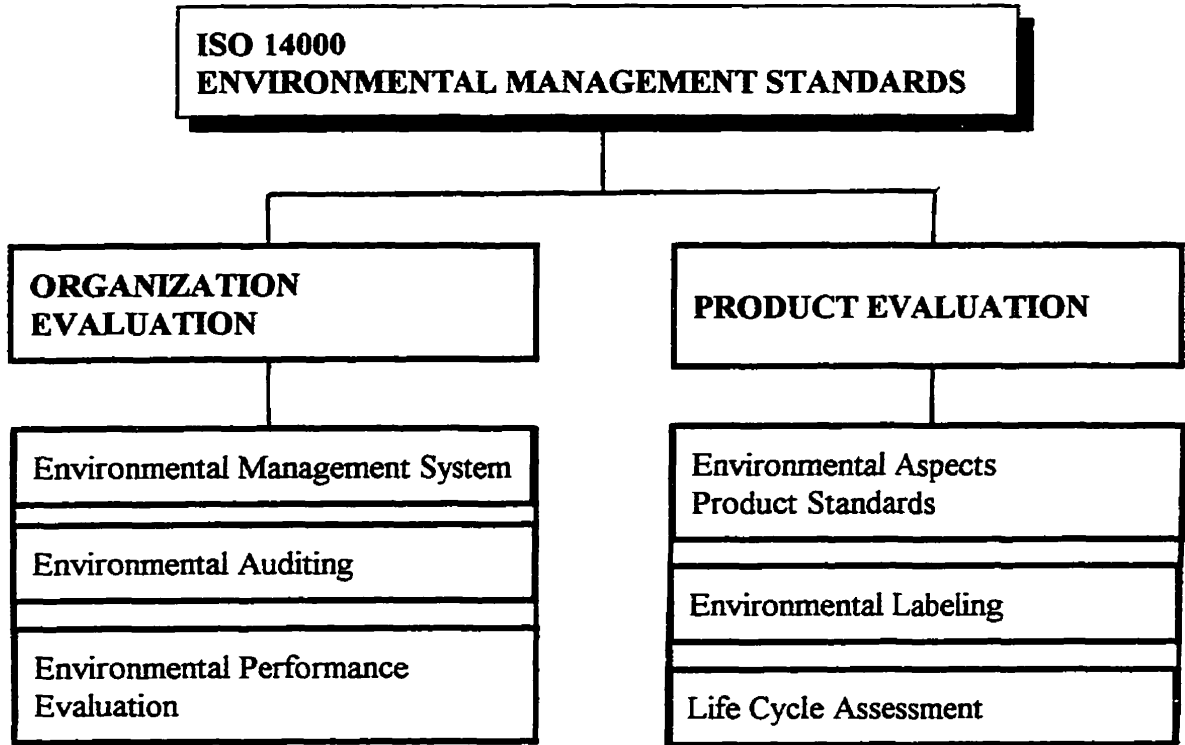
FIGURE 2.1 ISO 14000 Subject Areas

```
┌─────────────────────────────────────────────────────┐
│ ISO 14000                                           │
│ ORGANIZATION EVALUATION STANDARDS                   │
└─────────────────────────────────────────────────────┘
```

```
┌──────────────────────────────┐     ┌──────────────────────────────┐
│ ENVIRONMENTAL                │     │ ENVIRONMENTAL AUDITING       │
│ PERFORMANCE EVALUATION       │     │                              │
└──────────────────────────────┘     └──────────────────────────────┘
┌──────────────────────────────┐     ┌──────────────────────────────┐
│ ISO 14031                    │     │ ISO 14010                    │
│                              │     │ ISO 14011-1                  │
│                              │     │ ISO 14012                    │
└──────────────────────────────┘     └──────────────────────────────┘
```

```
┌──────────────────────────────────────┐
│ ENVIRONMENTAL MANAGEMENT             │
│ SYSTEMS                              │
└──────────────────────────────────────┘
┌──────────────────────────────────────┐
│ ISO 14001                            │
│ ISO 14004                            │
└──────────────────────────────────────┘
```
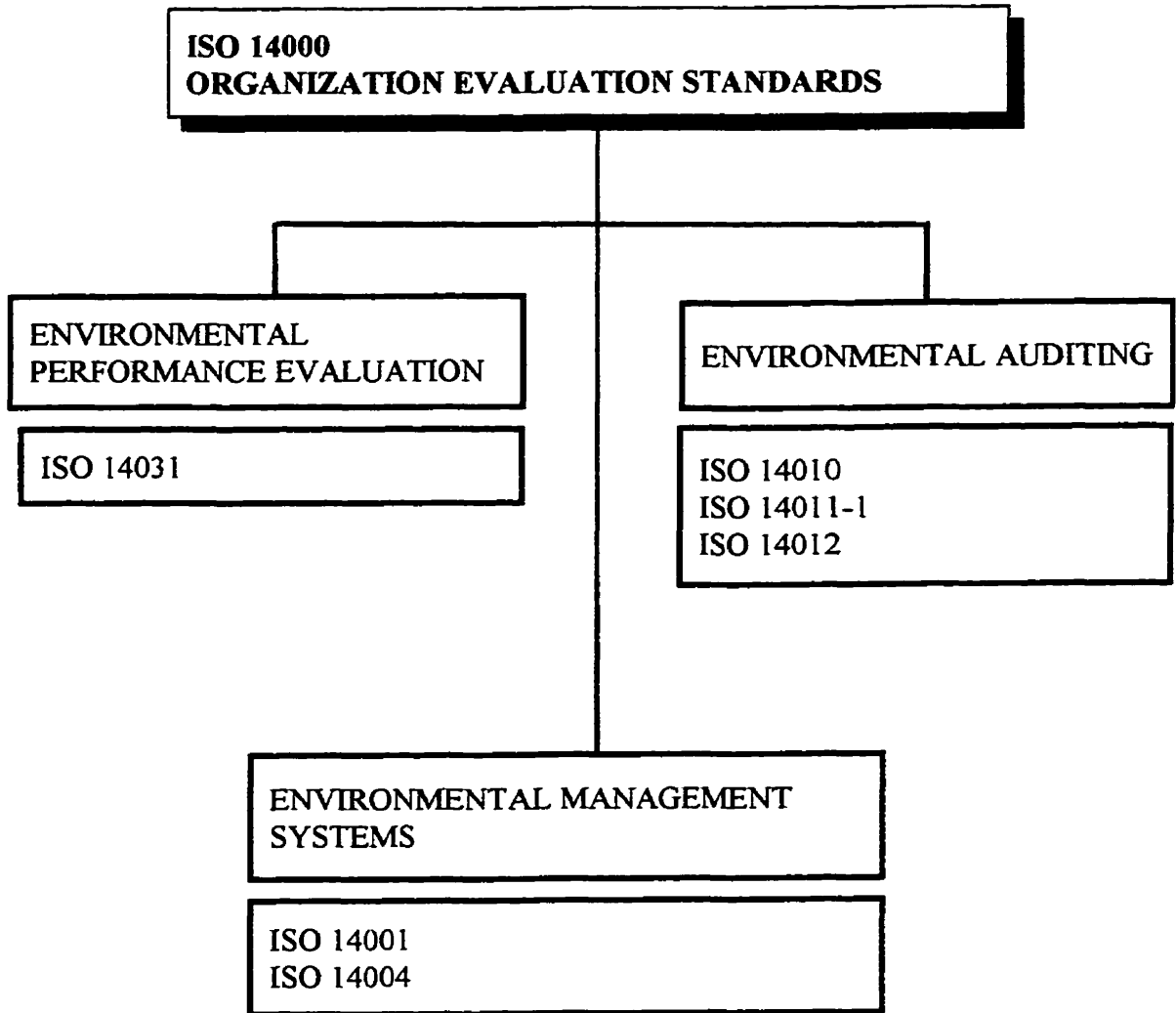
FIGURE 2.2 ISO 14000 Organization Evaluation Standards

