Environmental Management Systems

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Introduction

Environmental Management Systems (EMS) can be designed to have various degrees of inclusion of all environmental aspects of an organization. In their simplest form, they may be nothing more than a system of organizing and disseminating information surrounding regulatory permits. Such a system may more correctly be called an Environmental Management Information System and although it's critical to a planning process that you have accurate information, an EMS goes beyond this task. A true EMS includes evaluating and managing all potential environmental ramifications of an organization.

Implementing an EMS means looking at everything from the environmental impacts associated with getting you raw materials to impacts associated with ultimate disposal of the product you produce – and everything in between.

Environmental management cannot be restricted to waste management. Companies have seen real gains in waste reduction in recent years through the waste minimization techniques of the 1980s and more recently the pollution prevention techniques of the 1990s. Pollution prevention calls for you to look at the entire process, determine the source of contamination and what can be done to prevent it. Likewise, true environmental management must include all aspects of the organization, such as personnel training, purchasing, management organization, communication, risk management, and emergency planning.

Some standards have been established for EMS. The International Standards Organization (ISO) has established a series of environmental standards (ISO 14000) that prescribe the necessary elements for an EMS. The ISO standard is the focus of this chapter. In addition, the Kansas Department of Health and Environment (KDHE) has established criteria for EMS. This will be covered later in this chapter.

Companies in the United States have tried to get some regulatory relief by implementing an EMS that meets the ISO 14000 standard. The ISO standard is broad in scope and emphasizes total environmental responsibility. The standards have been criticized by some, though, because they are not specific with regard to compliance with all applicable environmental regulations for all portions of the business. For instance, it would be possible for a manufacturing plant to be certified under the ISO 14001 standard without including the facility's waste water treatment plant. Also, the EMS only has to be in place and be progressing. Even if you are out of compliance in an area, you can still meet the ISO standard as long as your system finds the problem and you progress toward the solution.

Regulatory agencies are much more interested in assuring compliance. While they may appreciate your efforts toward improvement, they want to assure that you remain in compliance at all times. Therefore, they have established their own criteria for Environmental Management Systems and have afforded some benefits for companies that have an EMS in place and find a violation during a self-audit. Businesses also resist EMS legislation, believing the government should regulate performance and not mandate how it's achieved.

The ISO 14000 standard follows this philosophy. Although the steps to having an EMS are well defined, implementation and the exact form of each step is left up to the individual organization.

Standards Background

ISO 14000

ISO is the International Organization for Standardization. It was established in Geneva, Switzerland in 1946 to promote international trade by harmonizing standards. ISO has developed international voluntary consensus standards for manufacturing, communication, trade, and management systems. The United States is represented by the American National Standards Institute (ANSI).

The need for international environmental management standards was assessed by the Strategic Advisory Group on the Environment (SAGE), a committee established by ISO in 1991. They recommended development of a standard and in January 1993, ISO created Technical committee 207 (TC 207) to develop the ISO 14000 series of 20 standards. TC 207 is composed of various subcommittees and working groups. Representatives from the ISO member countries contribute their input to TC 207 through national delegates.

The U.S. Technical Advisory Group (U.S. TAG) develops the U.S. position on various ISO 14000 standards. U.S. TAG is comprised of approximately 500 members representing industry, government, not-for-profit organizations, standards organizations, environmental groups, and other interested stakeholders. Several organizations are involved in the administration of U.S. TAG's input to TC 207, including: ANSI, the American Society for Testing and Materials (ASTM), and the American Society for quality Control (ASQC).

TC 207 is developing the ISO 14001 Standard which specifies requirements for an environmental management system. An organization can actually become registered to the ISO 14001 Standard for their EMS. Several guidance documents are also being developed and environmental auditing guidelines have been published. Published ISO standards must be reviewed every five years.

The standards are designed to help manufacturing and service companies of any size, or in any industrial sector, develop a uniform set of environmental management elements that will help to achieve their own environmental goals. If you adopt the standard, you make a clear management commitment to an environmental policy, form a plan to carry out the policy, identify activities that significantly impact the environment, and train employees in environmental practices. You also create a review system to assure programs are implemented and maintained. In a nutshell, an effective EMS requires:
1. Identification of clear goals, supported by management, with respect to the environment.
2. Development and implementation of ways to measure and progress toward the goals.
3. Periodic and episodic review and improvement.

ISO 9000

In 1987, the ISO 9000 series of quality management standards was published. The standards promote consistent quality practices and facilitate international trade. The standards are used as a benchmark for quality management by industry and government worldwide with over 81 countries adopting the standards and over 13,000 companies in North America attaining registration.

