

ORGANIZATIONAL ISSUES ASSOCIATED WITH THE IMPLEMENTATION OF ISO 14000

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INTRODUCTION AND OVERVIEW

For years, industry has argued that the command and control regulatory approach to the environment has been inefficient and burdensome; that given the responsibility, industry could implement programs that would meet the goals of environmental protection more effectively and cheaply. ISO 14000 now gives industry an opportunity to establish that this concept is indeed a superior approach. The International Organization for Standardization (ISO) 14000 series of standards represents a novel approach to environmental management that relies on changes in organizational commitment, focus and behavior, rather than on coercion from regulatory authorities. The underlying premise of ISO 14000 is improvement of environmental performance through self-regulation and market driven pressure.

ISO 14000 is an evolving series of standards being developed to provide organizations with the structure for managing environmental impacts. The standards address six distinct, but related, subjects including:

- ∃ environmental management systems;
- ∃ environmental auditing;
- ∃ environmental performance evaluation;
- ∃ environmental labeling;
- ∃ life-cycle assessment; and
- ∃ environmental aspects in product standards.

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Under the environmental management system (EMS) standard, ISO 14001, companies will develop

¹The final environmental management system (EMS) standards (14001 and 14004) were issued in September 1996; ISO 14001 Environmental Management Systems - Specification with Guidance for Use and ISO 14004 Environmental Management Systems - General Guidelines on Principles, Systems and Supporting Techniques. The three environmental auditing standards Guidelines for Environmental Auditing - General Principles on Environmental Auditing (14010), Guidelines for Environmental Auditing - Audit Procedures - Auditing of Environmental Management Systems (14011/1) and Guidelines for Environmental Auditing - Qualification Criteria for Environmental Auditors (14012) were published as final standards on October 1, 1996. The other standards are in various phases of development.

an environmental policy; identify environmental aspects and impacts of their activities, products and services; define significance; prioritize aspects and impacts; identify legal and other requirements governing the operation of the organization; establish objectives and targets; implement programs to meet those targets; establish an auditing system and procedures for management review; as well as follow-up and corrective action with regard to audit findings.

The environmental management program describes how an organization will meet its environmental objectives and targets. ISO 14001 requires that an organization develop an environmental management program to address all of its environmental objectives and targets and describe how each will be achieved. The program must include a specific plan that describes the actions required to meet each objective and target, the person(s) responsible for meeting each objective and a time schedule detailing when each target will be attained. Objectives and targets can be prioritized within the program, but all objectives must be included.

The underlying premise of ISO 14000 is improvement of environmental performance through self-regulation and market driven pressure. An environmental management system (EMS) provides organizations with order and consistency which enables them to address environmental concerns through the allocation of resources, assignment of responsibilities, and on-going evaluation of practices, procedures and processes. An EMS allows an organization to anticipate and meet its environmental objectives and to ensure on-going compliance with national and/or international requirements.

An EMS provides a framework to balance and integrate economic and environmental interests. The process of designing an EMS is iterative and interactive and the structure, responsibilities, practices, procedures, processes and resources for implementing environmental policies, objectives and targets must be coordinated with existing efforts in other areas, including operations, finance, quality and occupational health and safety. Such coordination and integration will require change, not only with regard to the engineers' thought processes, but entail a significant amount of systemic change within the entire organization.

Environmental Management Systems (EMS)

ISO's EMS model is based on five basic principles. The EMS requirements are contained in Section 4 of ISO 14001. The most basic requirement, in Clause 4.0, is to establish and maintain an EMS that includes all requirements described in the standard. The model for an EMS is based on five major steps which are discussed in general terms below.

1. **Commitment and Policy** - An organization defines its environmental policy and ensures commitment to it. Top management must commit to continual improvement of the EMS, prevention of pollution and compliance with applicable law. The environmental policy must be relevant to the nature, scale and environmental impacts of activities, products and services. The policy must be documented, available to the public, and communicated to employees.
2. **Planning** - An organization formulates a plan to fulfill its environmental policy. During this planning phase, the organization develops a cross-functional team and identifies significant environmental impacts of activities, products and services, along with legal and other standards to which the organization subscribes. It then sets

objectives and quantifies them wherever practicable.