2.1   Environmental Management Systems

As indicated in Figure 2.2, the area of environmental management systems
(EMS) is addressed by two documents, ISO 14001 and ISO 14004.
The ISO 14001 document entitled "Environmental Management Systems
- Specification with Guidance for Use" is the most important in the ISO
14000 series. This standard lays out the elements of the environmental
management system (EMS) to which organizations must conform if they
seek certification after passing an independent third party audit by an
accredited auditor.
The ISO 14004 document entitled "Environmental Management Systems -
Guidelines on Principles, Systems, and Supporting Techniques" provides
supplementary information. It is not designed for certification and is meant
to be used only as guidance by organizations that are beginning to
implement an EMS. ISO 14004 also includes several elements and
suggestions for improving an existing EMS within organizations which
currently have a system in operation.

2.1.1 ISO 14001

ISO 14001 is the management system specification document in the ISO 14000 series. It contains the elements which must be satisfied by an organization seeking certification to the standard. These elements must be implemented, documented, and executed in such a way that an independent third party auditor can grant certification on the basis of evidence that the organization has implemented a viable EMS. ISO 14001 is also designed for organizations that wish to declare their conformity to the standard to second parties that are willing to accept such self-declaration without the intervention of third parties.

Section 3.5 of ISO 14001 defines an EMS as "that part of the overall management system which includes organizational structure, planning, activities, responsibilities, practices, procedures, processes, and resources for developing, implementing, achieving, reviewing, and maintaining the environmental policy."

The EMS must be designed to provide a structure and systematic approach to overall environmental management. Required elements of a management system as described in the standard are shown in Figure 2.3.

```
┌─────────────────────────────────────┐
│        Continual Improvement        │
├─────────────────────────────────────┤
│         Management Review           │
├─────────────────────────────────────┤
│    Auditing and Corrective Action   │
├─────────────────────────────────────┤
│   Environmental Management Program  │
├─────────────────────────────────────┤
│ Environmental Goals, Objectives, Targets │
└─────────────────────────────────────┘
┌───────────────────────────────────────┐
│   Commitment and Environmental Policy  │
└───────────────────────────────────────┘
```
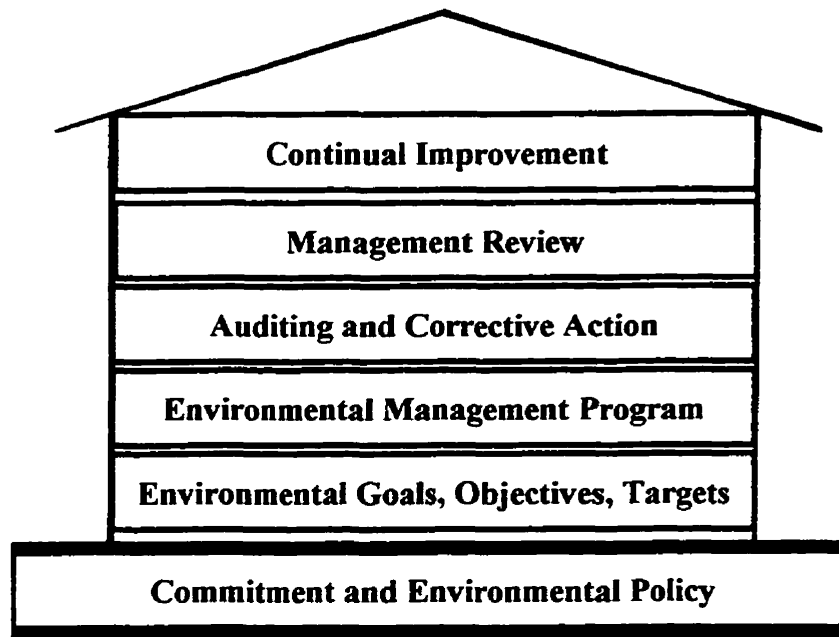
FIGURE 2.3 Environmental Management System Structural Elements

The elements can be visualized as the floors of a building with the core

elements of management commitment and environmental policy forming

the foundation for all the other components of the EMS. The first "floor"

of the building contains the organization's environmental goals, objectives,

and targets; the second "floor" is the compilation of the goals, objectives,

and targets into an environmental management program made up of

processes, practices, procedures, and lines of responsibility. In order to

11

achieve the objectives and targets set by the organization, one or more programs may have to be established. The suitability and effectiveness of each program is periodically assessed by management reviewing the progress achieved by each of the environmental programs.

The third "floor" is the auditing and corrective action level. The purpose of the audits is to determine that the EMS is being maintained and that it is working the way in which it was intended. The audits are also used to assess the compliance and management review processes themselves.

The fourth "floor", management review, is designed to determine the adequacy, suitability, and effectiveness of the EMS by management on the basis of all inputs. Inputs are received from the periodic EMS audits and in the form of performance evaluations from each program within the system.

The top "floor" of the structure, continual improvement, is the ultimate goal for an organization. Achieving continual improvement of the EMS will ensure that the organization is consistently and reliably meeting its environmental obligations and protecting the environment.

It is obvious that the elements in the lower levels of the EMS are critical to the structure and must be in place to support the elements above. Continual improvement is not achievable without all aspects of the EMS in place.

2.1.2 Importance of ISO 14001

The ISO 14000 standards will be a factor in international development and commerce for numerous reasons. They will facilitate trade and remove trade barriers; improve environmental performance worldwide; and build worldwide consensus that there is a need for environmental management and for a common terminology of environmental management systems. The requirement in ISO 14001 to build and operate an EMS focuses the organization's efforts on establishing reliable, affordable, and consistent approaches to environmental protection that engage all employees in the enterprise. The environmental protection system becomes part of the total management system, receiving the same attention as quality, personnel, cost control, maintenance, and production functions. Reliability is achieved through continual awareness and competence of all employees. Thus, ISO 14001 has the potential to provide consistent environmental protection through better management, at an affordable price.

The implementation of an EMS will bring gradual cultural change within an organization due to the requirement for increased awareness, education, and training for employees. Employees are required to adhere to the environmental policy of the organization to know how to avoid or minimize environmental incidents.

This employee involvement in the environmental management process promotes a more environmentally conscious culture within the organization.

By implementing ISO 14001 an organization becomes aware of its environmental aspects. Environmental aspects include all activities, products, and services that can have an impact upon or interact with the environment. Awareness is the first step to responsible operation and growth toward environmental stewardship.

The focus of ISO 14001 is on the implementation and continual improvement of an organization's EMS and not on environmental performance. However, improved environmental management practices and heightened employee awareness and sensitivity should result in better environmental performance overall.

3.0 IMPLEMENTING AN ENVIRONMENTAL MANAGEMENT SYSTEM

Environmental management systems are developed through the systematic implementation of the structural elements as mentioned previously and as shown in Figure 2.3. This section discusses in detail the process of implementing each of these elements in accordance to the requirements of ISO 14001.

