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Introduction to Environmental Management

By the end of this section, you should be able to:

- Describe the potential benefits of an EMS for your organization.
- Define the relationship of accounting to environmental management systems.
- List multiple functions necessary for effective environmental accounting.
- Describe the origins of quality and environmental management systems.
- Explain how ISO 9000 and ISO 14000 can have an impact on world trade.
- List the kinds of cultural change an EMS can bring to an organization.

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Chapter 1

Introduction to Environmental Management

In the past, a company managed its environmental problems largely in reaction to outside pressures. These pressures came from government agencies, environmental interest groups, and citizens. Internal environmental managers were often part of the legal department and obtained funds to "fight" imposed rules and regulations. It was a case of the "shoot out at the OK Corral." Environmental management was regarded as a cost center versus a revenue-generating profit center.

Today that way of thinking is changing, replaced by a recognition that environmental management is an integral part of doing business. Companies have become more efficient, responsive, and tightly managed. As a result, companies that do not have a system for managing their environmental issues and opportunities will find themselves at a competitive disadvantage. However, before adopting a formal environmental management system (EMS), organizations typically have to be convinced of the financial benefits to be gained.

Section 3.5 of ISO 14001 defines an environmental management system as "the part of the overall management system that includes organizational structure, planning activities, responsibilities, practices, procedures, processes, and resources for developing, implementing, achieving, reviewing, and maintaining the environmental policy." Although ISO 14001 was developed independent of ISO 9000 to fulfill environmental rather than quality needs, both the ISO 9000 and ISO 14000 series of standards incorporate the Fourteen Points for the Transformation of Management developed by W. Edwards Deming.

Accounting for the Environment

Of interest to managers who are learning about environmental management systems, is environmental accounting. This term refers to a new method for addressing environmental costs and was coined by the US Environmental Protection Agency (EPA).

Although the accounting profession historically adheres to stringent and established guidelines, the goals for an EMS are less rigid. These goals are developed by a cross-functional team within each company, and are based upon each company's specific needs. The cross-functional team should include representatives from operations, finance, management, production, marketing, and legal. The whole process must be supported by senior management who has the authority to designate participants and commit time and resources to the process.

With a diverse group developing EMS guidelines, this means that each company's EMS is unique. It is important to structure a team that breaks down barriers between departments, creating a universal approach, as no one discipline has all the answers. An accounting department, for instance, may have little knowledge about hazardous waste issues and pollution prevention, but can gain knowledge in these areas through participation on the team. The accounting participant can work with the team to develop mechanisms that track costs and cost savings associated with the EMS.

Soft or contingent costs should also be considered. The results of recent court cases in the tobacco industry have demonstrated that companies are being held accountable for environmental issues. In short, environmental costs are now material, as customers are demanding "greener," more environmentally friendly products.

Instead of the traditional focus on historical data, environmental accounting requires looking to the future for ways to reduce costs through reuse, recycling, and recovery of materials used in manufacturing. It may be necessary to apply operational changes to mitigate costs.

In many states, accountants record a long-term liability for landfill closure costs that may not occur for 20 years or more. However, the dollar value of these costs must be determined by an environmental engineer, not the accountant. This is a typical example of the need to use a multi-disciplinary approach to identify, quantify, and categorize environmental costs and liabilities.

Diane Martin-Roche, a certified public accountant working as a project manager for SCS Management Services in Leesburg, Florida, has worked with solid waste and accounting issues for more than fifteen years. She cautions, "Don't get tunnel vision about environmental accounting. The first steps of the process do not include modifying the company's accounting system. It is important to remember that you are developing a business management tool, not performing a financial audit. The results of the project may warrant some changes in the way a company accounts for its environmental expenses. However, that determination is made at the end of the process, not at the beginning."

Christopher Kolarz, Director of Environmental for Niagara Mohawk Power, comments that his company is divesting its fossil generation portfolio and has all of these facilities ISO 14001-certified. "We are going to track to the extent we can the value as perceived by the buyers of these facilities that is derived from the ISO 14001 certification. We'll be doing this by interviewing the bidders after the assets have been transferred to the new owners."

"The certification has been part of the offer books, part of our communications strategy as we engage with their investment bankers and those performing environmental due diligence on behalf of the potential buyers. We have made it a point to strategically position the ISO 14001 certification and embed it in all of our dialogue, so we want to learn how successful that was and how it worked into the final bidding."

Ultimately, environmental accounting can lead to increased profits, which may be substantial, and to a sense of personal responsibility among employees concerning the impact of each individual's work actions on the environment, customers, and employees. No one role or person can accomplish this level of awareness within an organization.