3. **Implementation** - The third step is to put the plan into action by providing resources and support mechanisms necessary to achieve the environmental policy and the objectives and targets. In this step, the organization defines the roles and responsibilities of all involved in the process, including senior management representatives. It identifies and provides necessary resources. The organization identifies activities and processes with significant environmental impacts and implements procedures to manage those activities and processes. It establishes training procedures and carries them out. It establishes and implements internal and external communications procedures.
4. **Measurement and Evaluation** - The organization measures, monitors, and evaluates its environmental performance against its objectives and targets. It generates specific procedures for conducting performance evaluations. It monitors and measures processes on a regular basis and tracks performance and conformance with objectives and targets. The organization conducts audits of the EMS to identify areas that require improvement and nonconformances that must be corrected.
5. **Review and Improvement** - The final major step is to develop procedures to review and continually improve the environmental management system, with the objective of improving its overall environmental performance. The organization compares actual performance with its objectives and targets, then identifies and corrects the root causes of deficiencies. It also identifies further opportunities for improvement.

Environmental Performance Evaluation and Auditing

The success of an environmental management program depends to a great extent on how well it measures environmental performance. The task of evaluating performance and identifying appropriate environmental performance indicators is an ongoing process. The ISO 14001 standard requires that organizations develop specific, measurable objectives and targets. The standard also requires them to evaluate the performance of their EMS and to improve it. Environmental performance evaluation is a management tool that can provide an organization with reliable, objective and verifiable information on an ongoing basis to determine if it is meeting the environmental criteria set by management. The goal of EPE, which is in the developmental stages, is to give management a tool for generating the accurate information it needs to measure and track environmental performance to help meet its objectives and targets.

The EMS standards establish the core elements of an EMS. The EPE process provides guidance on how to measure performance on a regular basis against objectives and targets set by the EMS. Auditing an EMS provides guidance on how to verify the existence of the EMS against agreed upon criteria. The ISO environmental auditing standards provide the basis for developing an environmental audit program that serves to gather and distribute information related to an organization's EMS. An ISO 14001 EMS audit is the vehicle through which the environmental aspects of your organization and how they are managed are systematically compared against the requirements of the ISO 14001 specification.

Product Evaluation

Whereas the tools such as auditing and environmental performance evaluation are used to evaluate the EMS, there is another series of standards that focuses not on the system per se but rather on the characteristics of products, processes and services. These standards include environmental labeling and life cycle assessment.

The ISO 14000 environmental labeling guidelines will likely affect your organization if it has a presence in the retail market. These guidelines deal with product marks and their meanings and attempt to harmonize existing third-party labeling programs. The aim of the ISO standards in this area is not to make all labeling programs the same, but to achieve some consistency in methods and procedures. Life cycle thinking means taking a holistic environmental view of a product or service, from raw materials through production to distribution and final disposal. This perspective encourages an organization to look at all environmental aspects of their operations and helps them integrate environmental issues into their overall decision-making process.

The ISO 14000 standards are expected to have a major impact on how organizations throughout the world identify and manage their environmental concerns, and may become the environmental quality benchmark for conducting international business in the next century. Becoming proactive in managing environmental aspects of an organization makes good business sense. The potential benefits are vast and include market advantages, compliance performances, and cost savings.

Cost savings become readily apparent when an effective management system is in place, because resources are properly allocated, trained and focused; systems are delivering information that stimulates accurate decision-making and decreased report generation time; and planning activities are ensuring that the job gets done right, on time, and within budget. In addition, life cycle assessment provides a tool that identifies environmental issues throughout a product's life. Reducing or eliminating these issues means reducing or eliminating the activities associated with them, which translates into cost savings.

IMPLEMENTATION ISSUES

Despite the utility of the standards in providing guidance to implement environmental management programs, the key to environmental management is not simply to follow the requirements of the standards, because while adherence to the standards may leave the organization with a well organized and well documented program, the most effective programs focus on practical methods of putting life and energy into the concept. Further, although the standards provide guidance in terms of functional requirements, they are silent with regard to implementation methods or organizational processes that are fraught with human and systems change issues. There is no clear agenda for addressing the human factors associated with change in implementing these functional requirements. Historically, broad based organizational change programs were not successful because they were viewed as add-ons, with upper management oblivious to the organization's resistance to change. Top management spoke about the desired outcomes but did not put their money where their mouths were and had no intentions of acting personally to achieve the outcomes. Successful programs, on the other hand, manage transitions and focus on shared visions and behavioral norms as core supports for the change effort.

Systemic changes which may be required to implement a successful environmental management system are difficult for many reasons including, marketplace forces, the lack of hard proof that the change will result in benefits, and fear in terms of what the change will mean to individual employees.