3.1 Commitment and Environmental Policy

Implementing a sound EMS depends upon commitment from all levels of management and employees, but a commitment from top management is of utmost importance. ISO 14001 requires that an organization's environmental policy be defined by the top management and that the policy be implemented throughout the organization. This commitment from top management to sound environmental practices serves as the basis for developing and improving the EMS.

As specified in Section 3.9 of ISO 14001, the environmental policy is a "statement by the organization of its intentions and principles, in relation to its overall environmental performance, which provides a framework for action and for the setting of its environmental objectives and targets."

An environmental policy can be based on existing guiding principles and

tailored to fit an individual organization. For example, an organization involved in the production of chemicals may adopt all or part of the Chemical Manufacturers Association "Guiding Principles of CMA's Responsible Care Initiative" as part of its policy (see Appendix A). The policy should apply to the organization's activities, products and services. It should reflect the organization's mission and values, and show commitment, leadership, and direction for the organization's environmental initiatives.

3.1.1   Key Elements of Environmental Policy

a) Relevance

As defined in Section 4.2 of ISO 14001, an organization's environmental policy must be "appropriate to the nature, scale, and environmental impacts of the organization's activities, products, and services." This wording allows an organization to customize environmental policy to fit its own needs and clearly define their environmental values and aspirations.

b) Commitment to Continual Improvement and to Prevention of Pollution

The policy must include a commitment to continual improvement as well

as to prevention of pollution (see Appendix B). Continual improvement is defined in Section 3.1 of ISO 14001 as the "process of enhancing the environmental management system to achieve improvements in overall environmental performance in line with the organization's policy". The improvements are to be made to the EMS, which, once improved, may yield improvements to environmental performance. The main part of continual improvement is the process of enhancing the EMS. There is no obligation in ISO 14001 for an organization to continually improve its environmental performance, only its EMS.

The concept of prevention of pollution requires the organization to consider ways to prevent pollution. There is no specific obligation to implement methods for preventing pollution if they are technically or economically impractical or otherwise not selected as viable. The requirement is for an organization to demonstrate to the registrar that methods to prevent pollution have been evaluated before other options were considered.

c) Commitment to Comply with Regulations

The policy should also include a commitment to comply with relevant environmental legislation and regulations and to meet other requirements to which the organization subscribes (see Appendix C). Although an

17

organization does not have to meet all regulations and commitments to become registered to ISO 14001, the organization must have a plan in place or some other means of proving that it is working toward achieving total compliance with country laws and voluntary commitments.

Once in place, the environmental policy must provide the framework for the organization to set and review environmental objectives and targets (see Appendix D). It is also a requirement for the environmental policy to be documented, implemented, maintained, and communicated to all employees. Documentation can take the form of a signed statement from the board of directors or the senior level executive. Implementation can be demonstrated through the organization's instructions, objectives, targets, strategic plan and environmental management program. The policy must also be made available to the public and interested parties.

Environmental policy can be communicated at neighbourhood meetings, through stockholders publications, newspaper ads or through presentations to various groups.

3.2   Planning

After environmental policy is set, ISO 14001 requires an organization to develop a plan for carrying out the policy. The planning section of the

standard (Section 4.3) requires an organization to:

1. Establish a procedure to identify the environmental aspects of its operations

2. Establish a procedure to identify legal and other requirements to which the organization subscribes

3. Establish and maintain documented environmental objectives and targets at each relevant function and level within the organization.

4. Establish and maintain an environmental program for achieving objectives and targets.

A discussion of each of these elements is presented as follows.

3.2.1 Environmental Aspects

The relationship among environmental aspects, environmental impacts, and the EMS is an important consideration when implementing ISO 14001. The environment is defined in the standard as "surroundings in which an organization operates, including air, water, land, natural resources, flora, fauna, humans, and their interrelation" (Section 3.2). It is the backdrop for an organization's activities, products, and services. An environmental aspect is any "element of an organization's activities,

19

products, and services which can interact with the environment" (Section 3.3), and a significant environmental aspect is one that " has or can have a significant environmental impact" (See Appendix E). The difficulty for an organization is determining what is and what is not an environmental aspect.

The standard defines environmental impact as "any change to the environment, whether adverse or beneficial, wholly or partially resulting from an organization's activities, products, or services" (Section 3.4) (See Appendix F).

The elements of the EMS are shaped and implemented around the organization's environmental aspects and environmental impacts. ISO 14001 authors intended for the EMS to ultimately address the given environmental circumstances of the organization. If an organization has no environmental aspects, there is no need to implement an EMS. However, if an organization has numerous environmental aspects, and many of them are significant, then the organization will require an increasingly sophisticated EMS.

The process by which environmental aspects are catalogued and categorized by the organization is subject to assessment by a certifying agency. Omission of indisputable aspects in the inventory is seen as a deficiency in the process of aspect identification.

3.2.2 Legal and Other Requirements

The organization is required to identify, or catalogue, legal and other

requirements to which the organization subscribes that are directly

applicable to its activities, products, and services. This requirement

necessitates that organizations doing business in more than one country

understand the environmental laws of applicable countries.

Procedures for satisfying legal requirements must be developed and

implemented, and evidence of an organization's efforts toward this end

must be demonstrated during the certification process. Because of the

number and complexity of regulations in existence around the world,

establishing this procedure could require extensive technical knowledge,

especially for multinational organizations. (See Appendix G)

3.2.3 Environmental Objectives and Targets

ISO 14001 defines an environmental objective as an "overall goal, arising

from the environmental policy that an organization sets itself to achieve,

and which is quantified wherever practical" (Section 3.7). Environmental

targets are "detailed performance requirements, quantified wherever

practicable, applicable to the organization or parts thereof, that arise from

the environmental objectives and that need to be set and met in order to achieve those objectives" (Section 3.10).

The setting of objectives and targets must be consistent with the organization's environmental policy and with its commitments to prevention of pollution. The organization must prove that it considered prevention of pollution in its activities, services and products. The objectives and targets do not have to show evidence of pollution prevention, although in some cases they might (See Appendix H).

3.2.4   Environmental Management Program

An environmental management program provides a comprehensive framework for the elements necessary to achieve the company's policies, to ensure sustained conformance to environmental requirements, and to enable continual improvement. Typical elements of an environmental management program are as follows :

- ►   Management structure, responsibilities, organization and authority
- ►   Environmental management business processes
- ►   Resources (people and their skills, financial resources, tools)

- Process for setting objectives and targets to achieve environmental policies

- Operating procedures and controls

- Training

- Measurement system and auditing

- Management review

An organization's policies, its environmental aspects, and the laws to which it is subject all directly influence the structure of its environmental management program. Such a program consists of action steps, schedules, resources, and responsibilities required for the organization to achieve both its stated short term objectives and policy conformance. Tools that might be used to implement the environmental management program include documented processes, practices, procedures, employee training and awareness, and emergency planning.

Among other things, the environmental management program must designate responsibility for achieving objectives and targets, and must set a time frame by which they are to be achieved. Certification is not dependent upon successfully achieving objectives and targets, only that the program for achieving them is established and implemented.

