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ISO 14000: REVIEW AND GUIDELINES FOR THE PHOTOVOLTAIC INDUSTRY

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ABSTRACT

The International Organization for Standardization (ISO) has released and is in the process of ratifying a new set of environmental management system standards, ISO 14000. These voluntary international standards will have a significant impact on how companies throughout the international community manage their environmental programs. Initially this impact will result in increased international trade opportunities due to the anticipated customer requirement for suppliers to demonstrate certification. Other potential impacts will benefit both companies engaged in international commerce and companies with a domestic focus. These would include installing a cohesive system to manage environmental matters, participation within a new regulatory paradigm, and adhering to a potentially new set of legal standards. The wide range of potential environmental, commercial, legal and regulatory benefits offered by ISO 14000 offer most companies significant reason to explore the possibilities of implementing an environmental management system. Organizations will be able to anticipate and meet growing environmental expectations and to ensure ongoing compliance with national and international requirements as well as satisfy the growing demands of customers, stakeholders and the interested public.

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1.0 INTRODUCTION

The imminent ratification and subsequent adaptation of the International Organization for Standardization (ISO) new environmental management system standards, ISO 14000, will have a significant impact on how companies throughout the international community manage their environmental programs. Initially this impact will result in increased international trade opportunities due to the anticipated customer requirement for suppliers to demonstrate certification. Other potential impacts will benefit both companies engaged in international commerce and companies with a domestic focus. These would include installing a cohesive system to manage environmental matters, participation within a new regulatory paradigm, and adhering to a potentially new set of legal standards.

At this point it is still speculative to determine the full impact of these standards and the extent of affect they will have on business in the U.S. However, as demonstrated by the widespread acceptance of ISO 9000, International Quality System Standards, a trend of adopting a systems approach to management is occurring and will likely continue with ISO 14000. Therefore, it is recommended that companies familiarize themselves with these standards and how they might influence their particular industry. Practical questions of implementation and certification should be kept in mind, however, will be answered easier in the near future when a more accurate forecast of impact can be determined.

As an emerging industry with significant international ties, the photovoltaic (PV) community will be effected from these standards if they do become globally adopted. In fact some major players in the PV industry have recently received certification to ISO 9000. This again demonstrates a trend within the industry to move toward a uniform system approach of management. This paper will expose interested parties within the PV industry to the details of ISO 14000 and will assist decision makers assess the various possibilities for implementation certification of ISO 14000 for an individual facility.

2.0 ISO BACKGROUND

ISO was founded in 1946 in Geneva, Switzerland to promote the development of international, voluntary, consensus-based standards. ISO is composed of member bodies from approximately 110 countries. Historically, ISO has focused almost exclusively on product-related standards. In the process it has developed approximately 8,000 standards and technical reports including ISO 9000, Quality Management System Standards.

Environmental management standards is not a new concept to European firms. Prior to ISO 14000, European firms were being certified to the British Environmental Standard BS 7750. ISO 14000 borrows many ideas and

concepts from BS 7750, but offers more universal and international applicability. A second international standard for Environmental Management Systems is the European Unions regulation 1836/93 which provides for voluntary participation in an ecomanagement and audit scheme (EMAS) (Tusa, 1996).

ISO 14001 and BS 7750 are technically equivalent, but many of the BS 7750 requirements were incorporated into an appendix of 14001, making them guidelines, not requirements. The major difference between ISO and the older standards is that BS 7750 and EMAS a requires companies to publicly disclose environmental performance information. ISO focuses solely on management systems and not performance assessment.

The EMAS regulation is based partly on previous American efforts to develop environmental management systems as well as ISO 9000 quality management systems. It is intended to promote both compliance with existing environmental requirements and also to stimulate more aggressive national enforcement of those requirements. EMAS does this by requiring publication of statements identifying significant environmental effects after validation by external auditors. Unlike EMAS, ISO 14000 has a greater emphasis on life cycle analysis and management systems. Also ISO 14000 does not require preparatory reviews or quantification of inputs and outputs and has a strong commitment to pollution prevention. EMAS, however contains strict legislative requirements with respect to auditing procedures and requires that best available environmental technology be used (Tusa, 1996).

ISO 14000 origins date back to 1990, when the Business Counsel for Sustainable Development working under the auspices of the United Nations Environmental Program (UNEP) asked ISO, who recently developed the successful ISO 9000, if it could develop a role for itself in the area of environmental standards. This emerged primarily as a result of the Uruguay round of the GATT negotiations and the Rio Summit on the Environment held in 1992. While GATT concentrates on the need to reduce non-tariff barriers to trade, the Rio Summit generated a commitment to protection of the environment across the world. The environmental field has seen a steady growth of national and regional standards resulting from growing worldwide concern for the environment.

In 1991, ISO responded by organizing a Strategic Advisory Group on the Environment (SAGE). This included government and industry representatives from approximately 40 countries to develop a strategic plan. SAGE concluded that there were significant potential benefits associated with the development of a single international standard for environmental management systems. These include (Tusa, 1996):

- reduced trade barriers associated with the proliferation of conflicting national standards and reduced costs associated with complying with multiple environmental management standards;

- improved production efficiencies and reduced operating costs and decreased long term environmental liabilities associated with the implementation of organized environmental management systems;

- enhanced environmental performance and reduced environmental impacts associated with the production and delivery of goods and services in organizations with environmental management systems;

- increased opportunities to meet the needs of environmental stakeholders potentially including customers, investors, employees, regulators, local communities and the general public as a consequence of implementing environmental management systems;

- potential opportunities to reduce "command and control" requirements, particularly in those countries with extensive environmental regulatory programs, as a consequence of the improved environmental performance and enhanced credibility of organizations operating with environmental management systems; and

- increased opportunities for organizations with organized environmental management systems to demonstrate their commitment to environmental excellence such as those associated with the Chemical Manufacturers Association's Responsible Care Program, the International Chamber of Commerce's Charter for Sustainable Development and the Global Environmental Management Initiative (GEMI).

In 1992 SAGE recommended that ISO organize a technical committee to produce international standards for environmental management systems. In June 1993, ISO formed Technical Committee 207 (TC 207) and directed it to establish a series of voluntary consensus-based standards for environmental management systems. The purpose of these standards are based in-part on the concept that improved environmental performance can result when environmental issues and obligations are systematically identified and managed (Tusa, 1996). The theme of the standards is to provide a system for enterprises to anticipate and meet growing environmental performance expectations through continuous improvement, and to ensure ongoing compliance with national and international requirements. Also the standard should be compatible with the approach taken in ISO 9000. Based upon contributions of hundreds of experts from around the world, standards have been developed in several areas including environmental management systems, environmental labeling, environmental performance evaluation, and are currently being developed for

environmental life-cycle assessment. TC 207 was not to develop test methods for environmental pollutants, not to develop standards or guidance specifying minimum levels of environmental performance and not to develop standards or guidance on product standardization.

TC-207 is split up into various subcommittees, each of which is developing standards for a specific area (Table 1). Individuals developing standards within ISO represent private and public sector representatives from countries around the world. Each country is represented in the ISO member body. In the U.S., this body is the American National Standards Institute (ANSI) (Tusa, 1996). ANSI formed a U.S. Technical Advisory Group (U.S. TAG) to develop input that reflects U.S. interests in the development of ISO 14000, which is illustrated in Figure 1. The US TAG was originally comprised of members from:

- Government Organizations
- Fortune 500 Companies
- Consulting Organizations
- Auditing Organizations
- Standards Organizations
- Public Interest Organizations

Table 1. Organization of TC 207

Subcommittee	Secretariat	Purpose
SC1	United Kingdom	Environmental Management
SC2	Netherlands	Environmental Auditing and Related Environmental Investigations
SC3	Australia	Environmental Labeling
SC4	United States	Environmental Performance Evaluation
SC5	France	Life Cycle Assessment
SC6	Norway	Terms and Definitions
Working Group 1	Germany	Environmental Aspects in Product Standards

In the U.S. all interested individuals and organizations can participate in the standard development process by joining the U.S. TAG. The members of the U.S. TAG has recently increased from the above listed parties to about 500 members consisting of representatives from small and large businesses, government agencies, consulting firms, law firms, and environmental organizations. The U.S. Environmental Protection Agency (EPA) has been particularly active in the U.S. TAG and has been instrumental in promoting the concepts of regulatory compliance, pollution prevention and continuous improvement (Tusa, 1996).

ISO member bodies participate in the Technical Committee group, Sub-Committee group level or Working Group level. A "work item", is assigned to a working group that begins drafting a document to develop the work item into a "working draft" standard. When completed and approved, the working draft is

sent upward to the Sub-committee. When revised and approved at this level, the document or standard is coined "Committee Draft" version. Throughout the document and standards setting process, much debate and compromise from many parties affects the final drafting of the document. The committee draft version may then be elevated to Draft International Standard (DIS) status. At this point, ISO and the Technical Committee will vote on the DIS to become an "International Standard". There are six steps in the ISO standards setting process:

1. New Work Item Proposal
2. Assignment to a sub-committee or Working Group
3. Working Draft
4. Committee Draft
5. Draft International Standard
6. International Standard

In the case of ISO 14000, many divergent positions are represented by the delegates to TC 207 and the various subcommittees and working groups. For example, delegates from countries with existing environmental management standards, such as the United Kingdom and the European Union, tended to be protective of the concepts and approaches that had already been developed at national and regional levels. Delegates from countries with less substantive environmental programs tended to be very concerned about developing an international environmental management standard that by its very nature would prevent countries with fewer resources or less developed environmental infrastructures from competing in the marketplace. Delegates from United States, which is noted for its very comprehensive command and control regulatory system coupled with a highly litigious legal system, were very concerned about developing an environmental management standard that would prescribe additional regulatory requirements or which might result in increased legal exposure.