Financial Benefits of Proactive Environmental Management

Even before a formal EMS standard was developed, companies have realized financial benefits from proactive environmental management. An EMS, like any management system, involves setting goals and putting in place a process to reach those goals. An organization needs to be able to gather data to measure its performance in meeting goals and to provide management with the resulting information.

Xerox Corporation's Asset Recycle Management (ARM) program uses leased Xerox copiers as sources of high-quality, low-cost parts and components for new machines. The parts are reconditioned, tested, and reassembled into "new" machines. Cost savings in raw materials, labor, and waste disposal came to more than \$300 million in 1995.

3M started their Pollution Prevention Pays (3P) program in 1975. The program implements employee suggestions that prevent pollution, save money, and yield a return on investment. By 1994, 3P had saved \$573 million and reduced pollution company-wide by 50%.

Dow Chemical recognizes employees who find ways to cut the company's waste and emissions through their Waste Reduction Always Pays (WRAP) program. In 1990, the top five WRAP initiatives saved \$10.5 million by eliminating 13.4 million pounds of waste from production processes.

United Airlines has complete recycling facilities at its Newark, Chicago, Denver, and Seattle hubs. Newark, the smallest hub, reclaims one ton of aluminum cans and four tons of cardboard per month to earn the company \$50,000 per year.

Intel has integrated environmental, health, and safety programs into its corporate culture. The company has adopted a philosophy of designing for the environment, which means integrating environmental, health, and safety (EHS) into manufacturing processes. This resulted in rates of water consumption and waste generation that were less than the rate of company growth in 1997.

Herman Miller manufactures furniture and has reduced significant costs through vigorous environmental management implemented in the early 90's. Reduction of packaging saved over \$1.4 million. A waste-to-energy plant at their main manufacturing facility burns scrap wood and sawdust, yielding a savings of \$350,000 from reduced energy and landfill disposal costs. Recycling of fabrics, such as leather trimmings to make attache cases and vinyl scraps to deaden noise in automobiles, saves the company a quarter of a million dollars per year.

While coordinating environmental efforts and responsibilities in their organizations, these companies have streamlined operations, reduced pollution and waste, and saved substantial sums of money through EMS implementation.

Deb Reese explains that Matsushita Semiconductor's being certified to ISO 14001 saves the company money because of the immediate recognition of the program. "It has become obvious that no one can make a quality product while damaging the environment. In addition, with both standards integrated, we are down to three days per month for simultaneous audits for both standards. We have a requirement to be audited twice a year for each standard to maintain the certification, which boils down to less cost for auditors and less of my own time tied up."

Quality Management Systems

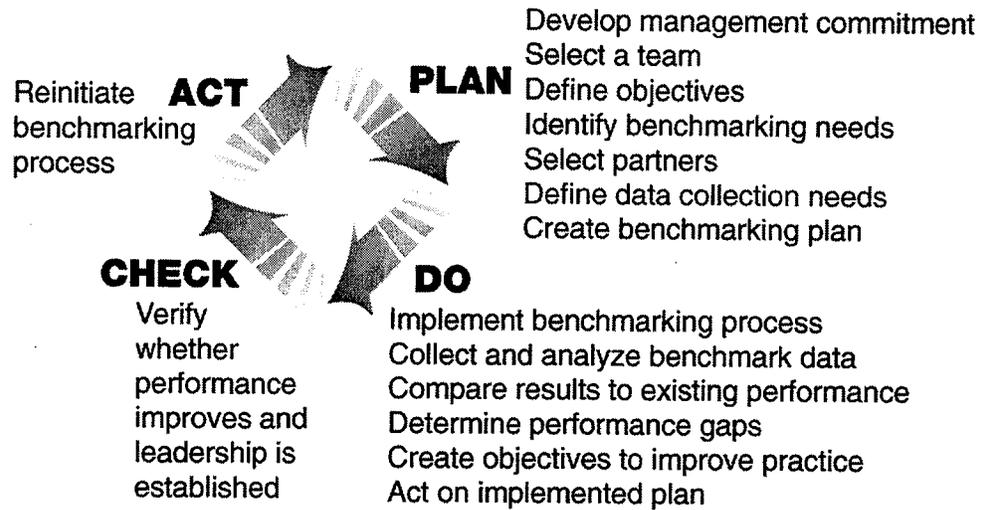
To understand how environmental management systems have developed, it is necessary to first review the structure and logic of quality management systems as conceived by W. Edwards Deming, a pioneer in quality management. Deming is recognized as having developed a systematic approach to quality using his fourteen points for the transformation of management (Deming, *Out of the Crisis*, 1986). The fourteen points (Table 1-1) represent a synthesis of activities that a company can employ to achieve improved performance and quality.