3.3   Implementation and Operation

A company may have well developed environmental policies and goals and

the best laid plans for environmental excellence, yet run into a major

environmental problem because of inadequate implementation and

operation of an EMS. These situations can happen quickly, create

negative public reactions, and leave lasting damage to an organization's

financial position and reputation. Most environmental tragedies have

stemmed from breakdowns in the process management system,

particularly from inadequate attention to some aspect of the organization's

operations.

This section discusses techniques for integrating the EMS into an

organization's operations. While not all risks can be eliminated,

implementation of an adequate EMS can help an organization in

identifying actual and potential environmental impacts and environmental

risks. Once impacts and risks are identified, the organization can set

objectives and targets, including the development of cost-effective

strategies for minimizing environmental risks for selected operations.

Development of an EMS is an iterative process. Organizations can

develop an EMS to identify environmental aspects and impacts, set

objectives and targets, evaluate environmental performance, and make

operational adjustments for continual improvement over time. Under 14001, implementation and operation of an organization's EMS will be evaluated on the following seven elements:

1. Structure and responsibility

2. Training, awareness and competence

3. Communication

4. EMS documentation

5. Document control

6. Operational control

7. Emergency preparedness and response

A discussion of each of these elements follows.

3.3.1 Structure and Responsibility

Organizations can vary widely in both their structure and the roles played by individuals within that structure, yet have equally effective EMS's. The most critical elements are the support of upper management, line management, and the organization's employees.

The values set by top management in the environmental policy play a crucial role in defining and organization's EMS. The organization that commits to an effective EMS, to regulatory compliance, and to the

25

prevention of pollution is on their way to environmental progress.

Conversely, an organization that makes implementation of an EMS a

paperwork exercise will obtain none of the benefits and may produce

employee cynicism and less environmental care.

The following approaches to the subject of environmental responsibility

may be very helpful:

- Distribute environmental responsibility throughout the
organization, through the management team and the employees.

- Provide regular feedback to management and employees of the
organizations conformance to the EMS and to progress in
achieving objectives and targets, including milestones and problem
areas. An "open book" management approach will help to engage
employees and encourage broad based support for environmental
initiatives.

- Consider ways to broaden traditional roles to include
environmental responsibilities. For example, a team representative
of both middle management and employees could be included in
corporate environmental facility reviews. This accomplishes two
goals: it provides the team's viewpoint in the review process, and
it broadens the team's knowledge of environmental requirements
and opportunities.

26

3.3.2 Training, Awareness, and Competence

ISO 14001 specifies two types of training to be provided by the organization: training for general awareness, for all employees of the organization, and training for competence to perform a given assignment. Training may also be required for contractors and suppliers performing work that could have environmental impacts for the organization.

All employees or members of an organization at all levels are to receive awareness training on:

- ▸ The importance of conformance with the environmental policy and procedures and with the requirements of the EMS.

- ▸ The significant environmental impacts, actual or potential, of their work activities and the environmental benefits of improved personal performance.

- ▸ Their roles and responsibilities in achieving conformance with the environmental policy and procedures and with the requirements of the EMS, including emergency preparedness and response requirements.

- ▪ The potential consequences of departure from specific operating procedures.

In addition, those "performing tasks which can cause significant environmental impacts shall be competent on the basis of education, appropriate training, and/or experience, as required" (Section 4.4.2). Training enables continuous improvement in all system elements and fits in well with "learning organizations". Careful development of training content will reduce training time and increase its effectiveness. Media for training can range from classroom delivery, to video or audio taped sessions, to computer based or to multimedia approaches. Documentation of training, including who was trained, the training content, and the date of training, must be maintained to meet the requirements of ISO 14001.

Contractor and supplier training should be implemented to ensure the protection of employees from contractor activities on their premises and to ensure that contractors and suppliers meet the organization's environmental and product quality requirements. The training should make contractors and suppliers aware of the environmental aspects and impacts of their activities, which could lead to better environmental protection, prevention of environmental harm, and ultimately to a reduction in liability for the organization. This training allows the contractors and suppliers to see the value of an integrated EMS and may lead to the development of an EMS within their own organizations.

3.3.3 Communication

Another key aspect of sound environmental management is

communication with employees, neighbours and other interested members

of the public, and with customers. ISO 14001 specifies in Section

4.4.3,pg.4,that procedures be in place for :

- ► Maintaining internal communication between various functions and levels of the organization.

- ► Receiving, documenting, and responding to relevant

  communication from external interested parties regarding

  environmental aspects and the EMS.

The organization must consider processes for external communication on

its significant environmental aspects and record its decision about whether

to implement a communication process. However, only environmental

policy must be made public under the requirements of ISO 14001.

Communication can be achieved through several means, including

management reviews, presentations, awareness training, or written

communication, such as newsletters or an annual report.

3.3.4 EMS Documentation and Document Control

EMS processes and procedures must be documented and kept current to ensure a match between the document process and what is actually practiced by the organization.

The major challenge is creating an effective means for deploying the latest documentation. Small organizations can put all relevant information into a binder and keep it in a central location. Larger organizations can organize and distribute up to date information through their computer network. Paper copy distribution can also work, as long as obsolete documents are removed from service. In all cases, the documentation should be dated, clearly identified, organized, reviewed and updated on a fixed schedule.

3.3.5 Operational Control

Section 4.4.6 of ISO 14001 contains important requirements about operational control and mandates actions necessary for an organization to show conformance.

The standard specifies the following:

" The organization shall identify those operations and activities that are associated with the identified significant environmental aspects in line with its policy, objectives, and targets. The organization shall plan these activities, including maintenance, in order to ensure that they are carried out under specified conditions by:

a) establishing and maintaining documented procedures to cover situations where their absence could lead to deviations from the environmental policy, and the objectives and targets

b) stipulating operation criteria in the procedures

c) establishing and maintaining procedures related to the significant environmental aspects of goods and services used by the organization and communicating on relevant procedures and requirements to suppliers and contractors"

In conjunction with identifying its significant environmental aspects, an organization must identify its operations and activities associated with those aspects. For example, air emissions, such as sulfur oxides, from a power generating facility must be identified. Understanding equipment and processes is critical to identifying and ultimately minimizing associated

environmental impacts.

Once such operations and activities are identified, procedures must be developed to meet the requirements noted in a) through c). In developing these procedures, the following suggestions may useful:

- ► Keep the procedures simple to understand and to use

- ► Decide beforehand how they will be distributed for use

- ► Provide training and motivation to those responsible for carrying out the procedures

- ► Create a systematic way for reviewing the procedures to keep them current and relevant to the users

The organization must ensure that its suppliers and contractors understand its requirements, so that they do not cause the organization to compromise its own EMS.

3.3.6 Emergency Preparedness and Response

The procedures for operational control are intended to prevent the need for emergency response. However, preparing for an emergency is a critical part of any EMS. An organized, competent response to the occurrence of

an emergency will help minimize any damage to human health or the environment. Examples of items to include in an emergency plan are shown in Appendix I.

In addition to planning for emergency response, the organization should document the most effective mitigation techniques for its operations. Techniques could include employee training, certification of operators, loss prevention programs, system design improvement programs, and development of an accident/ incident investigation program.