Similarly, the individual perspectives of the various participants were very divergent - largely depending on what type of organization each individual represented and what experience each individual had in the environmental arena. For example, individuals from large multi-national companies often had significantly different perspectives from individuals in small or mid-sized enterprises.

As a consequence, many of the issues being addressed in the subcommittees and working groups have been very contentious and consensus has not always been easy to achieve. This has led to a standard language that is very general and subject to multiple interpretations (IESU, 1996).

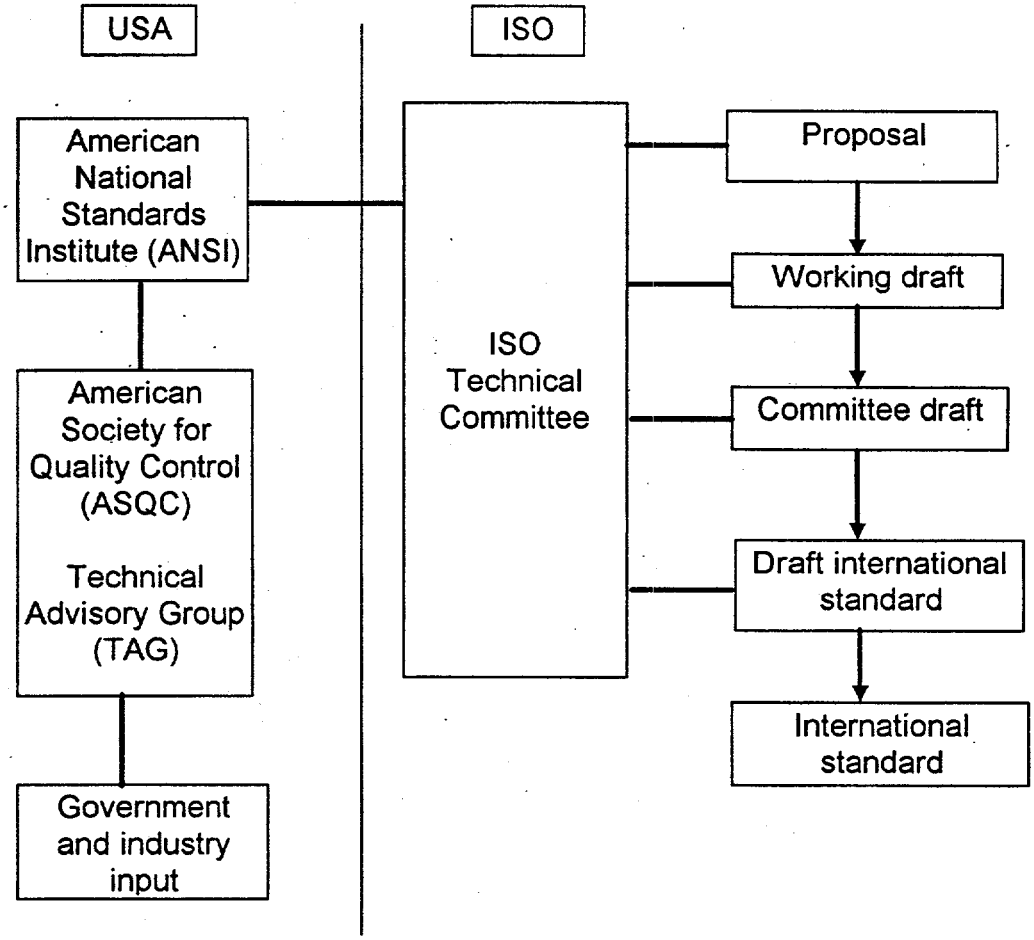

Figure 1. U.S. Involvement in the Development of ISO Standards

3.0 ISO 14000 - ENVIRONMENTAL MANAGEMENT SYSTEMS

ISO's goal in developing ISO 14000 is to create a consensus based environmental management system standard that will be adopted globally and supplant all of the standards which already exist. ISO 14000 is a series of standards that are intended to provide organizations with a system for managing the impact that they have on the environment. Similar to ISO 9001, ISO 14001 is the "specification document" that will be used for third-party registration. Other documents in the ISO 14000 series are considered "guidance documents" and are intended to help an organization develop and implement its Environmental Management System (EMS). These guidelines include; guidelines on principles, environmental auditing, environmental performance evaluation, eco-labeling, life-cycle assessment and environmental aspects in product standards. Table 2 provides a list of the different parts of the standard.

Table 2. ISO 14000 Standards

Standard	Title / Description
14000	Guide to Environmental Management Principles, Systems and Supporting Techniques
14001	Environmental Management Systems - Specification with Guidance for Use
14010	Guidelines for Environmental Auditing - General Principles of Environmental Auditing
14011	Guidelines for Environmental Auditing - Audit Procedures-Part 1: Auditing of Environmental Management Systems
14012	Guidelines for Environmental Auditing - Qualification Criteria for Environmental Auditors
14013/15	Guidelines for Environmental Auditing - Audit Programmes, Reviews & Assessments
14020/23	Environmental Labeling
14024	Environmental Labeling - Practitioner Programs - Guiding Principles, Practices and Certification Procedures of Multiple Criteria Programs
14031/32	Guidelines on Environmental Performance Evaluation
14040/43	Life Cycle Assessment General Principles and Practices
14050	Glossary
14060	Guide for the Inclusion of Environmental Aspects in Product Standards

An EMS is a part of the organization's overall management structure which addresses the immediate and long-term impact that its products, services and operations have on the environment. An EMS also provides order and consistency in organizational practices to anticipate and meet growing environmental performance expectations through continuous improvement.

The subjects covered under ISO 14000 can be divided into two separate areas: 1) organizational management and evaluation systems; and, 2) environmental tools for product evaluation (Figure 2). As shown, organization evaluation consists of three subsystems that include the EMS, environmental performance evaluation, and environmental auditing. Product evaluation consists of three separate applications and includes LCA, environmental labeling and environmental aspects in product standards. A separate effort is focused on terms and definitions to harmonize their usage among all areas and applications under ISO 14000. Tables 3 and 4 show the various subsections of these larger sections.

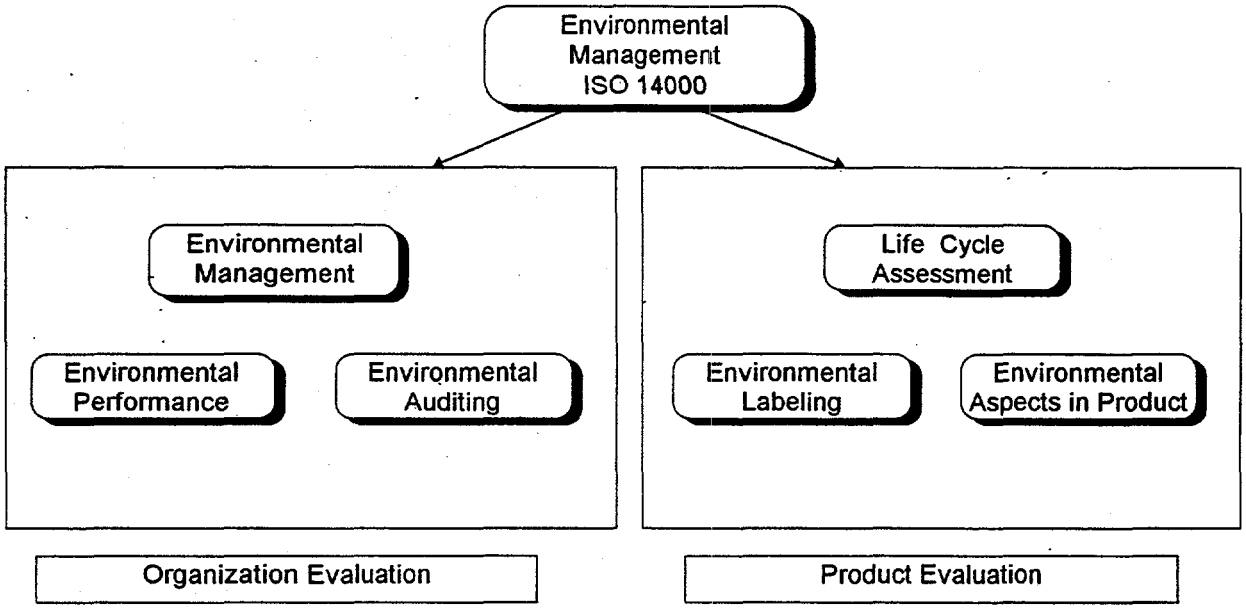

Figure 2. ISO 14000 Major Subsections

Table 3. ISO 14000 - Organization Evaluation Standards

Environmental Performance Evaluation (EPE)	Environmental Management System (EMS)	Environmental Auditing (EA)
ISO 14031 - Guidelines on Environmental Performance Evaluation	ISO 14001 Environmental Management System -- Specification with Guidance for use	ISO -14010 Guidelines for Environmental Auditing -- General Principles
	ISO 14004 Environmental Management Systems -- General Guidelines on Principles, Systems and Supporting Techniques	ISO 14011-1 Guidelines for Environmental Auditing -- Audit Procedures -- Part 1: Auditing of Environmental Management Systems
		ISO 14012 Guidelines for Environmental Auditing -- Qualification Criteria for Environmental Auditors of Environmental Management Systems
ISO 14040: Terms & Definitions		