When new management systems are being implemented, all too often, companies pay attention only to the technical aspects of system design and implementation and ignore the human and organizational aspects that deserve attention. As a result, there is resistance, misunderstanding, mismatched expectations, delayed implementation and results that fall short of goals.

Understanding the principles of systemic change will help to pave the road to a successful change.

There are six principles: courage; vision; commitment; architecture; roadmap; and constancy. Change is scary and the courage to forge ahead must be summoned. The organization is comprised of interdependent components that must be aligned to successfully implement change. The core of these components is the vision. The internal interdependent components are the structure, processes, tools and people. To the degree that the organization is aligned to its vision, its customers and the internal interdependent components, it is more effective and more efficient.

The starting point of any organizational transition is a clear statement by top management that provides the rationale, supportive policies, and the goals that drive the change. ISO 14001 recommends a comprehensive environmental policy, but does not specify that the policy address how the people will need to work together to solve problems. Implementation efforts must address such issues as employee participation, decisionmaking processes, and conflict management.

Individual value systems need to with the organization's stated policies or there may be a lack of motivation to pursue common goals and perform at high levels. If there is a value congruency throughout the organization, the EMS will have a better chance of success. It is possible that new patterns of communication will have to be adopted such that appropriate feedback and interaction can be achieved. Information needs to be shared and employees need to know that sharing this information is crucial in establishing the basis for environmental controls. Reward and incentive programs should be evaluated for conformity with the goals that the organization is trying to achieve. This "open-book" management represents a shift away from traditional command and control and may be distrusted by top and mid-level managers.

First and foremost is the need to build awareness and an understanding of the need and depth of the changes to be made. Personnel within the organization need to understand that competition among businesses and the increasing awareness about the state of our environment and the costs associated with its maintenance can make environmental performance a competitive differentiator. They must understand that reducing a company's environmental impact means increasing the efficiency of its operations and/or reducing the use of raw materials in its products. This translates into cost savings. Environmental awareness can also result in new products and services that use environmental performance as indicators.

Many of these concepts and thought processes will be new to employees who might be accustomed to working in a "vacuum". The employee must begin to look beyond their specific input to the manufacturing process, to the big picture. No longer can employees think only of the task at hand - every employee is being asked to consider his or her job in light of the impact it has on quality, the environment, and ultimately the bottom line.

It is often useful to begin the process of change by starting at the end; by looking at the end result, the result that you are seeking to achieve and by aspiring to change. Link the change effort to a vision (the core) of a desired future state; when people share a common vision of a desired future, they are likely more willing and more able to make changes that will move the business forward.

Education is an integral component of change and your organization will benefit if it builds learning into the process of change by dedicating time, energy and focus to learning how to change. It is helpful to evaluate past change efforts in the company to determine what works and what doesn't work in their particular environment. When a new change is implemented, set up a feedback mechanism for monitoring effectiveness, putting in corrections and continuously improving.

Continuous communication is imperative because change creates uncertainty, and whatever you can do to reduce uncertainty will help to foster the change. The organization should share information about what the change is, how it will affect people, when it will happen, what is known and what is not known.

Resistance can be positive or negative and should not necessarily be treated as bad. Rather, the organization should view questions and challenges as constructive data about how the change is perceived and what it will take to implement it effectively. During implementation of an EMS, management must manage resistance. Management must be aware of how to help people get in touch with their individual and collective intention for change and assist them by revealing the nature and scope of the "big picture". The business reasons for adopting an ISO 14001 EMS must be clearly defined.

PRODUCT AND PROCESS IMPLICATIONS

Current command and control regulatory approaches deal largely with complying with regulations and with preventing obvious mistakes of the past, by emphasizing waste minimization, avoidance of known toxic chemicals and "end-of-pipe" control of emissions to air, water and soil. Many companies tend to isolate environmental issues and keep them "harbored" within the environmental department. Instead of taking the proactive approach, they employed the classic mode of "react and attack".

Corporate environmental, health and safety personnel are involved, and to some extent manufacturing personnel, however process designers and engineers do not play a role. However, because the industrial products that are being designed and developed today will dictate the impact that industry will have on the environment in the future, process and product design engineers hold a key to future industry - environment interactions.

ISO 14001 requires a commitment to the prevention of pollution. Note the use of the verbiage prevention of pollution as opposed to pollution prevention. Prevention of pollution is defined in the standard as the "use of processes, materials or products that avoid, reduce or control pollution, which may include recycling, treatment, process changes, control mechanisms, efficient use of resources and material substitution."