The ISO 14000 standards follow the same continuous improvement principles of management as the ISO 9000 standards. The quality standards apply to consistency of the production processes while the environmental standards apply to the company's environmental aspects and impacts.

Sustainable Development

The term "sustainable development" was coined in 1987 by the World Commission on Environment and Development, in it's report, *Our Common Future*. This report emphasized the need to balance environmental protection and economic growth.

The International Chamber of Commerce (ICC) created the Business Charter for Sustainable Development in 1991. The ICC Charter is comprised of sixteen Principles for environmental management that foster sustainable development. The Principles in this document include some of the basic elements of environmental management systems.

The United Nations Conference on Environment and Development (UNCED) was held in Rio de Janeiro in 1992, and is also called the Earth Summit (or Rio Summit). Two documents from this summit are Agenda 21 and the Rio Declaration. Agenda 21 is a comprehensive guidance document for sustainable development, and the Rio declaration is a set of 27 principles for achieving sustainable development.

These international initiatives on sustainable development signified new levels of environmental responsibilities for the business community worldwide. Rather than simply complying with environmental regulations, businesses were now being asked to consider their total impact on the environment and take steps to mitigate that impact.

Environmental Stewardship Codes

Many private sector programs have been established to encourage environmental stewardship. The Chemical Manufacturers Association developed the Responsible Care program, the Global Environmental Management Initiative (GEMI) and the Coalition for Environmentally Responsible Economies (CERES) established environmental principles (formerly the Valdez Principles).

Other EMS Standards

The British Standards Institute published BS7750 in 1992. This was the first national standard for environmental management systems. The British Standards Institute had previously published BS 5750, a national quality management system standard, which was a significant contribution to the development of ISO 9000. ISO 14001 was largely based on BS 7750, however it is not as stringent as BS 7750. Several other countries, including Ireland, France, South Africa, and Spain also developed national environmental standards. The standards were all similar but significant differences and contradictory requirements remained. Thus the need for an international standard was established.

Trade and Marketing

The international community appears to be adopting ISO 14000 as the Environmental Management System standard. It is likely that certification will be a contract requirement for some government agencies and large contractors. The automotive, electronics, and chemical industries are all moving toward ISO 14001 registration.

Whether or not your company is required to have a certified EMS, there may be marketing advantages to publicizing your EMS. If you can effectively communicate to your customer that you're environmentally responsible, it may provide you an edge in the marketplace. Your customer knows that if you have an EMS, you're concerned about the environment (where they and their children live), you will be less of a potential liability threat to them, and you're less likley to be shut down for environmental reasons. You may be able to expand your market share or to enter new markets, also.

Having an EMS in place, and effectively communicating it, can enhance your company's image with the community, your customers and the regulators.

Bottom Line

An EMS can save you money. It can help you identify causes of environmental problems and then eliminate the root cause. This saves money in actual and potential fines and liability. The EMS can also help identify wasteful practices that can be changed or eliminated. The company saves money by buying less raw material and by not paying for waste disposal. Improved quality and efficiency can result from the planning process and the corrective action associated with an EMS.

One way to think of a waste stream is to realize that you pay for waste four times. Consider that a waste stream can cost you money in the following ways.
1. Waste is product lost (income never collected).
2. Waste is labor-intensive (you pay to move and manage it).
3. Waste must be disposed of legally thus requiring control equipment or a waste disposal contract.
4. Waste products increase your potential liability.

Improved Environmental Performance

An EMS can help systematically track regulatory performance. When violations occur, the EMS has a process to help determine the root cause of the problem and to improve the procedure. Having an EMS in place does not mean there are no more violations. But an EMS provides a formal structure so that violations or nonconformities can be discovered and corrected in a systematic and timely fashion. Over time this certainly results in improved environmental performance.

Improved environmental performance has its own set of benefits. Reporting or testing of environmental indicators is often tied to nonconformance. For example, in the chromium NESHAP, the surface tension of the plating bath must be periodically measured to assure it's under a specified threshold. The frequency of measurement is dependant upon exceeding the threshold. If the bath is always in compliance, the measurement only needs to be taken about once a week. When the surface tension exceeds the threshold, the measurement needs to be taken every four hours. The measurement schedule can be subsequently reduced with concurrent, conforming measurements. The point is that there is incentive to stay in compliance so you don't have to take so many measurements and fill out so much paperwork.