Table 4. ISO 14000 - Product Evaluation Standards

Environmental Aspects in Product Standards (EAPS)	Environmental Labeling (EL)	Life Cycle Assessment (LCA)
ISO 14060 Guide for the Inclusion of Environmental Aspects in Product Standards	ISO 14020 Environmental Labeling Basic Principles for all Environmental Labeling	ISO 14041 Life Cycle Assessment - Principles and guidelines
	ISO 14021 Environmental Labeling - Self Declaration Environmental Claims - Terms and Definitions	ISO 14041 Life Cycle Assessment - Life Cycle Inventory Analysis
	ISO 14022 Environmental Labeling -- Symbols	ISO 14042 Life Cycle Assessment - Impact Assessment
	ISO 14023 Environmental Labeling - Testing and Verification Methodologies	ISO 14043 Life Cycle Assessment - Interpretation
	ISO 14024 Environmental Labeling Practitioner Programs - Guiding Principles Practices and Certification Procedures of Multiple (Type I) Programs	
	ISO 14050: Terms and Definitions	

Like the popular ISO 9000 quality management system standards, the ISO 14001 EMS standard outlines a generic management systems approach to an organization's operations. While ISO 9000 is concerned with product quality and meeting customer requirements, ISO 14000 focuses on all aspects of a company's environmental operations. Table 5 lists the similarities and differences between the two standards. In addition to satisfying customers, a company will need to be able to demonstrate environmental responsibility to a growing number of interested parties and direct stakeholders. Minimizing environmental impacts is quickly becoming another measure by which organizations will be evaluated (Casio, 1996). A management system does not superimpose regulatory standards, for example ISO 14000 does not describe how clean is clean. Facilities must still commit to the laws of the land and are subject to regulatory checks.

Table 5. ISO 14000 vs. ISO 9000

Similarities	
ISO 14001 shares the same concept as ISO 9000, in providing generic requirements for a management systems approach to a specific function of an organization. Whereas ISO 9000 deals with an organization's Quality Systems, ISO 14001 deals with an organization's Environmental Systems. Common or similar elements to both programs include:	
Policy	Records
Management Review	Internal Audits
Corrective / Preventative Actions	Training
Document Control	Organizational Structure
Differences	
Whereas ISO 9000 is designed to focus on customer requirements, ISO 14001 addresses the needs of a broad range of interested parties - shareholders, the public at large, employees, environmentalists, governmental and regulatory agencies, etc. Concepts and issues unique to ISO 14001 are as follows:	
System for Compliance with Existing Environmental Legislation and Regulations	Identification of Relevant / Significant Environmental Aspects
Conformance to Industry Codes of Practices	Identification of Objectives and Targets
Continual Improvement and Pollution Prevention	Emergency Preparedness and Response
Communications Regarding Environmental Aspects	

4. ISO 14001

ISO 14001 is a standard which provides the "core" requirements for developing and implementing an EMS. It is intended to be used to improve environmental performance by integrating designated environmental management systems with existing management policies and procedures. ISO 14001 is considered the "specification" document to which organizations could be audited or registered by an external third party.

The global standard applies to all types and sizes of organizations and is designed to encompass diverse geographical, cultural and social conditions. Other than a commitment to continual improvement and compliance with applicable legislation and regulations, the standard does not establish absolute requirements for environmental performance. Many organizations, engaged in similar activities, may have widely different environmental management systems and performance, and may all comply with ISO 14001. This gives an organization the freedom and flexibility to define its own boundaries (Wilson and McLean, 1996). Thus the level of detail and complexity of the EMS, the extent of documentation and the resources devoted to it will be dependent on the size of an organization and the nature of its activities. These features make it assessable and useful to companies in both industrialized and developing nations.

Adherence to ISO 14001 would require an environmental policy to be in existence within the organization, fully supported by senior management, and outlining the policies of the company to the staff and to the public. The policy

needs to clarify compliance with Environmental Legislation that may effect the organization and it must stress a commitment to continuous improvement. Emphasis has been placed on policy as this provides the direction for the remainder of the management system.

An EMS is that aspect of an organization's overall management structure that addresses the immediate and long term impact that its products, services and operations have on the environment. By implementing an EMS, the firm is able to anticipate and meet growing environmental expectations and to ensure ongoing compliance with national and international requirements. Table 6 lists the basic principles of an EMS which are further described in the sections below.

Table 6. Principles of an Environmental Management System

Recognize that environmental management is among the highest corporate priorities.
Establish and maintain communications with internal and external interested parties.
Determine the legislative requirements and environmental aspects associated with the organization's activities, products and services.
Develop management and employee commitment to the protection of the environment, with clear assignment of accountability and responsibility.
Encourage environmental planning throughout the product and process life-cycle.
Establish a disciplined management process for achieving targeted performance levels.
Provide appropriate and sufficient resources, including training, to achieve targeted performance levels on an ongoing basis.
Evaluate environmental performance against appropriate policies, objectives, and targets and seek improvement where appropriate.
Establish a management process to review and audit the EMS and to identify opportunities for improvement of the system and resulting environmental performance.
Encourage contractors and suppliers to establish an EMS.

4.1 Environmental Policy

To develop an effective environmental policy an organization should first focus on what needs to be done. It should ensure commitment to environmental management and define its policy. Usually a company's primary environmental objectives are those that can have most environmental impact. In order to gain the most benefit from the EMS these should become the primary areas of consideration within the improvement process of the company's environmental program. The program will be the plan to achieve specific goals or targets along the route to a specific goal and describe the means to reach those objectives such that they are real and achievable. The EMS provides further detail on the environmental program by establishing procedures, work instructions and controls to ensure that implementation of the policy and achievement of the targets can become a reality. The standard stresses communication as the vital factor, enabling people in the organization to be aware of their responsibilities, aware of the objectives of the scheme, and therefore be able to contribute to its success. The following points should be considered when devising an environmental policy:

- appropriate to nature, scale and environmental impacts of the organization;
- related to activities, products and services;
- commitment to continual improvement and prevention of pollution;
- compliance with laws, regulations and other subscribed-to requirements;
- framework for setting and reviewing environmental objectives and targets;
- documented, implemented, maintained and communicated to all employees;
- public availability.

4.2 Planning

An organization should formulate a plan to fulfill its environmental policy which should include the following parts. (Italicized text are direct quotations from the standard.)

4.2.1 Environmental Aspects

The standard reads "*The organization shall establish and maintain a procedure to identify the environmental aspects of its activities, products or services that it can have control and over which it can be expected to have an influence in order to determine those which have or can have significant impacts on the environment.*" There does not appear to be a limit to the coverage of the EMS in that it can include the organization's products, services, activities, operations, facilities, transportation, etc. From a slightly different viewpoint, all of the elements in the previous sentence should be considered for environmental impact resulting from current, past and future practices, and should further be reviewed for their impact under normal, abnormal and emergency conditions.

4.2.2 Legal and Other Requirements

The standard requires that "*The organization shall establish and maintain a procedure to identify and have access to legal and other requirements...applicable to environmental aspects of its activities, products and services.*"

4.2.3 Objectives and Targets

The standard reads "*The organization shall establish and maintain a procedure to identify and have access to legal, and other requirements to which the organization at all relevant functions and levels of organization.*" The objectives and targets shall consider legal and other requirements, environmental aspects, technological options and the views of interested parties. Also they should be consistent with policy and prevention of pollution.

4.2.4 Environmental Management Program

The standard reads *"The organization shall establish and maintain programs to achieve its objectives and targets."* This shall include means and time frame for achieving objectives. The program should be updated for new or modified activities, products or services. Also it should designate responsibility for objectives at each function and level

4.3 Implementation and Operation

For effective implementation an organization should develop the capabilities and support mechanisms necessary to achieve its environmental policies, objectives and targets.

4.3.1 Structure and Responsibility

To facilitate effective environmental management roles, responsibilities and authorities are defined, documented and communicated. Appropriate resources (e.g., human, financial) essential to the implementation and control of the EMS shall be provided by management. This includes an appointed manager to ensure system viability and to report on performance.

4.3.2 Training Awareness and Competence

An organization shall require all relevant personnel to receive appropriate training. This includes training on requirements of the system and on the importance of and potential consequences of departure from specified operating procedures, the significant impact of their work and the environmental benefits of improved performance. Also their roles and responsibilities in achieving conformance with the policy should be clearly conveyed.

4.3.3 Communication

The organization should establish and maintain procedures for internal communications and receiving, documenting, and responding to relevant communications both throughout the organization and from external interested parties. The organization shall also consider a process for external communications.

Those companies who have witnessed ISO 9000 assessments will know that the policy is frequently discussed during the assessment. Many staff members are asked if they understand or are aware of the policy, and any problems associated with the policy are seldom serious. The Environmental Policy is different, this provides the initial foundation and direction for the EMS and will be more stringently reviewed than a similar ISO 9000 policy (IESU, 1996). The

statement must be publicized in non-technical language so that it can be understood by the majority of readers. It should relate to the sites within the organization encompassed by the Management System, it should provide an overview of the company's activities on the site and a description of those activities, thus presenting a clear picture of the company's operations.