Table 1-1. Deming's Fourteen Points for the Transformation of Management

1. Create constancy of purpose toward improvement of product and service, with the aim to become competitive and to stay in business, and to provide jobs.
2. Adopt the new philosophy. We are in a new economic age. Western management must awaken to the challenge, learn their responsibilities, and take on leadership for change.
3. Cease reliance on mass inspection to achieve quality. Eliminate the need for inspection on a mass basis by building quality into the product in the first place.
4. End the practice of awarding business on the basis of price tag. Instead, minimize total cost. Move toward a single supplier for any one item, on a long-term relationship of loyalty and trust.
5. Improve constantly and forever the system of production and service, to improve quality and productivity, and thus constantly decrease costs.
6. Institute training on the job.
7. Institute leadership with the aim of supervision to help people, machines, and gadgets do a better job. Supervision of management is in need of overhaul, as well as supervision of production workers.
8. Drive out fear, so that everyone may work effectively for the company.
9. Break down barriers between departments. People in research, design, sales, and production must work as a team, to foresee problems of production and in use that may be encountered with the product or service.
10. Eliminate slogans, exhortations, and targets for the work force that ask for zero defects and new levels of productivity. Such exhortations only create adversarial relationships, as the bulk of the causes of low quality and low productivity belong to the system, and thus lie beyond the power of the work force.
Eliminate work standards (quotas) on the factory floor. Substitute leadership.
Eliminate management by objective and numerical goals for people in management.
Substitute leadership.
11. Remove barriers that rob the hourly workers of their right to pride of workmanship. The responsibility of supervisors must be changed from sheer numbers to quality.
12. Remove barriers that rob people in management and engineering of their right to pride of workmanship. This means abolishment of the annual or merit rating and or management by objective.
13. Institute a vigorous program of education and self-improvement.
14. Put everybody in the company to work to accomplish the transformation. This transformation is everybody's job.

Out of the Crisis, 1986 Copyright © The W. Edwards Deming Institute

Figure 1-1. Plan-Do-Check-Act Cycle



This teaching dramatically altered the economy of Japan. By the 1980s, Japanese automobiles and consumer electronics were consistently superior to similar American and European products. In recognition of his contribution to the success of their industries, the Union of Japanese Science and Engineering instituted the annual Deming Prizes for achievements in the quality and dependability of products.

The success of the Deming approach was clear. As a result, many countries began developing their own versions of quality management systems. By the 80s, it had become apparent to the International Organization for Standardization that a uniform standard for quality systems was needed, resulting in the issuance of the ISO 9000 quality management series of standards in 1987.

In response to widespread acceptance of the ISO 9000 quality management standards and to the proliferation of various environmental management systems, the International Organization for Standardization formed Technical Committee (TC) 207 to begin development of the ISO 14000 series of environmental management standards in 1992. As TC 207 carefully crafted the draft EMS standard (ISO 14001), companies around the world began to assess their existing environmental systems to learn what changes would be needed to meet ISO 14001.

Because many companies in the United States had not been prepared to step up to ISO 9000 in the early 90s and had to struggle to catch up with their European and Asian counterparts, U.S. companies are now carefully tracking

the increase of certifications to ISO 14001. While there are relatively few EMS certifications in the U.S., many savvy companies are aligning their environmental management systems to conform to ISO 14001.

Environmental Management Systems

An EMS is a structured plan to address the impacts a company or organization has on the environment. The EMS is implemented and checked to ensure that plan goals are being met. With the plan being revised to meet new goals, the EMS can guide a company toward continual environmental improvement.

A basic condition for any EMS is compliance with applicable environmental laws, regulations, and permits. An effective EMS goes beyond compliance to provide an organization with a systematic approach to the development, implementation, and maintenance of an environmental policy.

Matsushita Semiconductor was already certified to ISO 9002, so employees were able to ramp up to ISO 14001 concepts very rapidly, Deb Reese explains, and began turning in suggestions for improvement to their long-standing EMS. "Prior to ISO 14001, our EMS had been process-based, as the quality system also incorporated employee suggestions. The ISO 9002 system incorporates an employees' suggestion program that allows input on any kind of improvement, such as morale or process. "

Through planning, implementation, checking, management review, and continual improvement, organizations become more effective and efficient in the management of their activities and the impacts of those activities on the environment.