In addition to reduced monitoring and paperwork as a result of consistent and conforming environmental performance, the regulatory agency may potentially reduce the frequency or duration of inspections. There has been considerable discussion on allowing specific reductions in inspections as a direct result of having an EMS. The environmental agencies have not been willing to commit to reductions based solely on the fact that an EMS is in place. Improved environmental performance should result from an EMS, however, and the agencies may reduce inspections of those facilities with excellent records of compliance.

Health and Safety

Improved environmental performance leads to improved worker safety and correspondingly better health for employees. Recently companies have invested resources into "loss prevention." Putting employees and programs in place to prevent accidents and improve safety. This commitment to a prevention philosophy is reflected in pollution prevention programs and environmental management systems. Organizations realize that they can influence their environmental and safety conditions and impacts. They are taking a proactive approach to managing these aspects of their company, like they manage the rest of the business.

Employee participation

The process of establishing an EMS involves employees at every level of the organization. Once the EMS is in place, it is continually being evaluated and improved. Employees are given many opportunities to participate in the process. This gives them a feeling of ownership over the EMS. They know that they are responsible for the ultimate success of the program. They understand that their job makes a difference. They have control to suggest changes that will improve their procedures. They understand that their work is important and they can see how it fits into the overall picture. This contributes to a sense of pride and ownership in their work.

Communication is key to an effective EMS. In many organizations, communication is one-way, with management telling employees what to do, or employees reporting results to management. The EMS process allows for two-way communication. Employees must have a sufficient understanding of the overall organization's goals and management must understand the specific work required to achieve the desired outcomes. The EMS provides a formal opportunity for everyone to discuss what is needed and the easiest way to achieve the results.

An effective EMS can also reduce training for new employees. Because formal procedures are established and in place, training is streamlined. New employees can benefit from the extensive planning that is part of the EMS. They are able to come into their job and be briefed on the overall picture and specifically instructed on their responsibilities. They know how they fit into the organization and what lines of

communication are available to them. They have written specifications they can refer to for exact procedures and guidance.

Key Concepts

Continual Improvement

Like the ISO 9000 quality model, the EMS has continual improvement as its basis. Planning, implementation, and review are all part of the EMS, but its important to understand that you must periodically and continually check and improve your system. The EMS is not simply a plan or a program. It is not a one-time process or exercise that your company goes through. You don't end up with a notebook sitting on the shelf, never to be opened again. The EMS is how you operate. It defines the actual procedures you use. You must periodically, formally, review those procedures and their outcomes to find areas of deficiencies. Then you must correct the nonconformities, and document it.

Organizational priority

Environmental management must be an organizational priority or this continual attention and improvement process cannot occur. Upper management has to check on the environmental outcomes they establish and they must be involved in the EMS process.

Environmental management must be included in all aspects of the company. Every department needs to consider their role in the company and how their job can potentially effect the environment. During the initial planning phases of the EMS, people from all departments participate in identifying the company's total environmental impact. As time goes by, the impacts need to be reviewed and reconsidered in light of changes that occur during the course of business.

Cultural shifts within the organization are vital to the success of an EMS. People must reexamine their preconceived notions about their operating practices. Such shifts cannot be sustained by a small group of people performing the analysis. Involving the entire organization will produce maximum synergistic effects. Everyone must be included in planning, awareness training, and other educational and motivational programs.

General requirements

Essentially for ISO 14000 certification, you are setting your own environmental standards that you will be measured against. You decide which environmental factors in your operation you will focus on. This decision is based on any potentially serious environmental ramifications of your company. It is critical to understand, however, that the ISO 14000 standard essentially assures that you're doing what you say you'll do. Therefore, choose carefully what you say.

The general requirement under ISO 14001 is that you create and continue to improve a working environmental management system. In order to have a successful program, there are some things you must do. These specific things are described below. They fall into the following categories:

- Environmental policy--this sets the standard you will judge your environmental performance against-- are you achieving what you say you'll achieve?
- Planning--these requirements prescribe the steps necessary to make a thorough plan.
- Implementation--these elements are required for the day-to-day operation of the EMS.
- Checking--these steps prescribe what's necessary to check your EMS--to make sure it's functioning properly. Realize that you're not checking your compliance but you're checking how well your system is functioning.
- Review--periodic management review of the EMS is required.

Environmental Policy

The company environmental policy must be defined by top management. It must
* be appropriate in scope, considering the environmental impacts of the company.
* commit to environmental compliance, continual improvement, and reduction or control of pollution.
* be documented, communicated, and maintained.
* allow for review of objectives and targets.
* be publically available.