4.3.4 Environmental Management System Documentation Manual and Procedures

The organization shall establish and maintain information, in paper or electronic form, to describe the elements and interaction of the EMS and provide direction to related documentation.

4.3.5 Document Control

The organization shall establish and maintain procedures for controlling all documents required by this standard to ensure that they can be located and are periodically reviewed, revised as necessary and approved by authorized personnel. Also to ensure that documents relevant to the operations of specific duties are available at appropriate areas.

4.3.6 Operational Control

The organization shall identify activities, including maintenance, and ensure that they are carried out under specified conditions. This includes establishing an operating criteria, procedures related to significant impacts of goods and services and communicating these procedures and requirements to suppliers and contractors.

4.3.7 Emergency Preparedness and Response

The organization shall establish and maintain emergency and accident prevention, response and mitigation procedures. These procedures should be revised following an incident and periodically tested.

4.4 Checking and Corrective Action

An organization should measure, monitor and evaluate its environmental activities.

4.4.1 Monitoring and Measurement

The organization shall establish and maintain documented procedures to monitor and measure on a regular basis key characteristics of its operations including, track performance, operational controls and objectives and targets.

These should be evaluated in compliance with all applicable laws and regulations.. Also procedures should be in place to periodically calibrate and maintain all relevant equipment.

4.4.2 Non Conformance and Corrective and Preventative Action

The organization shall establish and maintain procedures for defining responsibility and authority to investigate, mitigate and prevent nonconformance. Action should be taken to eliminate or prevent potential causes resulting in documented record changes in EMS procedures.

4.4.3 Records

The organization shall establish and maintain procedures for the identification, maintenance and disposition of environmental records including training records and the results of audits and reviews. The document retention periods should be established and reviewed in conformance to the ISO 14001 standard.

4.4.4 Environmental Management System Audit

Programs and procedures shall be maintained to enable periodic EMS audits to be carried out. This will determine if the EMS conforms to planned arrangement including the requirements of this standard and has been properly implemented and maintained. Results from this audit shall be reported to management for review.

4.5 Management Review

An organization should review and continually improve its EMS, leading to an improvement in overall environmental performance.

In addition to reviewing an audit, there is a requirement for management review of the system to ensure that it is suitable (i.e., for the organization and the objectives) and effective in operation. The management review is the ideal forum to make decisions on how to improve for the future. Management should periodically review system to ensure suitability, adequacy and effectiveness and address need for changes to policy, objectives and other elements of the EMS. All reviews should be documented. Table 7 provides an encapsulated view of the above mentioned sections.

Table 7. General Description of ISO 14001

Commitment and Policy	
Top Management	Recognize that environmental management is among the highest corporate priorities.
Continual Improvement	Establish and maintain communications with internal and external interested parties.
Identify legal and other standards to which the company subscribes.	Determine the legislative requirements and environmental aspects associated with the organization's activities, products and services.
Communicating to employees and make the environmental policy available to the public.	Develop management and employee commitment to the protection of the environment, with clear assignment of accountability and responsibility
Planning - Setting and reviewing environmental objectives and targets.	Encourage environmental planning throughout the product and process life-cycle.
Identifying obligations and setting objectives and targets.	Establish a disciplined management process for achieving targeted performance levels.
Identify significant environmental aspects of activities, products and services.	Provide appropriate and sufficient resources, including training, to achieve targeted performance levels on an ongoing basis.
Prevention of pollution.	Evaluate environmental performance against appropriate policies, objectives, and targets and seek improvement where appropriate.
Set relevant objectives and targets and Quantified wherever practicable.	Establish a management process to review and audit the EMS and to identify opportunities for improvement of the system and resulting environmental performance.
Implementation	
Define roles and responsibilities, including senior management.	Identify activities and process associated with significant environmental aspect and implement relevant management procedures.
Provide necessary resources.	Train employees and establish internal and external communications procedures.
Measurement and Correction	
Monitor and measure processes which can have a significant impact on the environment.	Audit and correct nonconformance - Track performance and conformance with objectives and targets.
Management Review	
Top management review of system in light of commitment to continual improvement.	Determine and correct root causes of deficiencies.
Compare performance with objectives and targets.	Identify further opportunities for improvement.

5.0 GUIDANCE DOCUMENTS

ISO 14000 EMS standards also contains a series of guidance document. Not to be confused with the 14001 standard, which can be audited, these documents provide an organization with "guidance" on how to implement an EMS. These documents include the following series:

- (ISO 14004) Environmental Management Systems - Guidelines

- (ISO 14010) Environmental Auditing
- (ISO 14020) Environmental Labeling
- (ISO 14030) Environmental Performance Evaluation (EPE)
- (ISO 14040) Life Cycle Assessment (LCA)
- (ISO 14060) Environmental Aspects in Product Standards

5.1 ISO 14004 - Environmental Management Systems/Guidelines on Principles, Systems and Supporting Techniques

This document provides assistance to organizations initiating, implementing, or improving an EMS. It outlines the elements of an EMS and provides practical advice on implementing or enhancing such a system. The EMS principles include identification of applicable regulatory requirements, commitment to continual improvement and evaluating environmental performance on a regular basis. The guidelines are intended for use as a voluntary, internal management tool and are not intended for use by EMS certification/registration bodies as a specification standard. The document includes EMS principle, general outlines and issues practical help, including specific suggested steps for each EMS topic.

5.2 ISO 14010/12 - Environmental Auditing Standards

As with ISO 9000 the EMS requires a planned comprehensive periodic audit of the EMS to ensure that it is effective in operation, is meeting specified goals, and the system continues to perform in accordance with relevant regulations and standards. The audits are designed to provide additional information in order to exercise effective management of the system, providing information on practices which differ to the current procedures or offer an opportunity for improvement (Smith, 1996).

Firms seeking "registration" to ISO 14001 will use independent, third-party auditors or "registrars" who are accredited to audit the firm and to offer registration to the standard. EMS registration to ISO 14001 is formal acknowledgment by an independent third party that the organization's system complies with the standard. Registration is also a means by which businesses can communicate to their stakeholders that an effective system is in place for managing their affects on the environment.

The scope of the work if ISO TC 207 Subcommittee 2 is development of ISO 14000 standards for Environmental Auditing (EA) and related environmental investigations, such as site assessments and initial reviews. All of the EA standards are guidelines and function as recommended elements of model environmental auditing programs. They are designed to apply equally to all types of environmental audits, regardless of whether they are internal audits by company and/or consultant auditors or registration audits conducted by registrar auditors. To date, Subcommittee 2 has developed three EA Guidelines:

- ISO 14010 - General Principles
- ISO 14011 - EMS Audit Procedures; and
- ISO 14012 - Qualification Criteria for Environmental Auditors

The 14010 and 14011 EA Guidelines contain basic principles and procedures for conducting environmental audits. Although 14011 appears to contain procedures only applicable to EMS audits, it can be applied to all types of environmental audits. The principles and procedures recommended by 14010 and 14011 are intended only as minimal EA baseline criteria. They take into consideration that an organization commissioning an EA is free to supplement them depending on the desired objectives and scope of a given audit.

An important concept underlying the 14010 and 14011 EA Guidelines is that essentially, an environmental auditor's primary role is to determine conformance and not performance. Unless it is expressly requested to do so by the client, the environmental auditor should refrain from offering performance related opinions, judgments or conclusions (Smith, 1996).

Major Points of 14010 include:

- Types of environmental audits are not specified.
- Basic auditor qualifications including; objectivity, independence, and competence.
- Auditing process should be done with professional care, using systematic procedures, with confidentiality, and have the findings submitted with a written report.
- Auditor client agreements should include; an audit scope (designed to meet audit objectives defined by the client), audit criteria, and an audit plan (ISO 14011).
- Provide examples of the report content. In addition to listing findings these should include; audit objectives, scope and criteria, audit period, identification of audit team members and participating auditee representatives, and recommendations.

Major points of 14011 include:

- Illustrates a documented verification process of objectively obtaining and evaluating audit evidence to determine whether an organization's EMS conforms with the EMS audit criteria, and communicating the results of this process to the client.
- EMS audit criteria include: Policies, practices, procedures or requirements, such as covered by ISO 14001 and, if applicable, any additional EMS requirements against which the auditor compares collected audit evidence about the organization's EMS.

- It is a generic environmental auditing procedures guideline.
- Development of compliance/performance and environmental EA guidelines dropped as SC2 work items.
- In the near future the audit process could be integrated with ISO 9000.
- Sample audit objectives include: Responsibilities and qualifications of auditors, lead auditors and audit teams, clients, and auditees.
- Audit process include: Scope and resources determinations pre-site visit activities, on site activities, reporting, and documentation record retention.

ISO 14012 seeks to provide guidance regarding the appropriate minimum qualifications for both internal and external auditors and lead auditors for all types of environmental audits. The introduction states that although internal auditors should be as competent as external auditors, depending on the size and complexity of the organization, it may not be necessary for them to satisfy all of the guideline's detailed criteria.

Major points of 14012 include:

- The applicability for internal and registration audits, these include all types of environmental audits.
- In the future additional national certification requirements are expected.
- Recommended minimum qualifications for auditor and lead auditors including; education, work experience, training, personal attributes and skills, maintenance of competence. Scope of education, training and work experience, includes knowledge of; environmental science and technology, technical and environment aspect of facility operations.
- Knowledge of relevant requirements of environmental laws, regulations and related documents. These should include the EMS and the standards audit procedures, processes and techniques.
- Also, personal attributes and skills communication, interpersonal independence and objectivity, organization, reasoning and judgment, and cultural sensitivity.