3.4 Auditing and Corrective Action

Subsection 4.5 of ISO 14001 addresses checking and monitoring activities related to the EMS as well as methods for taking corrective action if deficiencies are found. Topics of discussion in this section are:

- Monitoring and measuring the EMS
- Handling and investigating nonconformance
- Implementing corrective action and preventative action
- Maintaining environmental records
- Establishing and maintaining an EMS audit program

3.4.1 Monitoring and Measurement

Monitoring and measurement are required elements of an EMS which

allow an organization to assess its progress in meeting stated

environmental objectives and targets. A monitoring and measurement

program is a continuous process that includes on going data collection and

continual tracking of specified parameters. A functional monitoring and

measurement system should include:

- ► Procedures to monitor and measure on a regular basis key

  characteristics of operations and activities that have a significant

  impact on the environment.

- ► A mechanism to record information that tracks performance,

  relevant operational controls, and conformance with environmental

  objectives and targets

- ► A procedure to calibrate monitoring equipment and a method for

  ensuring that calibration records are kept for the period of time

  prescribed.

- ► A documented procedure for periodically evaluating compliance

  with environmental legislation and regulations.

3.4.2 Nonconformance, Corrective and Preventative Action

ISO 14001 requires an organization to establish and maintain procedures for handling, investigating, and initiating corrective and preventative action for nonconformance. Responsibility and authority for all activities related to nonconformance must also be defined.

"Nonconformance" refers to deviations from the EMS and from requirements of ISO 14001 and should not be confused with "noncompliance" which is the term used for deviations from country law and regulations. One requirement of the EMS is management vigilance over the continuous operation of the EMS elements. This requirement provides the feedback mechanism to correct the EMS if any part falters and needs correction. The standard further requires that steps be taken to prevent recurrence of the nonconformance.

Nonconformance includes anything that does not meet requirements, as defined by the EMS. It can include, but is not limited to, nonconformance with respect to policy, objectives, and targets; structure and responsibility; training plans; record keeping; monitoring and measurement plans; EMS audits; and management review documentation and EMS improvements implementation.

The management system for handling nonconformance should include the

following:

- Identification of the cause of the nonconformance, through root cause analysis or other methods

- Identification of options for corrective and preventative action, including the addition or modification of procedures or other controls

- Personnel training

- Implementation of a plan for selected corrective action

All corrective and preventative actions should be appropriate to the magnitude of the nonconformance and to the actual or potential environmental impact.

Maintaining environmental records of all actions is a key part of an EMS. These records will allow an organization to demonstrate conformance to the ISO 14001 standard, as well as to track progress toward meeting objectives and targets. Records must be maintained so that they are readily retrievable and be protected against damage, deterioration, or loss.

3.4.3 EMS Audit

ISO 14001 defines an EMS audit as "a systematic and documented verification process to objectively obtain and evaluate evidence to determine whether an organization's environmental management system conforms to the EMS audit criteria set by the organization, and to communicate the results of this process to management" (Section 3.6). The audit is required on a periodic basis, depending upon the environmental importance of an organization's activities and the results of previous audits. The purpose of the audit is to determine whether the EMS conforms to planned arrangements for environmental management and if the EMS is properly implemented and maintained.

The audit is an audit of the EMS, not of environmental performance. The audit criteria pertain to the EMS and are set by the organization. The EMS audit is expected to be an objective evaluation against the preestablished criteria. Basically, the auditor determines if the EMS is in place as specified in ISO 14001 and whether it is working and attended to. An organization needs to have the audit system in place, documented, implemented, and maintained, with results reported to management, in order to achieve conformance.

It is important to distinguish between the EMS audit required by ISO

14001 and the certification audit conducted for certification purposes. Both can be third party audits, but the EMS audit is conducted against preestablished criteria that the organization has a role in developing, while the certification audit follows uniform criteria established by the conformity assessment system in a given country. Neither the EMS nor the certification audit is a compliance or performance audit. In both cases, compliance and performance data may be viewed only as indicators of whether the management system itself is working.

An effective EMS audit program should allow the organization to determine whether the EMS:

- Conforms to a planned arrangement for environmental management, including the requirements of ISO 14001
- Has been properly implemented and maintained
- Provides information on the results of the EMS audit to management for its review

The audit program procedures should specify the frequency of the audits, the audit scope, audit methodologies, and responsibilities and requirements for conducting the audits and for reporting the results. The audit scope should be limited to requirements defined by the EMS, and

should not include environmental performance.

The audit can be conducted by personnel within the organization or by a third party audit team. If internal personnel conduct the audit, there should be some mechanism in place to ensure objectivity.

The EMS audit provides a snapshot in time of the effectiveness of an organization's EMS. It compares the organization's EMS implementation with its statements of intention. Once the audit is completed, the results of the EMS audit are reported to management in the form of a written report.

3.5 Management Review

Management review is vital to the success of an EMS as it provides the link between an organization's environmental policy, long-term goals, environmental results, and continual improvement.

With respect to ISO 14001, management has the following responsibilities:

- ► Environmental policy and strategy
- ► Judgement and action on EMS review and audit results
- ► Judgement and action on environmental performance results

39

- Staffing, organizational structure, and culture

- Financial and technological resources

As specified in the standard, management is the leader of the organization, setting the organization's course, assessing its results, and adjusting the EMS elements to achieve short and long term environmental goals.

3.5.1 Elements of Management Review

In accordance to ISO 14001 specifications, a management review is to be performed and documented at intervals determined by management to ensure that the EMS is suitable, adequate, and effective. The EMS must ensure that needed information is compiled for a proper management review. The information required includes:

- Previous management review and audit results

- Environmental objectives and targets verses performance results

- Changes in business environment that may influence policy, objectives, and targets

- New or changed legislation

- New or changed stakeholder or interested party expectations

40

- Changes in applicable technology, including work processes

- Organization's financial and competitive position

- Business areas and activities

- Market preferences

- Environmental incidents, nonconformances, and corrective action

The involvement of senior management is key as they are responsible for setting environmental policy. Their participation is essential to ensure sufficient feedback for continual improvement. Management involvement is also important in the certification process, since it shows commitment to the environmental policy and its successful application. Management reviews can be simple or involved, informal or formal, reflecting the organization's culture.

Environmental management staff plays a role to ensure a productive and effective management review. The following tasks can best be performed by those with environmental management responsibilities:

- Highlight current and emerging issues

- Coordinate EMS audits

- Oversee the EMS, including underlying processes and performance indicators being used

- Provide guidance on environmental performance measurements to

line and supporting organizations

- Collect, analyze, and review with management environmental performance measurements of the entire organization

The environmental management staff also provides the technical assistance to line management to improve the EMS on the basis of management assessments and directions.

3.5.2 Management Review Approach

Management reviews should reflect the organization's culture and style, as well as the preferences of the individuals involved. There are many approaches that management can use to structure its reviews, the most common being a combination of both formal and informal methods. Formal methods include:

- Regular update and review of a given set of program and process measurements

- In-depth review of program and process elements

- Review of nonconformances, either in scheduled periodic reviews or upon detection

42

- Framing and review of environmental policy, EMS, and strategy for continual improvement

Informal methods, such as "Management by walking around", help management to stay in touch with how things are working, or not working, within the organization. By interacting with employees in their work area, upper management can observe practices first hand, and can seek employee suggestions about how to improve the EMS. Discussions with peers managing similar operations can help shape, reinforce, or reshape management approaches through the benefit of comparative analyses or bench marking.

Unscheduled reviews can take place as problems arise that need to be resolved immediately. Informal methods are used to quickly gather background information, frame the problem or issue, and develop options and an action plan to resolve the issue. Any unscheduled reviews should be fully documented and introduced at the next regular review meeting to track the status of corrective action and to ensure that senior management is informed.