The environmental policy can be developed by your EMS team or by top management but it must have the support of top management.

The environmental policy should be based on:
* compliance to applicable regulations.
* continuous improvement.
* prevention of pollution.

Formulate environmental policy by considering of all potential environmental impacts and aspects of your company. Your policy should be appropriate for your company size and the impact it has on the environment. Realize that your objectives and targets (which is part of what you'll be measured against) are a direct outgrowth of your environmental policy.

Your policy must be clear so that others can understand it. You must communicate the policy to employees and the public. They need to be able to share in your environmental vision. It is the guidance for making decisions. It should be carefully crafted.

Some examples of corporate environmental policies are attached.

Planning

Environmental Aspects and Impacts

An environmental aspect is any activity, product, or service that your organization takes part in or provides, that interacts with (impacts) the environment. An environmental impact is any change in the environment, whether good or bad, that is wholly or partly a result of the organization's activities, products or services.

Some environmental aspects may not be within your control, or at least not be easily controlled. You may choose to not control some aspects. The ISO 14001 standard requires you to have a procedure to identify your environmental aspects and subsequently decide what is significant. You further must consider significant aspects and potential impacts when setting environmental objectives.

Some environmental aspects are obvious. Any regulated activity surely should be identified. Therefore, review all your regulated activities to determine what aspect of the activity has the potential impact on the environment.

Likewise, determine what the potential impact would be. How serious is this impact? Focus on the aspects of your operations that have the most serious impact.

A brainstorming session on this issue may be very useful as a place to start. You may consider everything from how the raw materials are gathered and shipped to you to how the employees get to work to the ultimate disposal of your product after its useful life is over. If your company provides services, you may consider everything from the methods of communication you use (e-mail vs. faxes or memos) to the kind of marketing give-always you provide (refillable vs. disposal pens) to the energy efficiency of your office

building. Try to think of every possible activity, product, or service that has an environmental aspect. It may be comforting to note during this no-holes-barred exercise that the environment extends from within an organization to the globe, but it is limited to the world—it does not include the universe!

Add to your list by reviewing known aspects, such as:
- regulatory and legislative requirements
- natural resource use
- existing environmental and safety audits
- normal and emergency operations

When you have a long list, decide what aspects have significant impact. It will probably be obvious, in fact, you probably knew what was significant before you went through the brainstorming and review exercise. It is important to go through them, however, because things will come out that you've never thought about. There may be opportunities to easily reduce some of your environmental impacts. These can be quick successes that are critical to building momentum in the program.

For example, energy efficient lighting, motors, or other electrical equipment can save money on utility bills and reduce pollution from power plants. Ride sharing programs can reduce air pollution in your area. Significant solid waste reduction can be achieved by using e-mail or voice mail for appropriate communications.

A facility walk-through can aid in identifying environmental aspects. Consider
- shipping and receiving
- emergency procedures
- spill response
- material storage (indoor and outdoor, including above ground and underground storage tanks)
- material handling
- purchasing procedures and documentation
- accounting procedures and documentation
- laboratories
- housekeeping
- hazardous waste storage and handling
- solid waste storage and handling
- training
- lighting
- scrap and rework
- process efficiency and material flow
- inventory management
- work in process
- maintenance
- equipment leaks
- stormwater discharges
- grounds check
- wastewater treatment
- noise
- traffic
- visitor or contractor access

Legal and other requirements

You must have a procedure for identifying and communicating any applicable legal or other environmental requirements. Your legal requirements include any federal, state, or local regulations or permit conditions. Other requirements may include industry standards or nonregulatory guidelines.

Your procedure for identifying those requirements could include
- regular communication with
- regulatory agencies,
- nonregulatory technical assistance organizations (such as the Small Business Environmental Assistance Program, mandated in every state by the Clean Air Act Ammendments),
- consultants,
- attorneys, or
- peer groups.
- you can read
- newsletters,
- internet news services,
- trade group publications, or
- attend seminars.

Applicable requirements must be communicated to the appropriate people in your organization. Don't forget to include communication of any nonregulatory requirements.

Many individuals within the organization may subscribe to different trade publications or attend peer group meetings. Many times, environmental issues are highlighted in those venues. Be sure that the organization does not rely solely on the environmental manager for identification of all applicable requirements. There may be aspects of the operation that the environmental manager is not familiar with so doesn't recognize applicable regulations. Part of the system you establish to identify applicable requirements should include communication with those outside of specifically the environmental area.

Objectives and targets

Your objectives and targets should be specific and measurable. They should reflect your environmental policy and be consistent with it. They should be geared toward the prevention of pollution whenever possible.