This change in verbiage indicates a need to look at the design stage to prevent potential problems that may cause significant environmental impacts. In the past, the design phase of the operation has been

the least affected by initiatives such as ISO 14001. However, this will all change as companies recognize the benefits of proactive management. No longer will engineers be able to design and operate in a bubble away from its impact on the environment. The choice is either pay now and implement a sound environmental management program to control current and potential impacts associated with the processes or pay later in the form of expensive take-back and recycling programs.

No organization exists in a vacuum. Every industrial activity is linked to thousands of other transactions and activities and to the resulting environmental impacts. For example, a large firm manufacturing high technology equipment may have thousands of suppliers located around the world. The suppliers may be changing on a daily basis. The firm may actually manufacture thousands of different products to a wide variety of customers, each with his or her own need and cultural characteristics. As such, each customer may treat and/or use the product very differently, which is a big consideration if the use and maintenance of the product may be a source of potential environmental impact. When the product is finally disposed of, the product may end up almost anywhere, in any country, in a high-technology landfill, an incinerator, on the side of the road, or in a river that supplies drinking water to a small community.

Industrial ecology is an approach to industry-environment interactions to aid in evaluating and minimizing such impacts. It involves the design of industrial products and processes from the dual perspectives of product competitiveness and environmental interactions. This is a systems-oriented vision which starts with the premise that industrial design and manufacturing processes are not performed in isolation from their surroundings, but rather are influenced by them, and in turn have influence on them. The goal is to optimize the total materials cycle from virgin material, to finished material, to component, to product, to obsolete product and to ultimate disposal. Factors to be optimized include resources, energy and capital.

Industrial ecology involves both products and processes and there is a distinction between the two. Products are what is sold by a corporation: tires, computer, cars, for example. Processes are the techniques by which those products are made: for example, the production of glass from lime, soda ash and sand. Very often, the people who design the processes and the people who design products are different. In addition, the interactions of process design with the environmental concerns are likely different from those of product design.

Processes are the ways in which feedstock material of one sort or another is transformed into intermediate materials. As such, processes define much of the flow of solids, liquids, gases and energy into a manufacturing facility and are responsible for much of the flows of solids, liquids, gases and energy leaving that facility. Processes become an integral part of an industry and they are then difficult and expensive to do more than make incremental changes, at least in the short term. Product designers on the other hand, have considerable flexibility when choosing the processes needed for their products. Product designers must consider industry-environment interactions that are primarily outside the province of the process designer: choice of materials, product packaging, environmental impacts during product use, and the optimization of product recycling.

An EMS can be used to begin looking at the implications of environmental concerns into each specific product. An integrated - engineering, manufacturing, product/process development - EMS also can be used to pinpoint and identify products that are beginning to generate money or should be maintained because they are money-making ventures for the company and at the same time assess the

environmental implications of that particular product.

An EMS can benefit a company's production needs, however the advantage to engineering are less apparent to the majority of companies. An established EMS has the capacity to generate information that was once thought unattainable for the purpose of designing a product. An EMS puts in place a structure for collecting data that details potential concerns and impacts that directly affect the design specifications stage of product development. It is a way to begin integrating ISO 14000 with design for the environment. Organizations can look at the process and begin to deal with environmental impacts of designing and developing that product in that stage through environmentally conscious manufacturing practices.

An EMS can be an integral tool in design for the environment analyses. The integration of environmentally conscientious manufacturing and EMS are critical. The integration of ISO 14000 and tools based on higher levels of LCA thinking such as design for the environment, industrial ecology and risk analysis are crucial to the success of future products and markets. By looking at tools that deal with energy, materials, processes and potential process impacts down the line, you can begin to collect and use data on the amount of usage and waste associated with these areas.

CONCLUSIONS

Facility personnel will now be required to think beyond the factory gates. They will have to be aware of the environmental aspects of their activities and the potential impacts on the environment . They will have to think about what they purchase from their suppliers and how they package their products for distribution to their customers. Environmental managers have been talking about integrating environmental issues into the business decisionmaking at an organization, however, historically, this has been met with resistance. Now, all facility personnel will have to start integrating environmental issues into their day-to-day activities. It can no longer be an end-of-the-pipe issue.

If implemented properly, ISO 14000 indeed does provide industry with the opportunity to meet their environmental goals within a flexible framework that can be made to fit the organization.