5.3 Environmental Labeling Standards ISO 14020/24

5.3.1 ISO 14020 - Goals and Principles of All Environmental Labeling

This standard contains the guiding principles for the development and use of environmental labels/declarations. Environmental label/declaration indicates the environmental attributes of a product or service that may take the form of statements, symbols, or graphics on product or package labels, product literature, technical bulletins, advertising, publicity etc.

Environmental labels provide information about a product or service in terms of its overall environmental character, a specific environmental attribute, or any

number of attributes. Purchasers can use this information in choosing the products or services they desire based on environmental as well as other considerations. The provider of the product or service hopes the environmental label will be effective in influencing the purchasing decision in favor of its product or service.

Major principles include:

- Environmental labels/declarations shall be accurate, verifiable, relevant, and non-deceptive.
- Information on the environmental attributes of products and services relevant to an environmental label/declaration shall be available to purchasers from the party making the environmental label/declaration.
- Environmental labels/declarations shall be based on scientific methodology that is sufficiently thorough and comprehensive to support the claim and that produces results that are accurate and reproducible.
- Information concerning the procedure and methodology used to support environmental labels/declarations shall be available and provided upon request to all interested parties.
- The development of environmental labels/declarations should, wherever appropriate, take into consideration the life cycle of the product or service.
- Any administrative requirements or information demands related to environmental labels/declarations shall be limited to those necessary to establish conformance with applicable criteria and/or standards of the labels/declarations.
- Procedures and criteria for environmental labels/declarations shall not create unfair trade restrictions nor discriminate in the treatment of domestic and foreign products and services.

5.3.2 ISO 14021 - Terms and Definitions for Self Declaration of Environmental Claims

This standard deals with Environmental Labeling and establishes general guidelines regarding environmental claims in relation to the supply of goods and services, and defines and gives rules for the use of specific terms used in environmental claims. Overall guidance is similar to that presented in ISO 14020.

5.3.3 ISO 14024 - Guiding Principles, Practices and Criteria - Guide for Certification Procedures

This standard contains guiding principles and practices, criteria procedures and guidance for certification procedures for the development of multiple criteria-based, third-party environmental labeling programs. It is intended to provide

practitioners and stakeholders with a reference document ensuring the credibility and non-discriminatory nature of the program.

Environmental labeling programs covered by this standard imply the use of labels of different types to inform consumers that a third-party is certifying that the labeled product meet a set of predetermined criteria which are considered to promote environmentally sound purchasing decisions for products of that category. The labels or the right to show them, are presently awarded to applicants by either government sponsored or private agencies. Government sponsored agencies could be national or regional in nature.

5.3.4 ISO 14030/31 - Environmental Performance Evaluation Standards

Environmental Performance Evaluation (EPE) is a process to measure, analyze, assess, report and communicate an organization's environmental performance against criteria set by management. The standard focuses on an organization's own activities, products and services. The organization must use scientifically obtained, objective and verifiable data. They also must consider local regional and verifiable data and appropriately considers views of interested parties. Evaluating environmental performance includes planning, collecting and analyzing data, evaluating information, reporting communicating result and reviewing and improving the EPE.

Planning involves setting performance criteria and selecting environmental indicators. Indicators are absolute or relative information about environmental performance or the condition of the environment. They should be kept simple and understandable and kept to a limited number for each corresponding area (e.g., management area, operational area, emissions, discharges, etc.).

Data should be collected systematically from appropriate sources with appropriate frequency. The data reliability is base on availability, adequacy, scientific validity, verifiability. All information should be reported and communicated internally to management and other employees and externally consistent with organization's policy. The EPE should be subject to a periodic review to assess for possible improvements. Improvements should be made with the data collected analysis and evaluation, indicators thus increasing the value of the EPE (Bowers, 1996).

Although EPE and audits are similar in a number of ways, however, the EPE is designed to simply provide information to the organization regarding their environmental performance. Table 8 outlines the differences between a EPE program and Environmental Audits.

Table 8. EPE vs. Audits

EPE	AUDITS
ongoing	periodic
frequent	sampled data
line function	independent
produces information	verifies system

5.4 Life Cycle Assessment (LCA) Standards

5.4.1 ISO 14040 - Principles and Guidelines

ISO 14000 establishes general guidelines, principles and procedures for initiating, conducting and reporting LCA studies in a responsible and consistent manner. LCA is a systematic tool of assessing the environmental impacts associated with a product or service to; build an inventory of inputs and output make a qualitative and quantitative evaluation of those inputs and outputs, and identify the most significant aspects of the system relative to the objective of the study. LCA considers the environmental impacts a products life, from cradle to grave. Categories for environmental impact include resource depletion, human health, and ecological consequences.

This standard does not specify in detail the life cycle assessment tool. Associated documents will contain methodological detail.

Key features of a LCA include:

- A valuable analytical tool in the decision making process in conjunction with a number of important factors other than those address by the LCA
- Should systematically and adequately address the environmental aspects of product and service systems from raw materials acquisition to final disposal
- Has the potential to identify opportunities to improve the environmental aspects of product and service systems at various points in their life cycle
- Results should not be reduced to a simple overall conclusion, since tradeoffs and complexities exist for the system analyzed at different stages of their life cycle
- There is no single methods to conduct LCA's; this standard present core elements that should be taken into consideration when implementing a LCA for a specific application
- The length and level of detail will vary depending on the objectives of an LCA
- The scope, assumptions, data quality parameters, methodologies and output of LCA should be understandable, comprehensible and transparent. All data sources should be discussed and clearly and appropriately communicated
- Provisions should be made, depending upon certain applications, in LCA studies to respect confidentiality and propriety matters

- Methodology should be able to incorporate any technical improvements including new scientific findings.

5.4.2 ISO 14041 - Life Cycle Inventory Analysis

This standard is presently in the preliminary stage. Working Groups 2 and 3 from Subcommittee 5 are working to create a feasible DIS by April 1997 (IESU, 1996).

5.4.3 ISO 14042 - Impact Assessment

This standard is presently in the preliminary stage. Subcommittee 5, Working Groups hope to complete a working draft by early 1997 (IESU, 1996).

5.4.4 ISO 14043 - Interpretation

This standard is still in the preliminary stage. The standard proposes to give interpretation advice based mainly on conclusions and recommendation language contained in the document. Working Group 5 is now attempting to reach agreement on conclusion methodology for LCA or impact assessment. To date the main body of the text is divided into:

- Identification of major burdens of impact,
- Evaluation
- Sensitivity analysis
- Consistency check
- Conclusions and recommendations

To complement the main body of the standard, delegates plan to include several case studies on LCA interpretation.

5.5 ISO Guide 64 Environmental Aspects In Product Standards (formally ISO 14060)

This ISO Guide is intended for standard writers. Its purpose is to:

- Raise awareness that provisions in products standards can affect the environment in both negative and positive ways.
- Outline the relationship between product standards and the environment.
- Help avoid provisions in product standards that may lead to adverse environmental effects.
- Emphasize that addressing environmental aspects in product standards is a complex process and requires balancing competing priorities.

- Recommend the use of life cycle thinking and recognized scientific methodologies in developing product standards that incorporate environmental aspects.

This guide sets forth some general ideas that should be taken into consideration when developing product standards. They seek to balance the need to achieve the intended product performance while reducing adverse environmental effects. It outlines the ways in which provisions in product standards may affect the environment during the stages of a product's life cycle, provides an overview of recognized scientific methodologies in identifying and assessing environmental effects of provisions in product standards and highlights some strategies for improving environmental performance.

6.0 IMPLEMENTATION

The first thing management should look at when it considers implementing ISO 14001 is its potential benefits and associated costs. Factors influencing the cost of an ISO 14001 EMS implementation and certification include site size, complexity of operations, integration of current environmental management practices, site/corporate environmental culture, availability of resources, implementation of ISO 9000, and support of upper management (IESU, 1996). For example, organizations with highly integrated environmental management programs should incur lower costs. However, firms that may incur the greatest expense for 14001 EMS implementation may also realize the greatest benefits resulting from expense reduction via pollution prevention and energy waste minimization, reduced legal liability, a reduction in environmental fines, and increased environmental performance. Another factor the ISO 14001 EMS implementation expense was the existence of or co-implementation of an ISO 9000 quality system. A rough estimate of level-of-effort needed for ISO 14001 implementation varies between six months and two years and is dependent on the aforementioned variables.

When deciding on whether to implement ISO 14001 these basic propositions should help guide management as it evaluates its options and a course of action (Wilson and McLean, 1996):

1) No guarantee - ISO 14001 by itself will not guarantee improved environmental performance. The standard imposes no substantive performance obligation or level. It does stress "continuous improvement" but this injunction applies as much or more to the EMS as to actual performance. Currently ISO goal-setting process can equally enshrine mediocre or ambitious environmental performance objectives, depending upon what the company wants and still satisfy certification requirements under the standards.

2) Improved Performance - A strong EMS is essential for driving improved performance. If a company wants improved environmental performance on a sustained basis, it needs to have a strong management system in place. ISO 14001 is intended to help companies systematically identify and manage their environmental obligations and risks.

3) ISO 14000 is not essential for improved environmental performance - Many larger companies have already built a strong EMS that manages their environmental, health and safety activities.