Note that the prevention of pollution includes pollution control, because it prevents the release of pollution into the environment. In the U.S.A., people think of pollution prevention as stopping the generation of pollution, not simply controlling it once it's created.

Objectives are the overall goals the company decides to achieve. They should be measurable if possible. Targets are the detailed performance requirements that arise from the objectives. Targets should be quantifiable and can be the way objectives are measured.

The views of interested parties, your legal and other requirements, and your environmental aspects and impacts should all be considered when setting your objectives and targets. Interested parties include any individual or group concerned with or affected by the environmental performance of the organization.

Likewise, consider any applicable technology that can help your achieve your objectives. You must be able to achieve the objectives within the financial requirements of your organization. Specific technologies may be useful to help you achieve your objectives but they may not be affordable. Likewise, financial techniques such as total cost accounting may be very useful but not practical for your organization.

Consider your environmental program and operations when setting objectives and targets. Set goals that are flexible and simple. You must communicate your objectives and targets and you progress toward achieving them. Set them with input from the people that will be impacted by the them and keep them realistic.

Environmental Management Program

The final piece of your planning puzzle is designation of responsibility and authority for the environmental management system. It may be a "road map" that includes several distinct programs to achieve all your objectives and targets. Each program should clearly identify how the targets and objectives will be achieved, who is responsible, and the time scale.

Programs can be formulated for current and new activities. They can include planning, design, production, marketing and disposal activities. Coordinate your plans with existing business plans, strategies, and budgets. Involve affected employees in the program. Keep the program flexible enough to accommodate market or regulatory changes.

Build on existing programs for compliance, health and safety, and quality management. Integrate your EMS with other business plans, strategies, and budgets. Your employees need to be involved and help develop the plan.

Your action plan must be reviewed when there is a significant change in products, services, processes, facilities, or materials. It needs continual improvement, as does all your EMS. Persons assigned specific responsibilities may be listed by their title rather than their name. If you reorganize, the management plan needs to be updated. If other documents referred to in the action plan get changed, it may necessitate a change in the action plan.

The components of your EMS are interrelated. As you organize and systematically review documents and procedures, you can see that they depend on each other. It's almost impossible to make an isolated change. But that's also an advantage of the system. Since pieces of the EMS function together, some redundancy is eliminated and communication is improved. By going through the process, a better understanding of how the organization functions should be achieved. That's part of the reason it's important to have a cross functional team.

The EMS leader, or "champion" needs both responsibility and authority from top management. The EMS champion must also have a team of committed, involved employees to help with the work of designing, implementing, and reviewing the system. When selecting team members, choose partially based on their contribution to waste generation or management. Include:
- facilities (building and grounds maintenance)
- environmental management
- process engineering
- safety and health
- quality assurance
- procurement
- legal
- finance
- production supervision

Implementation and Operation

Structure and responsibility

Some persons must have definite responsibilities assigned related to the EMS. A management representative needs to have overall responsibility and authority. They need to be able to assign specific components to others. The responsibility must be sufficient to assure the EMS is established, implemented

and maintained and that performance of the EMS is reported. This is all necessary to accomplish proper system operation and review.

Top management must insure there are adequate resources to implement and maintain the EMS. The key responsibilities must be defined and communicated to those affected or assigned accountability.

Training

Training needs must be formalized and reviewed by management. Specific needs should be established and correspond to the personnel's responsibilities. All personnel that have potentially significant impact on the environment need to be appropriately trained. Management has the responsibility for deciding what this training should be.

Contractors that work on your facility must also have proper training so their actions do not adversely affect the environment or undermine your environmental goals or objectives.

Relevant personnel should receive training in and have an awareness of:
- emergency preparedness
- company environmental objectives and goals
- the importance of conformance with company environmental policy
- the potential environmental impact of their job activities
- their specific roles and responsibilities related to the EMS
- consequences of not following operating procedures

Communication

A procedure for internal and external communication must be established and maintained. When communicating internally, different functions and levels within the organization must be able to pass information effectively and to respond to that information.

Communications should be documented. Documentation helps to hold people accountable and helps define the proper flow of information. Documentation can be as simple as writing a response on the request and filing copy of it, or responding to an e-mail by keeping the original request as part of the response message. Procedures for distributing information should be established and refined. Many forms of communication probably currently exist within your organization. As part of the EMS you need to identify
- which current forms of communication are effective?
- who needs to know the information?
- what additional documentation must be established?
- what can be combined, eliminating unnecessary reporting?
- what follow-up is established to assure needed information is received and is correct?
- what opportunities are there for employees or others to have access to the information?
- how do employees communicate environmental concerns?