4.0   CERTIFICATION STRATEGY

Section 3 of this report discussed in detail the structural elements of an EMS and presented a systematic process for implementing each of these elements. The process allows for an integrated approach to achieving continual improvement of the EMS. The objective of an organization undertaking this process is the achievement of an audit ready EMS which has a documented environmental management program and all EMS elements and procedures consistent with actual organizational practices.

The organization at some point, must decide whether or not to pursue certification to ISO 14001. There are basically four options available to organizations that implement ISO 14001:

1) Decide not to seek certification

2) Seek certification only after compelling reasons to do so exist

3) Obtain certification immediately

4) Self declare conformance to ISO 14001

Organizations electing the first option may or may not have an acceptable EMS in place or under development. Based upon information available to them, they have decided that certification is not necessary for them to achieve marketplace

objectives, environmental compliance objectives, and other environmentally related objectives.

Organizations that choose the second option want to implement an EMS for systematic environmental control, as well as a certification ready position, but do not necessarily want to spend money on third party certification at this time. Having laid the foundation for certification, these organizations can obtain it quickly to take advantage of any new market opportunities that require it.

The third option is one which organizations will pursue if they have a current or imminent market requirement to meet or if their organization sees the benefits of certification as outweighing the costs. Certification can be a catalyst for improving an organization's EMS, improving reliability of compliance processes, identifying and reducing environmental risks, and obtaining market advantages.

The fourth option will be selected by organizations that choose to proclaim their good faith efforts for environmental protection, but get no specific benefit from certification. Local governments, small service businesses, and non profit organizations are examples of organizations which may select this option.

Should an organization choose to seek certification, an EMS certification audit, as previously discussed, is needed in order to become certified to ISO 14001. The audit will test for conformance of the organization's EMS to the requirements specified in the standard.

5.0   INITIAL ENVIRONMENTAL REVIEW

Although it is not required under ISO 14001, conducting an initial environmental review is a good practice for several reasons. The results of the review can help in formulating an effective environmental policy; in planning the implementation strategy; and in formulating the criteria for the periodic EMS audit required under ISO 14001.

The initial environmental review assesses the organization's current position with respect to the standard. For example, if an organization already has an ISO 9000 certified system in place, then many of the issues within an EMS such as document control and training may have been addressed.

The process of conducting an initial review begins with the commitment of senior management to developing an EMS. Once this commitment is made, a review team, consisting of in-house or external experts in the fields of environmental impact assessment and environmental regulation, should be established. Formal authority to conduct the review should be granted to the review team, which should then focus on the following three key areas:

- Examination of existing environmental management practices and procedures

- Identification of significant environmental impacts and their priority

- Identification of legal and regulatory requirements

As a result of this review, which covers all aspects of an EMS, the organization

knows its strengths and weaknesses, risks and opportunities regarding the current

status of its EMS. The gap between the requirements of the ISO 14001 standard

and the actual status of the organization indicates which aspects the organization

should focus its efforts on to improve the system. This will provide a clear

direction to the development of an environmental management program that

should fill the gaps.

PART B   ORGANIZATIONAL IMPLICATIONS

1.0   INTRODUCTION

Depending upon an organization's existing management system, the decision by

upper management to implement an EMS may have a dramatic effect on both

employee motivation and behaviour. The success or failure of the EMS is

dependant upon management's ability to identify possible problem areas and to

formulate plans to alleviate any problems which they perceive as detrimental to

the program.

Persons knowledgeable in the field of Organizational Behaviour will recognize the

EMS outlined in Part A of this report as an adaptation of many elements of

"Management by Objectives (MBO)". MBO has been adopted by many

organizations over the years and is possibly the most widely used form of

management in today's business. As the popularity of MBO grew within business

organizations, the number of scientific investigations of the theory by researchers

in the field of organizational behaviour grew accordingly. The investigations have

resulted in both proponents and critics of the theory.

Regardless of whether they support or oppose the theory, a consensus has been

reached by researchers as to several factors which could lead to the failure of

MBO programs.

The following sections will provide a brief discussion of the theory of MBO and summarize the causes of failure of MBO programs which have been identified by a number of researchers.

2.0 MANAGEMENT BY OBJECTIVES

Although specific features of MBO programs may vary from one organization to another, in general, the following definition of MBO will apply:

> "A managerial process whereby organizational purposes are diagnosed and met by joining superiors and subordinates in the pursuit of mutually agreed upon goals and objectives, which are specific, measurable, time bounded, and joined to an action plan; progress and goal attainment are measured and monitored in appraisal sessions which center on mutually determined objective standards of performance" (McConkie, 1979, p.37)

The definition identifies the three key component processes of MBO: goal setting, participation in decision making, and objective feedback.

Goal setting focuses the attention and actions of employees toward the achievement of predetermined objectives.

Participation in decision making promotes understanding throughout the

organization. Open communication between the hierarchal levels allows subordinates to be made aware of top management's objectives and top managers to be made aware of possible problems at the operational level in implementing programs to achieve their objectives.

Objective feedback is provided in the form of a periodic performance review by the superior and the subordinate as to the progress by the subordinate toward the objectives set at the beginning of the period. The joint setting of goals and objectives and the subsequent joint review of progress toward goal attainment eliminates the traditional, often subjective, method of performance appraisal practised in many organizations. The result is a more constructive assessment of past performance which will assist in the setting of future goals and objectives. Goals set at each level of the organization must be consistent with the goals set at other hierarchical levels. According to Pinder, "the goals set at the highest level of the organization should be stated in relatively general terms, which can subsequently be translated into increasingly more specific terms at each lower level" (Pinder, 1984, p.173).

Combining the three key component processes into a formal MBO program has proven difficult for some organizations, resulting in the failure of the entire program. Researchers have identified a number of reasons for MBO failures, several of which will be discussed in the next section of this report.

3.0   MANAGEMENT BY OBJECTIVES PROGRAM FAILURE ANALYSIS

Research indicates that two types of problems lead to the majority of MBO

program failures. The first involves political issues during the implementation

stage, while the second type results from the behaviour reactions of members of

the organization after the program has been implemented.

Most organizations consist of complex political social systems with employees at

all levels vying for power, influence, and a share of a finite amount of resources.

The perception of a loss a power by those currently holding it may result in

resistance to the new program. On the other hand, those newly empowered may

be fully supportive of the new program. The coalitions formed (both pro and con)

by the sharing of power will create a division of the work force. The fear of

redundancy within the organization by some managers may disrupt the flow of

power to lower levels. These managers may only pass down to lower levels a

portion of the influence which has been passed down to them. A general

resistance to change within an organization is anticipated, however, active

resistance may result from employees who feel that they have suffered a loss of

influence from reassignment of duties or job reclassification. Due to employee

commitment and loyalty to their immediate work unit, they may only comply to

objectives which they perceive as beneficial to their unit. Achievement of the

overall objectives of the organization may suffer accordingly. Managerial,

professional and technical personnel may perceive an MBO program as limiting

their professional freedom, which may cause them to resist its implementation.