4) Advance trailing edges - ISO 14001 is more likely to help advance the "trailing edge" in corporate environmental management than extend the leading edge. ISO 14001 does address important environmental management processes, but it has little if anything to say about integrating them into the way companies run their businesses. Instead, it appears to stress a functionally defined, largely self contained system in which the connections to business operations and decision making are either faint or missing. Also it is does not mention management of those areas in which proactive environmental efforts can directly add business value, (e.g., design for environment, product stewardship, influencing the development of public issues and legal requirements, or communicating performance to key external stakeholders).

5) Value vs. certification - Obtaining value from ISO 14001 may not require gaining actual certification to the standard. For those companies looking to strengthen their EMS from a modest starting point, ISO 14001 supplies a workable, quality-oriented model to follow. For those leading-edge companies that may already have strong EMS in place, the ISO standard still provides one more useful external benchmark against which they can calibrate their own relative strength and weaknesses. In either case, going the extra mile to satisfy ISO 14001's extensive documentation and other bureaucratic requirements in order to gain certification may not be sufficiently valuable to justify the added work and expense. Companies may find it more attractive simply to continue their own self-improvement efforts and self certify to the standards or even retain independent third party to attest their EMS is equivalent to or otherwise consistent with ISO 14001.

6) Export value - ISO 14001 certification is more likely to be valuable to companies with major export markets. Significant exporters, especially companies seeking to sell their products and services to certain European and Asian markets, may want to give more serious consideration to obtaining certification to the ISO 140001 standard. Certification to this (or the other major standards) could prove necessary to meet competitive pressures introduced either directly by customers or indirectly through supply chain or a multilateral lending institution. Knowing what export customers want and expect is critically important.

7) Government pressure - National governments can also be an important driver for ISO 14001 certification. Governments are generally more likely than individual companies or individual consumers to feel pressure to impose EMS certification as a condition of purchase. Since governments agencies tend to buy in large quantities, a requirement by a key government customer could be sufficient reason to warrant a company getting ISO-certified. In the US, both the Department of Energy and the Department of Defense expressed a willingness to consider extending preferential buying to otherwise qualified suppliers also having EMS certified to ISO 14001.

8) Gatekeepers - For certain businesses, like oil and gas exploration and production, national governments become key gatekeeper able to condition or even deny access to the country and the resources themselves. For example, in the latest UK biding round for North Sea oil gas and lease rights, the UK government awarded 10 percent of the evaluation points based on whether the applicant's operations were certified to one of the existing voluntary standards for environmental management. A number of governments in Latin America and Asia are considering making ISO 14001 certification a condition of country entry for foreign oil exploration and production operators. Wary of building elaborate, expensive, command and control structures for environmental regulation, they see requiring the ISO standard as a low-cost, politically presold way to ensure a level of responsible environmental management among both foreign and locally owned natural resource industries.

9) Regaining confidence - Demonstrating environmental due diligence to key external stakeholders can sometimes be a powerful additional motive for getting ISO 14001 certification. Companies in a turnaround situation after a major environmental upset or embarrassment often look for tangible ways to demonstrate their renewed commitment to sound environmental management. Certification can send an important message not only to shareholders and customers but also to lenders, insurers, joint venture partners, and nongovernmental organizations in a position to help or hinder the company's business prospects.

10) Federal stronghold - Environmental regulatory agencies may ultimately hold the wild card determining the business importance of ISO 14001 certification. In the US the EPA and a number of state environmental regulators, have at least raised the prospect of exercising less intrusive oversight over companies' operation in exchange for voluntarily certification to the ISO 14001 standard. The formal barriers to committing to such initiative is remarkably low. No major legislative or regulatory changes would be required. The agency would need to restate enforcement policy providing for a differential treatment of companies (e.g., expedited permitting, reduced inspection frequency, reduced severity of regulatory or civil penalties) depending upon the certification status of their

EMS. Should EPA or individual states changes their environmental enforcement approaches toward making ISO 14001 a de facto standard for corporate environmental management behavior, companies that now view this standard as not adding value may need to reconsider in light of these possible regulatory advantages translating directly to the bottom line.

As these various considerations indicate, the potential significance to individual companies of the proposed ISO 14001 standard depends on each individual company and the business challenges faced. There is no one right answer as to how companies should respond. A company needs to determine the value of attaining the standard for your particular business relative to the financial and other costs associated with achieving it.

6.1 Implementation Benefits

Determining what the EMS is supposed to accomplish will take substantial data collection, discussion and negotiation. If the objective of the EMS is to demonstrate that the company is committed to compliance with applicable regulations, then the EMS is not likely to reduce the company's operating costs (except for the potential for non-compliance penalties and other liabilities). However, if the EMS is focused on eliminating waste and pollution at its source, then the EMS becomes an efficiency system that can reduce operating costs significantly.

The return on EMS activities is not always measured in months or quarters. It may take years to see the return at the end of the product life cycle for long-life products. And it may not be measurable in terms of direct dollars. But companies that develop an EMS usually enjoy some or all of the benefits listed in Table 9. In order to estimate the relationship between potential benefits of an EMS and its associated costs, a cost benefit analysis would be useful.

Table 9. Implementation Benefits

Efficiency	It cost more to run a compliance-driven management system than one that manages environmental affairs as a business function.
	Discipline in the handling of environmental issues.
	Guidance in anticipating and managing communications.
	Opportunities to market your management systems as a benefit to customers and markets.
	An educated work force that continuously generates ideas for improvement of the EMS.
	Better overall control of environmental affairs.
	Cost savings through programs such as pollution prevention.
	Potential to mitigate fines and penalties.
	Potential to keep fines and penalties from recurring.
	Improved compliance status and ability to comply with new regulations.
	Fewer burdens to change production, products and activities to meet compliance.

Operational	Identify and correct problems internally before they are discovered externally.
	Will cut down on "bureaucracy" by eliminating conflicting national standards and replace them with one internationally accepted standard.
	Provide efficiency, discipline and operational integration with ISO 9000.
	Ensures greater employee involvement in business operations.
	Easier to obtain operational permits and authorizations.
	Aid in developing and transferring technology.
	Will help to reduce pollution.
	Meet industry "peer pressure" to obtain registration.
	Create a benchmark of current practices with consistent methodology.
	Aids in creating a high quality workforce.
	Provide evidence of due diligence.
Marketing	Demonstrates to customers that the firm is meeting environmental expectations.
	Public relations benefit by being able to communicate a commitment to providing a safer, cleaner, healthier environment for all concerned parties.
	Meets potential national and international government purchasing requirements.
	Gain awareness, recognition and understanding in worldwide markets.
	Profit from marketing "green" products.
	Provides a competitive marketing tool.
	Improve international competitiveness.
	Enhancing market share.
	Enhancing image.
Financial	Improves relationship with insurance companies resulting in obtaining pollution-incident coverage at best possible rates.
	Elimination of costs associated with meeting conflicting national standards.
	Process cost savings by reduction of input materials and energy.
	Satisfying investor / shareholder criteria.
	Help to reduce liability and risk.
	Improved access to capital.
Regulatory	Demonstrates a commitment to governmental authorities that the firm is moving beyond compliance and pursuing continual improvement.
	Have a proactive and improved environmental program.
	Reduction or elimination of compliance audits.
	Reduction or elimination of costs associated with compliance audits.
	Recognition of due diligence - reduction or elimination of fines associated with environmental violations.
	Preferred government supplier status.
	Reduced monitoring and reporting requirements.
	Faster track for permits.

6.2 Implementation Procedure

There are many opinions about the best way to develop a corporate EMS, but most agree on the basics of the Plan (i.e., management commitment, data collection), Do (i.e., prevention activities), Check (i.e., internal and external measurement and reporting) and Act (i.e., corrective action) method.

If a company is ISO 9000 registered, it should use the infrastructure developed for quality management system to develop a ISO 14000 EMS. It is not necessary to reinvent the basics of information management. For example most reporting mechanisms will be the same and can be used again in the EMS. The procedures and work instructions in support of a quality management system are valuable tools for the launching of procedures relating to EMS. Their structure and form should be copied, as well as much of the manner in which they are handled as quality documents and records.

If a company has an EMS, have it reviewed. There are two ways to do this. The least expensive is to have a high level assessment based on ISO 14001. This will provide a basic understanding of how well the current EMS relates to ISO 14001 without being time consuming or costly. The second is to participate in a full-scale initial review, which is a detailed gap analysis using ISO 14001 as a benchmark. These are more time consuming and costly and are usually an indication of intent to register or to develop a registerable EMS. If you have no EMS, a high-level assessment tool will provide the basis from which to get started.

A gap analysis identifies detailed similarities and discrepancies between ISO 14001 and an existing EMS. Management can use the results to determine actions that are required to correct identified deficiencies. As mentioned the process is time consuming and labor intensive. The assessment team must conduct a thorough document review and a verification of the process through observation, interviews and sampling. An effective gap analysis will be performed by an assessment team that is characterized by their independence from the facility being audited with, however, a thorough knowledge of operations and activities. Knowledge of applicable regulatory requirements and ISO standards are also advisable. This analysis will perform a element-by-element comparison of the requirements imposed by ISO 14001 and existing company policies, procedure and practices. It should elicit two kinds of data: Qualitative data involve "attribute" or kind (e.g., the components of a substance or mixture) and quantitative data involve "measurement of amount" (e.g., the amounts of components of a substance or mixture). All data employed in gap analysis must be objective (i.e., free from personal bias or interpretation) (McCreary, 1996).