Some examples of internal communication include:
- employee newsletters
- internet page or e-mail
- staff meetings
- safety meetings
- other employee meetings
- break room or bathroom postings

- suggestion box

With regard to external communication, establish procedures to handle external communication. You need to be able to handle concerns and complaints from neighbors, customers, and others. You also want to communicate your commitment to the environment to interested parties. When reviewing external communications establish procedures for two-way information exchange.

Some examples of external communication include:
- internet page
- press releases or feature news stories
- open houses
- advertisements
- annual reports

Establishing communication procedures shouldn't be an overwhelming burden. Survey key personnel to find out how they're currently handling external and internal communication. Incorporate existing procedures as much as possible. Fill in gaps in documentation and coverage.

Documentation

Documentation is mentioned throughout the EMS elements. In order to know what's happening and to be able to prove it, things need to be documented. Documentation is a way to measure results. Peter Drucker points out that you can't manage what you don't measure. Documentation simply provides a way to maintain information.

Your EMS documentation should include the core elements of the EMS and the ties to related documents. Keeping documents current and complete is key to an effective EMS. In order to effectively manage the EMS documents, you must have *procedures* in place and follow the procedures to:
- locate EMS documents
- periodically review documents by appropriate personnel
- keep current versions available for personnel that need them
- promptly remove obsolete documents or otherwise guard against their unintended use
- clearly identify any obsolete documents that must be retained for legal or historical reasons so they are followed for current operations

As with all aspects of an EMS, try to incorporate current procedures and try to keep things simple. Your procedure for controlling documents should be able to answer the following questions:
- What changes in operations, materials, personnel, etc. trigger document review?
- Who manages the changes? (Who approves, records, and updates?)
- How are documents replaced or new documents issued?
- How are affected workers trained when new or revised documents are issued?

Computers and local area networks can simplify the task of document control. The master document can be kept electronically and employees can access it as needed. Paper copies are usually also required, but headers or footers can be included in the documents to identify their latest revision. You can even include a projected expiration date (like on your credit card) so you're forced to make periodic review.

Word processing software also makes tracking of changes easy. You can mark revisions so that the old and new versions are clearly identified. This would be especially useful when minor revisions must be made before the periodic revision. These minor revisions can be easily made and distributed without reprinting the entire document.

Whatever works for your company is fine, as long as you have procedures for keeping the documents updated, useful, and available.

Operational Control

As you define your objectives and targets, you review your company's significant environmental impacts. The activities and operations associated with those impacts need to be specifically controlled. You must have documented procedures these areas. You want any part of your operations that could have a significant impact on the environment to run smoothly and consistently. You want the operators to know what they're doing and why. You want *control* of these operations. Written procedures that prescribe operating methods must be established and maintained.

Understanding the process is key to writing effective procedures. Work with the employees that are in the affected areas to write simple yet complete procedures. Use a consistent format and approach so that the procedures are easy to follow and to revise.

Emergency preparedness and response

Most companies have some emergency response procedures. Some regulatory programs include emergency response plans. Use the opportunity of establishing your EMS to review these plans and to identify other areas that need emergency planning that are not specifically covered by regulatory requirements. Examination of your environmental impacts should help you identify potential emergency situations.

To comply with the ISO 14000 requirements,
- You must establish and maintain procedures to respond to emergency situations and to minimize their environmental impact.
- You must review the procedures periodically and after any accident.
- You must test your emergency procedures if possible.

Checking and Corrective Action

The EMS is about knowing what to do to meet your environmental goals, having the tools (training, procedures, and resources) to meet them, and reviewing your progress so that you can continue to get closer and closer to your goals. This section covers what you must do to review your progress so you can move closer to your goals.

Monitoring and Measurement

The motivation for monitoring and measurement is to assess your current environmental performance, identify root causes of any problems that exist, point to areas that need corrective action, and ultimately improve performance and increase efficiency.

You have already identified the key operations and activities that could potentially significantly impact the environment. You must
- maintain procedures to track key characteristics of these operations.
- track performance and conformance with environmental goals.
- calibrate and maintain any monitoring equipment.
- formally review you compliance with applicable regulations and other requirements.

You probably currently do some monitoring for regulatory compliance, health and safety, or quality assurance. Identify which of these data are appropriate to monitor. What other data do you need? Ideally, you can identify a few process and outcome measures that will give you the information necessary.