Assuming the MBO program has survived the implementation stage by adequately

addressing all the relevant political issues, the program must face a number of

post-implementation issues. The first problem is to establish a strong management

information system which must be capable of setting goals and monitoring the

performance of employees with respect to attaining those goals. A management

team skilled in the participatory style of management is necessary to accomplish

this task. In setting goals, the objectives of the organization should be

incorporated with the goals of the individual employee as much as possible. The

congruency of these goals will have a direct effect on the commitment by the

employee in pursuit of his/her work goals. The tying of rewards to goal

attainment is another possible cause for the failure of MBO programs. According

to Ford, this practice "sometimes discourages innovation and risk taking, and

instead, encourages conservative goal setting, interpersonal rivalries and

factionalism." (Ford, 1979, p.52).

The most predominant reason for MBO program failure is the lack of top

management commitment and participation. The firm commitment and

participation by top management legitimizes the process and provides a role

model for the next organizational level. This process moves downward through

the hierarchy until the process has permeated throughout the entire organization.

As lower level workers have an opportunity to comment on operational problems and issues, top management acquires a better understanding of the barriers and obstacles to accomplishing organizational goals. Poorly conceived objectives can be abandoned in favour of more appropriate ones. Therefore, goal setting becomes an integral component of the ongoing management process, resulting in continual improvement of the system as a whole.

CONCLUSION

Part A of this report presented the elements required by ISO 14001 and an approach which may be used by organization wanting to implement an EMS conforming to the standards. Organizational implications and causes of failure of MBO programs were discussed in Part B. In concluding this report it is important to restate the fact that EMS standards are process standards, not performance standards. However, it is assumed that better environmental management will lead indirectly to a better environmental performance.

The environmental management system specified in ISO 14001 will provide a foundation for an organization's sound environmental performance. Effective implementation should complement a company's existing management system and will facilitate the development of systems to establish and monitor environmental policy and objectives throughout the full range of the company's activities.

By adopting a comprehensive EMS, an organization begins a more holistic, systematic approach to environmental issues. Pollution and other environmental concerns will be addressed from the perspective of the total enterprise, thereby ensuring cost-effective, risk based solutions to achieving continuous improvements in environmental performance.

In addition to the environmental benefits, an EMS complying to the ISO 14001 standard will ensure that environmental goals, objectives, and targets are established and pursued

54

in a cost effective manner. This could result in an organization improving its profitability in several ways. Cost savings may be realized due to increased efficiency of operations and a reduction of pollution prevention costs, potential penalties, and the risk of litigation. Organizations with sound EMS's may receive reduced liability insurance rates due to their reduced risk and emergency preparedness. The ability of an organization to attract investment capital, either though loans, bond issues, or share purchases, may increase due to their commitment to continual improvement of the EMS. These available funds could allow the organization to proceed with expansion plans or to take advantage of market opportunities that may arise.

Another important aspect is that ISO 14001 provides an opportunity for organizations to integrate environmental management into the entire culture of the organization. It creates a common international environmental language for global environmental progress and leads to increased awareness among employees of their importance in the environmental management process. Ultimately, it is individual employees who directly influence the environmental consequences of an organization's activities, products, and services.

The ISO 14001 framework serves as a guide for willing and committed organizations that seek cultural change for better environmental care, more consistent and reliable compliance with laws and regulations, and better performance from their systems and operations.

BIBLIOGRAPHY

Canadian Standards Association. National Standard of Canada, Can/CSA -
ISO14001-96 Environmental management systems, Specifications.
Ottawa:CSA, 1996.

Canadian Standards Association. National Standard of Canada, Can/CSA -
ISO14004-96 Guidelines on principles, systems, and supporting techniques.
Ottawa:CSA, 1996.

Canadian Standards Association. National Standard of Canada, Can/CSA -
ISO14010-96 Guidelines for Environmental auditing Ottawa:CSA, 1996.

Cascio, Woodside, G. and Mitchell,P. ISO 14000-The New International
Environmental Management Standards. Toronto: McGraw-Hill, 1996.

Chemical Manufacturers Association. Guiding Principles, Responsible Care: A Public
Commitment. Washington: CMA, 1991.

Daft, Richard L. Organization Theory and Design. 6th Edition Cincinnati: South
Western College Publishing, 1998.

Dobyns, Lloyd and C.Mason. Thinking About Quality Management. Toronto:
Random House of Canada, 1996.

Ford, C.H. MBO: An Idea Whose Time Has Gone?. Business Horizons, 22(12),
p.48-55, 1979.

Frederics, Isis and D. McCallum. International Standards for Enviromental
Management Systems. Canadian Environmental Protection, August 1995.

Frederics, Isis. ISO 14000: A Reality Check. Hazardous Materials Management,
Oct/Nov 1995.

Hemenway, C. ISO 14000 Questions and Answers. Toronto: ASQC Quality Press,
1996.

International Institute for Sustainable Development. Global Green Standards: ISO
14000 and Sustainable Development. Winnipeg: IISD, 1996

Locke, E.A. The Motivation Sequence, The Motivation Hub, and the Motivation Core. Organization Behaviour and Human Decision Processes, vol 50, p. 288-299, 1991.

Maslow, A.H. The Theory of Human Motivation. Psychological Review, vol 50, p. 370-396, 1943.

McCallum, D. Environmental Priority Setting. Canadian Environmental Protection, Mar/Apr 1996.

McConkie, M.L. A Clarification of the goal setting and appraisal processes in MBO. Academy of Management Review, vol 4, p. 29-40, 1979.

Pinder C.C. Work Motivation - Theories, Issues and Applications. Glenview: Scott, Forman and Company, 1984.

Smith, A.C. Continuous Improvement Through Environmental Auditing. Total Quality Environmental Management, Winter 1991/2, p. 121-129.

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

APPENDIX A

Guiding Principles of CMA's Responsible Care Initiative

- ► To recognize and respond to community concerns about chemicals and our operations

- ► To develop and produce chemicals that can be manufactured, transported, used and disposed of safely

- ► To make health, safety and environmental considerations a priority in our planning for all existing and new products and processes

- ► To participate with government and others in creating responsible laws, regulations and standards to safeguard the community, workplace and environment

APPENDIX B

Example of Elements to Include in Policy Statement:

Continual Improvement and Pollution Prevention

- ► Commitment to sound environmental management practices which allow for continued improvement within the environmental management system

- ► Commitment to sustainable development that protects the environment and has the potential to continually improve and enhance environmental performance

- ► Commitment to the replacement of natural resources whenever possible

- ► Commitment to pollution prevention and the manufacture of products in a manner which reduces releases to the environment

- ■ Commitment to life cycle thinking when developing new products and processes

APPENDIX C

Example of Elements to Include in Policy Statement:

Legislative, Regulatory and Other Compliance

- Commitment to compliance with all environmental regulations and, to the extent practicable, commitment to provide environmental protection beyond that which is required

- Commitment to sound management of environmental aspects so as to reduce, to the extent possible, global environmental impacts

- Commitment to provide technological solutions that are environmentally sound and to provide for technical transfer of these solutions to the benefit of sustainable development and the environment

- Commitment to being an environmentally responsible neighbour to the community

APPENDIX D

Example of Elements to Include in Policy Statement:

Framework for Setting and Reviewing Environmental Objectives

- ▶ Commitment to development and design of products and processes in an environmentally conscious manner so as to reduce consumption of resources