The following steps are suggested procedures to implement an ISO 14001 EMS (Hamner, 1996).

1) Obtain management commitment and establish the EMS framework that is outlined in ISO 14001. This framework was developed by many experienced environmental managers in many countries and provides a sound basis for organizing and EMS.

2) Conduct a thorough environmental assessment of the facility or organization for which an EMS is to be developed. This should include quantification of chemical use and emissions to all environmental media, life cycle analysis of products and identification of significant impacts during the product life cycle, and environmental aspects of the physical site such as property contamination surrounding impact assessment guidelines may be used as a framework. If feasible, include full cost accounting for all waste streams in the assessment. Be careful not to underestimate the true cash cost of generating waste, which includes lost raw materials, waste processing, waste collection and handling, treatment equipment, treatment operations and disposal. Waste stream costs should be allocated back to the processes which generate the wastes.

3) Establish a relative-risk assessment system to prioritize the environmental aspect that pose the greatest risk to the environment and to sustainable facility operations. The objective of this system is to determine where the EMS should focus.

4) Using the risk based information on priority chemicals, emissions or product aspects, conduct an audit of the production process or activities that require their use or generation, to answer the question, "why is this use/emission/impact happening?" This is a classic pollution prevention assessment which identifies what can be done to prevent problems and reduce costs and risks. It is important to note the sequence of these initial activities. Basic data and risk tolerances must be used to establish priorities for cause analysis and generation of prevention ideas. Also note that this sequence complies with the requirements of the European EMAS system to conduct a preliminary environmental review.

5) Establish objectives and targets for the EMS that will result in elimination of waste and consequent pollution at the source, meaning at the process or production unit level, which includes direct support functions such as purchasing and product design.

6) Begin implementing the prevention-based aspects of the EMS immediately, and develop a plan to implement the full EMS within a time frame of not more than two years. Report to stakeholders what is being done to prevent pollution, not what is being done to establish a management system.

7) Prepare a public report on corporate environmental performance that reflects real and perceived environmental concerns. It should include real operational data and describe realistic objectives and targets for achieving meaningful environmental results. This report is especially important to top management because it will identify major strategic issues for the company. Make sure the report is as honest and objective as possible. If real problems about

performance are identified by the draft report, implement targeted strategies to fix the problems and describe the strategies in the final report.

8) Communicate with all environmental stakeholders and use the corporate environmental report to begin a dialogue with them regarding their concerns expectations about corporate environmental performance. Again, focus on results and not procedures, this will be more information to all stakeholders.

9) Carefully observe the ISO 14001 process, paying attention to all available information sources. For example, useful information may be provided by European environmental activist are attacking the ISO standard as being weaker than existing European standards. Conversely, U.S. organizations that feel that the improvements, beyond the technical solutions for specific environmental problems are welcome may also offer valuable insight into the developing process.

10) Using information from environmental stakeholders and from internal sources, make a cost-benefit decision whether ISO certification will be necessary. It may be that a solid environmental report identifying real progress towards meaningful goals will satisfy most stakeholders, without the cost and complexity of an ISO certified EMS. On the other hand, stakeholder pressures the need for tight internal controls may make an ISO-certified system either a marketing or a management necessity.

11) If possible, delay certification for at least a year after the ISO EMS is finalized. This will enable companies to see how the ISO label is being accepted by environmental interest groups, and how the public discerns between companies with a genuine concern for improving their environmental performance and those who have obtained ISO certification solely as a public relations device. The way for a concerned company to distinguish itself is to implement meaningful pollution prevention and pollution prevention strategies and to report on real facts and results to stakeholders, within a framework that is guided by the ISO EMS standard.

The following steps are suggested for integrating an EMS into an existing management system (Block, 1996):

1) Understand the existing management system to ensure that the EMS is properly positioned within the management system. This process allows the identification of the potential obstacles and the existing elements that may "make or break" the EMS once implemented. On a specific level this process also provides information regarding management style (i.e., centralized or decentralized), corporate culture, vision and code of conduct. Individual managers should be interviewed to identify existing challenges in

communications and reporting, and to determine the availability of human resources.

2) Environmental objectives should be defined through extensive research into the operations, past performance, areas of weakness and strength, and existing resources of a company. An effective methodology in this phase should identify areas of greater weakness and prioritize the needed remedies. A gap analysis would be a useful tool at this point to establish a desired level of performance against which present conditions are measured.

3) Once the data is obtained and integrated with the standards, they can finally be implemented and tailored into an EMS design. ISO 14000 standards are not to be interpreted as "one size fits all" but rather, as a guidance to provide the necessary elements. For each company a varying degree of activity may be required in the implementation phase.

4) An EMS is far from a static process and should be regularly reviewed and modified. Changes within the organization will affect the effectiveness of the system and a regular review and adjustment is the key to ensuring that the system is in step with the company's needs. An EMS is a tool and not an end in itself, it therefore, requires flexibility and ability to be modified as the company changes.

6.3 Registration

Firms seeking "registration" to ISO 14001 will utilize independent, third-party auditors or "registrars" who are accredited by an accreditation body (i.e., Registration Accreditation Board (RAB)). These registrars audit the firm and have the authority to offer formal registration to the standard. EMS registration to ISO 14001 is formal acknowledgment by an independent third party that the organization's system complies with the standard. Registration is also a means by which businesses can communicate to their stakeholders that an effective system is in place for managing their affects on the environment. The RAB has recently lunched a program to accredit five US registrars, Figure 3 illustrates this process.

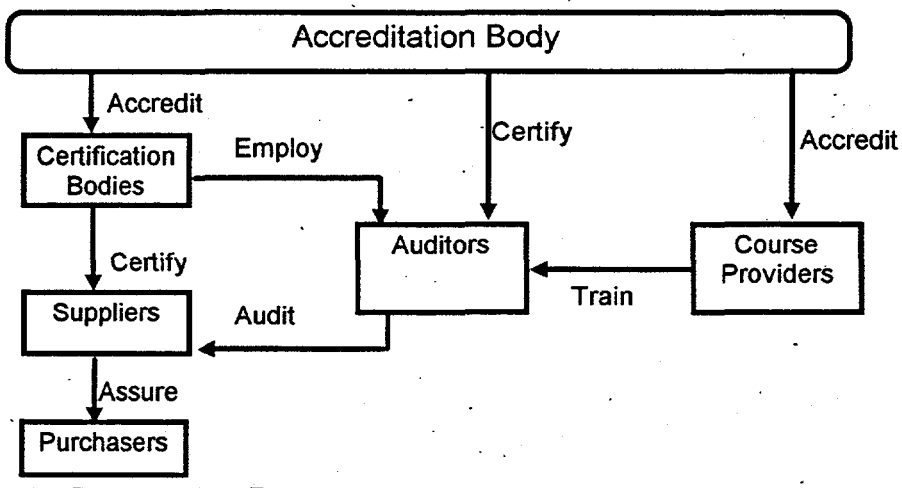

Figure 3. Registration Process

When preparing for an audit a clear distinction between what is required and what is recommendations by the standard should be kept in mind. The audible EMS requirements appear in ISO 14001 Section 4 only. Section 0-3 (i.e., introduction, scope references definitions) are not audible. The annexes are for clarification and guidance only and thereby, do not add to nor detract from specification requirements. The word shall means that the organization must perform the stated activity. The word should means the activity is recommended but not mandatory. Also be aware that ISO directs organizations to establish and maintain procedures, not outcomes.

When preparing for an audit EMS managers must delineate between what is required documentation vs. alternative evidence. The following eleven activities must be documented:

- Environmental policy
- Environmental objectives
- Roles, responsibilities and authority
- Relevant communication from external interested parties
- Decision regarding external communication about significant environmental aspects
- EMS documentation
- Calibration and maintenance of monitoring equipment
- Changes in any documented procedures
- Training
- Audits
- Management review of the EMS

The following three procedures must be documented:

- Operating procedures for activities associated with significant environmental aspects
- Monitoring and measurement of activities that can have a significant environmental impact
- Periodic evaluation of regulatory compliance

Eleven necessary procedures that do not have to be documented include:

- Identification of environmental aspects
- Identification of and access to legal and other requirements
- Identification of training needs
- Internal communication
- Receiving, documenting and responding to relevant communication from external interested parties
- Control of all documents
- Identifiable significant environmental aspects of goods and services used by the organization
- Identification of potential for and response to accidents and emergencies
- Defining responsibility and authority for addressing non-conformance and corrective/preventive actions
- Identification, maintenance and disposition of environmental records
- Periodic EMS audits

Examples of procedures for which documentation is not required can be verified through alternative evidence are interviews and observations. As mentioned in previous sections the pros and cons for formal registration to the standard may vary depending on the company. If a company decides to register the will enjoy some or all of the benefits listed in Table 10.

Table 10. Registration Benefits

Communicates evaluation and acceptance by an accredited, third-party professional organization.
Negates "conflict of interest" claims associated with organizations that "self-declare" the status of their programs.
Validates the integrity of an organization's claims.
Provides organizations with an un-biased review of their programs, policies, etc.
Addresses an anticipated recommendation by EPA.
Addresses an anticipated requirement between customers and suppliers.
Addresses an anticipated requirement to compete in international markets.
Addresses an anticipated requirement of international and national government purchasing departments.