Process measures are associated with activities that occur in the process, such as the amount of material used per production unit or the time or energy associated with a particular activity. Outcome measures look at results or byproducts from a process, such as the amount of waste generated per production unit or the level of contaminate in the wastewater. Process measures are "leading" indicators and outcome measures are "lagging" indicators. The number of people trained in spill prevention is a process measure, while the number of spills is an outcome measure. Usually a combination of process and outcome measures are useful to track performance.

Many companies have critical equipment calibrations performed by outside vendors. The key is to identify which equipment is critical for monitoring purposes and set up procedures to keep it calibrated.

It's very important to determine your regulatory compliance status on a regular basis. You need a process to systematically identify, correct, and prevent violations. EPA provides guidance for effective compliance management from their December 22, 1995, "Incentives for Self-Policing: Discovery, Disclosure, Correction, and Prevention of Violations," found in the Federal Register, Vol. 60, No. 246.

Tracking performance is different from environmental audits. Performance tracking is ongoing and part of regular operations. Environmental auditing is independent (even if done internally, it's separate from regular day-to-day functions.) see attached

Nonconformance and corrective and preventative action

There will certainly be times when mistakes are made or procedures are inadequate. It is almost impossible to plan for every single possibility. When failures occur or deficiencies are encountered you need to have a procedure for correction. Your procedure needs to cover:
- investigation of problems or nonconformities
- identification of root causes
- identification and implementation of corrective action
- documentation and tracking of corrective action

Be sure someone has the responsibility and authority to track nonconformance and assure corrective action. Corrections should be made as quickly as possible. People in affected areas should be encouraged to report existing and potential problems.

Document the procedure to correct the nonconformity. What you need to do will vary with the specific problem. Keep it as simple as possible. Be sure to try and identify the root cause of the nonconformity. You don't want to rewrite procedures every month when all you really need to do is provide better training. On the other hand, procedures must be adequate to cover critical issues.

Records

Records allow proof that your organization is operating as it says it is. Records are essential to assure consistency but keeping records should not be overly burdensome. Keys to records include:
- deciding what to keep -- what records add value? Which ones provide information you need?
- deciding who needs to see them -- who is responsible for the operation associated with the record? Who is responsible for overall oversight of the program?
- deciding how long to keep records -- what are the legal and historical requirements for the information?
- deciding what form the records will take -- can they be combined with health and safety or other existing records? Can they be gathered and maintained electronically?

In order for records to be useful, they must be maintained appropriately, be legible, identifiable, and traceable to the operation involved.. They need to be maintained and stored so they are readily accessible.

Examples of records that you might want to maintain are attached.

EMS Audit

You need to periodically review your Environmental Management System to determine how well you're complying with it. Your audits can be done internally or via an external party. Initially you may want to conduct a series of internal audits and then have an external audit. You may be able to cooperate with other businesses in your area to trade audits. These audits should help identify any gaps in your EMS and any nonconformances.

Your audits should address whether you're system is effective (covers all areas) and is being properly maintained. It could include interviews with affected personnel to determine their understanding of the EMS and any potential problems or improvements they may identify.

The audit results need to be communicated to the affected personnel and those responsible for maintaining the EMS. Consider all audit results when reviewing the EMS as part of your overall management review.

The EMS audit differs from a compliance audit. A compliance audit simply looks at outcomes to determine whether or not you're meeting regulations. An EMS audit looks at how your system functions -- to keep people informed, to collect information, to correct nonconformities. The ISO 14000 standard does not state specific environmental performance criteria — it has no requirements for performance, just a requirement for commitment. It's possible for two organizations with similar activities to have different environmental performance and still both be in compliance with the ISO 14000 standard.

Regardless, there are many reasons for companies to audit their environmental performance. These include:
- **Benchmarking** Where are we vs. where we want to be?
- **Customer satisfaction** What is the perception of our environmental performance by our customers and other concerned parties?
- **Information** What do our company decision-makers know about our environmental performance?
- **Improvement** What management, operation, product design, process design, and services improvements are needed?

Typical measures used to evaluate environmental performance are related to compliance. Number of inspections, enforcement actions, exceedances of discharge limits, reportable spills and releases, and quantities of waste are easy to survey.

These indicators have their limitations, however. Enforcement action may be slack, giving a false sense of security. Alternately, a company may have a thorough system of tracking and reporting environmental compliance parameters and thus don't have violations. Still, a significant level of risk and actual exposure may exist.