- ▶ Commitment to recycle and reuse materials to reduce waste generation

- ▶ Commitment to maintain a safe and healthy workplace for all employees

APPENDIX E

Examples of Environmental Aspects

- Waste generation

- Wastewater discharge

- Stormwater discharge

- Point source air emissions

- Automobile exhaust emission

- Chemical use operations

- Water use operations

- Energy use operations

- Use of natural resources

- Product disposal

- De-commissioning and reclamation

APPENDIX F

Examples of Environmental Impacts

Impacts of Ecology

- ▶ Impacts on flora and fauna
- ▶ Impacts on biological diversity
- ▶ Impacts on habitat
- ▶ Impact on landscape

Impacts on Natural Resources

- ▶ Impacts on agricultural land
- ▶ Impacts on forest resources
- ▶ Impacts on water supplies
- ▶ Impacts on energy resources
- ▶ Impacts on wetlands

Impacts on Pollution

- ▶ Impacts on air or water
- ▶ Impacts on soil erosion
- ▶ Impacts on waste generation
- ▶ Impacts on contamination levels

APPENDIX G

Examples of Laws which apply to a Multinational Organization

Canada

- Canada Water Act and Amendments
- Fisheries Act and Amendments
- Clean Air Act and Amendments
- Environmental Contaminants Act and Amendments
- Environmental Protection Act
- Canadian Environmental Assessment Act

United States

- National Environmental Policy Act
- Clean Air Act
- Resource Conservation and Recovery Act
- Surface Mining Control and Reclamation Act
- Clean Water Act
- Safe Drinking Water Act

APPENDIX H

Examples of Objectives and Targets

Objective: Reduce Effluents and Emissions

Targets

▶ Evaluate and implement actions for reducing effluents and emissions according to the following schedule:
33% reduction of hazardous waste by 1999
50% reduction of hazardous waste by 2000
30% reduction in waste water discharges by 1999
20% reduction in air emissions by 2000

▶ Evaluate feasibility of on-site recycling by year end 1999

Objective: Reduce Energy Consumption

Targets

▶ Evaluate energy saving bulbs, timers, and other equipment by year end 1998
▶ Establish on energy audit program by year end 1998
● Formulate long term energy saving plan by year end 1998
▶ Implement plan beginning first quarter 1999

APPENDIX I

Example of Elements to be Included in an Emergency Plan

Planning Elements

- Identification and description of areas on site that store hazardous substances
- Identification of areas which may be impacted
- Instructions for plan use

Operations, Direction and Control

- Designation of site emergency coordinator and other key personnel
- Description of communication methods to be used
- Description of procedures for responders and personnel
- Description of major cleanup methods
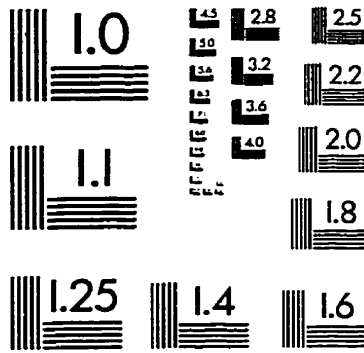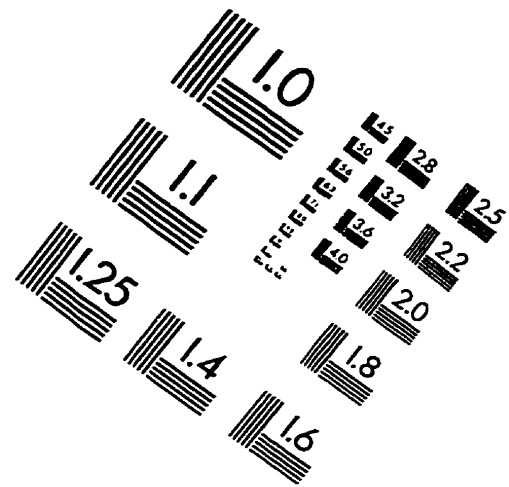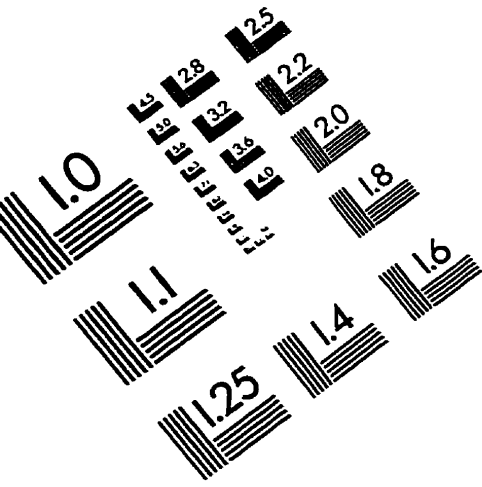- Lists of agencies to be notified

Resource Management

- Description of emergency equipment on site
- List of personnel resources available
- Description of training program for site personnel

Personal Protective Measures/ Evacuation Procedures

- Description of evacuation plans

IMAGE EVALUATION
TEST TARGET (QA-3)

150mm

6"
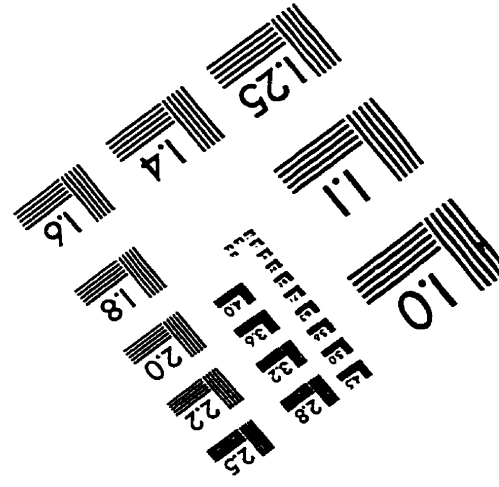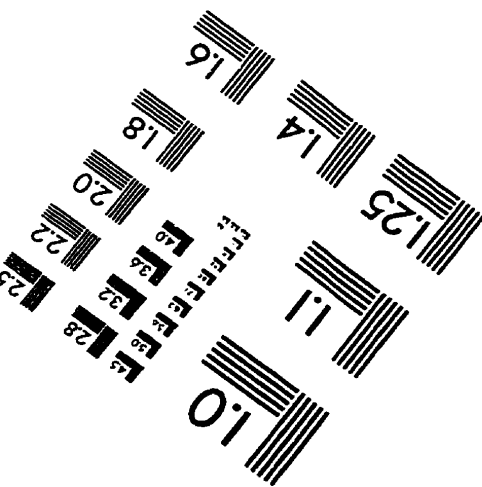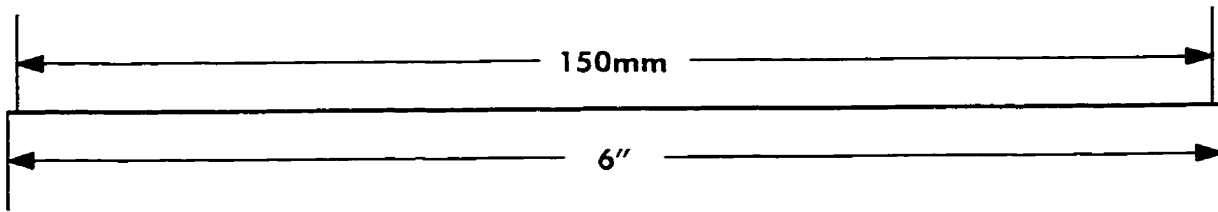
APPLIED IMAGE . Inc
1653 East Main Street
Rochester, NY 14609 USA
Phone: 716/482-0300
Fax: 716/288-5989