7.0 LEGAL

There are a number of legal considerations that should be reviewed at the outset of the implementation process. If the following issues are not addressed in a timely fashion, they could increase the companies risks while implementing ISO 14000 programs.

The major legal issues identified to date are (Freeman, 1996):

- Confidentiality of audits
- Establishment of common law standard
- Liability for improper certification
- Environmental claims and labeling
- Trade

7.1 Confidentiality of Audits

The basic issue here is whether ISO 14000 audits will qualify for protection under common law, EPA or Department of Justice (DOJ) policies, or State audit privilege laws. If they do not how can audit reports and related documentation be protected from disclosure to adverse parties.

Although fourteen States have enacted environmental audit privilege laws since 1992, they vary and are full of exception. None of these laws specifically address system audits. EPA and DOJ looks favorably to companies who voluntarily audit report and follow up, however there is no guarantee for confidentiality. These concerns are addressed at present, by the fact that ISO 14000 audits are generally not sought for legal advise or in anticipation of litigation. They are not focused on compliance issues and are not typically kept confidential. ISO 14000 is designed to be a participatory process with third party certification presented as an option. Companies generally would want audit results disseminated for educational purposes. If confidentiality is essential a company could conduct internal pre audits or choose to self certify.

7.2 Establishment of Common Law Standard

It is possible that the existence of a widely-accepted international standard be used by courts, judges and juries to define a new standard of care for corporations. This should render a decision not to participate with the ISO standard as a failure to comply with an industry standard thus elevating a decision resulting from an accident to a finding of negligence.

Common law is defined by the reasonable person standard. Commercial reasonableness is often judged by standard or typical business practice. If ISO 14000 is globally excepted (as with ISO 9000) these voluntary standards may be

used to establish a standard of care. Therefore, if an accident involving property damage or injury occurs at a site that does not participate in ISO 14000 and a great number of similar organizations are participants, it is possible that a court of law might find the company negligent.

7.3 Liability for Improper Certification

Companies who are inappropriately certified under ISO may have legal exposure for having received benefits based on the certification. These commercial benefits might include the ability to obtain contracts from customers that require ISO certification and the ability to advertise and label product as a result of this certification. Governmental benefits might include qualification for regulatory alternatives to "command and control" policies; qualification for favorable enforcement treatment and possible qualification to bid on procurement contracts favoring or requiring environmentally favorable products.

Commercial consequences that may result from an inappropriately received certification include cancellation of contract; suit by customer for breach of contract and a suit by disfavored supplier for interference with contractual relations. Governmental consequences could include the cancellation of contract, suit by government for breach of contract; suit by disfavored supplier for interference with contractual relations, contract appeal by disfavored supplier, False Claims Act suit, prosecution for submitting false statement to government, false advertising/labeling proceedings by the Federal Trade Commission (FTC).

7.4 Environmental Claims and Labeling

There appears to be a lot of overlap between ISO 14021 standards for environmental claims and labeling and the FTC's Environmental Labeling Guides. Prospect for harmonization and potential conflicts are now being reviewed.

7.5 Trade

The way these voluntary standards are implemented, may create or exacerbate non-tariff barriers to trade. These barriers may also be actionable under the present rules of international trade.

A major discrepancy between ISO 14000 standards and general trade principle is the distinction between production process and end products. At present distinctions based on production process are generally disfavored, ISO 14000 clearly presents an opposite approach. This will bring up the argument that because a product is ISO certified it may not be superior.

8.0 REGULATORY

Regulatory issues surrounding ISO 14000 may, in fact become the strongest motivator for implementation. U.S. government agencies are taking a hard look at ISO 14001 as a means to increase voluntary compliance to existing regulations and to reduce a variety of monitoring and reporting requirements (Casio, 1996). This replacement of the traditional command and control policy of environmental enforcement would benefit both government agencies and industry. Agencies would have the opportunity to refocus resource on more pressing matters such as chronically bad actors or give more attention to small and medium sized business. Agencies are already beginning to explore and support cooperative/voluntary regulation with alternative programs such as EPA's Project XL[1]. A third party registered industry is required to incorporate all applicable environmental regulations, therefore, it is expected that such industries will benefit from this new regulatory paradigm through cooperation with the agencies and perhaps easing the permitting process and specific requirements. In a company with an EMS, environmental managers will also become business managers, with input on planning and strategic decisions. They must be able to express the impact and benefits of environmental issues in terms of profit costs, performance and cultural, legal and technical objectives with measurable goals. Instead of focusing on compliance, these environmental managers will not have major influence on how a company does business. Environmental aspects of the products, activities and services of the organization are identified and made part of the business planning process, which will directly contribute to the bottom line.

New laws such as the National Technology Transfer and Advancement Act of 1995, which was signed into Public Law 104-113 in March 1996 are also likely to

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[1] The XL programs was created with the March 16, 1995, Reinventing Environmental Regulation initiative. XL projects give the regulated community the opportunity to demonstrate excellence and leadership, there, by granting them the flexibility to replace the requirements of the current system with an alternative strategy developed by the company. EPA's Project XL Team provides weekly updates on the latest developments on Project XL.

XL programs provide real world tests of innovative strategies that achieve cleaner and cheaper results than conventional regulatory approaches. Each project will involve the granting of regulatory flexibility by EPA in exchange for an enforceable commitment by a regulated entity to achieve better environmental results than would have been attained through full compliance with regulations. EPA has set a goal of implementing fifty pilot projects in four categories: XL projects for facilities, sectors, government agencies, and communities.

While this is a federal program, most projects will require the participation of other government agencies. A decentralized or "franchising" approach to the implementation of XL projects is being taken. Individual projects should be managed by the units of government that are best suited to address the issues raised by the project. EPA will not move forward with projects unless State and Tribal regulatory agencies are full partners, so it is encouraged that companies consult with and seek the support of these agencies while developing their proposal. Stakeholder involvement is also important to EPA in this process. As such, proposals developed with local governments, environmental groups, and citizens organizations are viewed favorably.

expedite the implementation of ISO 14001 among affected industries. For companies supplying materials and services to federal facilities this law has the potential to eliminate much of the time consuming and expensive procedures associated with satisfying government procurement regulations. For federal facility operators, the law may provide the impetus for ISO 14001 implementation and/or third party certification. It will likely impact the usage of the ISO 14000 series of EMS standards by federal government agencies such as DOE, EPA, the Department of Defense and the Nuclear Regulatory Commission. Specifically subsection 4 of the law addresses the definition of technical standards. The term technical standards means performance-based or designed-specific technical specifications and related management systems practices. It is likely that ISO 14001 will fall under the words related systems management.

Several U.S. States are preparing environmental management initiatives that link ISO 14000 to State regulatory practices. Motivated by the prospect of reduced reporting requirement and incentive-based voluntary regulatory plans, companies and State regulators are looking toward ISO 14000 to be a valuable tool to ensure improved environmental performance. The following is a list of actions already taken by some States (IESU, 1996).

- Pennsylvania Department of Environmental Protection is looking at revamping its permitting structure to allow for ISO 14001 certification to supplant their traditional command -control posture.
- Minnesota is participating in EPA's Project XL program and in proposing legislation that may allow for ISO 14001 certification in place of state audits.
- Colorado is proposing an environmental leadership program that echoes EPA's Project XL. One of the elective elements of the proposed program is ISO 14000 registration.
- Massachusetts State Department of Environmental Protection has developed the Environmental Results Program to replace a permitting program with a self certification program. ISO 14000 is an approach being viewed to lessen regulatory emphasis on detail regarding processes and more on outcome.
- The New York Department of Environmental Conservation is tracking the development of ISO 14000 to determine how to use these processes in the State. The State is presently talking with companies about ways to work with ISO 14000 to decrease regulatory stringency and lessen the frequency of inspections for registered organizations.
- Washington State Department of Ecology, is considering a sanction for third-party auditing not related to the State or a regulatory agency. Some incentives would be offered to companies with this function in place, such as reduced monitoring and reporting or civil penalty adjustments. In most cases, there would be two requirements: 1) Report and correct the violation; and, 2) demonstrate that a program such as ISO 14001 is in place.

- The Wisconsin Office of Pollution Prevention says the state is interested in finding ways to offer business incentives to ISO 14001-certified companies.

On a global scale, Hong Kong government officials have mandated that all consulting firms and contractors conducting business with the government have ISO 9000 certification. It is anticipated that ISO 14000 certification is not far behind (IESU, 1996).

9.0 CONCLUSION

The wide range of potential environmental, commercial, legal and regulatory benefits offered by ISO 14000 offer an significant reason to explore the possibilities of implementing an EMS. Organizations will be able to anticipate and meet growing environmental expectations and to ensure ongoing compliance with national and international requirements as well as satisfy the growing demands of customers, stakeholders and the interested public. The question of whether the benefits outweigh the cost for companies with effective environmental programs (i.e., many U.S. firms) can only be answered as time allows the standard to mature and evidence of its global appeal becomes apparent. Certainly, companies who compete in a global market and face international competition will want to research these possibilities thoroughly and expediently. Based ISO's success with ISO 9000, it would behoove all other interested companies to explore the how implementation might benefit the company and the level of effort it would take to implement the standard. It would be advisable for companies with even a modest interest in implementation to have a gap analysis performed. This will give management a precise concept of the areas of needs for an effective environmental program. It should be kept in mind that all effort put into any level of ISO implementation will reap the benefits of a companies greater familiarity with its present environmental management, thereby providing opportunity to increase the efficiency of the system and possibly reduce operating costs.

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