A useful way to assess environmental performance is to measure the company's performance against it's own environmental performance criteria. ISO 14031, Environmental Performance Evaluation (EPE), defines a process to select environmental indicators and measure, analyze, assess, report, and communicate this evaluation.

The basic steps of environmental auditing are
1. Pre-audit planning
2. On-site activities
3. Post-audit activities

Pre-audit planning includes defining the scope, the audit team, and schedule. It involves allowance for areas of concern raised by the facility, or by previous audits or inspections. It includes review of facility permits, agency reports and communications, and emergency planning.

On-site activities include the initial conference, gathering information, evaluation of findings, and the exit interview. In the initial conference, goals for the audit are set, a facility orientation is accomplished, and areas to be reviewed are identified. Typically upper management is involved in some way during the initial stage. They may participate directly in the opening conference or they have been involved in approving the audit and identifying key concerns.

Information gathering involves interviewing key supervisory and production personnel, physically observing production practices, and reviewing appropriate records and documents. The goal of this phase is to evaluate the current practices in order to identify any deficiencies in regulatory compliance or the company's stated environmental performance goals.

Deficiencies can be categorized as regulatory, company policy and procedure, management system, or best-management-practice recommendations. An example of the difference between a best-management practice recommendation and a regulatory compliance finding follows. Use of a funnel to pour waste solvent into the hazardous waste storage drum is a best management practice. If the funnel is left on the drum at all times, it must have a tight-fitting lid in order to meet the regulatory definition of a "closed container."

Post-audit activities concern documenting findings and suggestions for corrective action in the form of a formal report. The audit team can then follow up at a later date to assure all necessary corrective actions have been implemented and are effective. The report and follow-up should both be communicated to upper management.

Initially, audits may be time-consuming as personnel on the auditing team and in the facility are unfamiliar with the procedure. In order to be effective tools, though, audits must be frequently repeated. The procedure must be systemized and the findings prioritized.

The audit team can develop checklists to evaluate on-going compliance and performance issues. Even though checklists are used, still allow flexibility to investigate specific areas of concern not identified on the checklists. Areas of nonconformance can be ranked based the type of violation: regulatory, company policy, good-management practice, or minor, worthy of mention but requiring no formal action. The potential environmental impact, health and safety implications, potential regulatory consequences, and management system breakdown should all be considered when ranking nonconformances.

The response of the facility to correct the significant violations should be measured. The timeliness of the audit team to communicate the information to the facility following the audit should also be evaluated. In order to have an effective performance audit, the procedure, the reporting, and the correction must all be accomplished quickly. Under EPA's self-policing policy, a reduction or elimination of civil penalties may be achieved for violations discovered during an audit and promptly disclosed, generally within ten days, and corrected in a timely manner, generally within 60 days. (U.S. Environmental Protection Agency, "Incentives for Self-Policing: Discovery, Disclosure, Correction and Prevention of Violations," *Federal Register*, **60**, pp. 66706-66712, Dec. 22, 1995).

Performance audits are an important tool to measure your EMS and compliance. They help you effectively prioritize allocation of resources to achieve the most significant impact on the environment. They measure productivity of audit staff and the efficiency of operating management to respond. They quantify progress toward company goals. They help reduce potential liability risks, and they provide useful information for management to assess progress and to communicate success with the company's stakeholders.

Management Review

The final piece of the continuing improvement cycle is management review. Management involvement is essential to the success of an EMS. They must provide oversight in order to assure the EMS is functioning as it should be and that the company's objectives and targets are being addressed. It is easy in the day-to-day operation to lose sight of the big picture. Management can provide this perspective. Additionally, management needs to see how resources are being utilized and where additional resources are needed. Since the Environmental Management System is a *management* system, it provides useful information about what areas of operation need attention and which are functioning well.

The review process can take a period of time with different elements being reviewed independently. Reviews should include:
- audit results
- evaluation of reaching objectives and targets
- evaluation of appropriateness of the EMS
- concerns from interested parties

Management review should be documented, including any suggested changes and subsequent action. Consider any changes circumstances that occurred since the last review. There may be more effective ways of managing information, there may be others that need to be informed about specific information, there may no longer be a need for some information. You may have changed your raw materials, processes, product line, or services. Any changes and their potential environmental impact should be reviewed. These should then be considered during management review of the EMS.

Kansas Audit Bill - to view the Audit Bill or relevant information, refer to the KDHE, Division of Environment web page.

References

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Additional Resources

http://web.ansi.org – to order ISO standards

www.iso14000.com – the ISO 14000 information center

www.trst.com – articles and case studies on ISO 14000 and EMS

www.iso.ch – ISO web site