The ISO 14001 standard provides specific requirements for an EMS and shares some common management system principles with the ISO 9000 series of standards, including the "plan-to-check-act model" mentioned

above and the requirement for top management commitment. The basic focus of the ISO 14000 series of standards is environmental protection, while the ISO 9000 series of standards focuses on quality and customer needs.

It should be noted that ISO 9000 is not a prerequisite for ISO 14001, although companies that have both have successfully integrated the two management systems.

An effective EMS provides many benefits to the implementing organization, its customers and stakeholders, and to regulators, including:

- Reduced environmental risk.
- Proactive environmental management.
- Improved employee environmental awareness and performance.

- Increased operating efficiency and cost-effectiveness.
- Enhanced relationships and communication with employees, regulators, and stakeholders.

THINK ABOUT IT

List the ways an EMS could improve your company.

World Trade Implications of ISO Certification

Following the rapid adoption of ISO 9000 quality management system standards worldwide, certification (registration) to these standards has become a prerequisite for trade in many regions. By 1997, there were more than 100,000 companies certified to ISO 9000.

Randy Daugharty, Director of Business for BVQI North America, an international registrar, explains that a government source told him that there are three drivers for ISO 14001: industry, the EPA, and the consumer. For example, German tour groups look for certification to ISO 14001 in the Jamaican tourist industry, because they want to know that their holiday destinations are environmentally responsible. The Ford Motor Company has set a goal of having 150 sites certified to ISO 14001 by the end of 1998. Daugharty is interested to see if consumers become aware of the standard and begin to seek services and products from ISO 14001-certified companies. In any case, the already accelerated pace for certifications to ISO 14001 has picked up significantly, making the possibility of certification a valid issue for small manufacturers.

This accelerating, market-driven process strongly suggests that certification to the ISO 14001 EMS standard may be a requirement for doing business in the

21 st century. Some Asian governments, such as those of Japan and Taiwan, have already recommended certification to ISO 14001 for their industries. As of May 1998, nearly 1,000 Asian companies were certified to ISO 14001.

Why the Asian interest in ISO 14000? There are three main reasons:

1. Potential Trade Barriers

Japan, like the United States, ignored the early adoption of ISO 9000 because companies there believed that their quality systems were superior to the ISO 9000 standards. This attitude changed when a lack of ISO certification excluded their products from the European market. Japanese companies do not intend to be in the same situation with ISO 14000.

2. Environmental Performance

Historically, Asian governments have put industrial growth ahead of environmental protection which has resulted in significant ecological damage. Citizens are demanding that their governments take action to protect and improve the environment. ISO 14000 is seen as a way for corporations to improve their environmental performance.

3. Consumer Preference

As export-driven economies, the Asians have recognized that consumers have a growing expectation for environmentally friendly products produced by environmentally responsible companies. As stated by Nobuhiko Kawamoto, CEO of Honda, "We are taking a new direction, and our vector will be the environment." (Business Week, October 20, 1997)

Major US and Canadian companies are also aware of consumer preferences for environmentally responsible products and are pursuing ISO 14001 certification. These companies include IBM, Intel, General Motors, Ford, Chrysler, and Weyerhaeuser. This process may also extend to their suppliers.

Employee Involvement and Cultural Change

Because implementation of an EMS requires personal responsibility for the environment on the part of each employee, dramatic changes usually take place once the system begins to take hold in an organization. The following examples were drawn from the ISO 14000 Leadership Project performed in the Puget Sound Region in 1997. The project was funded by US EPA Region 10. Insights and advice from these some of the managers involved in the project appear in comment boxes in relevant sections of each chapter.

Matsushita Semiconductor experienced a major breakthrough in environmental awareness when employees realized that the contractor who ran their cafeteria was not recycling, even though recycling is common throughout the corporation. Although a subcontractor, the cafeteria is viewed as a

department; so it now recycles cooking oil, glass, aluminum cans, foil, plastic wrap, and paper.

While ISO 9000 improved overall quality in the company, ISO 14001 addresses individual actions as an impact on the environment. Employees are asked what the environmental impacts of their jobs will be if they do not follow specifications correctly when operating equipment or performing tasks. Suggestions from employees about how to improve operations abound.

Intalco Aluminum Corporation's cross-functional pollution prevention team was assembled in 1996 in preparation for ISO 14001 certification, although the company has had a very effective EMS in place for some time. Because Intalco is already certified to ISO 9002, the procedures and costs for ISO 14001 EMS practices were built into the same program, which is already fully integrated into the company's business processes and budget.

To cultivate environmental awareness among employees, articles on ISO 14001 regularly appear in the employee newspaper, and a revised environmental policy was distributed to all departments. The company also produced a six-minute video as an introduction to ISO 14001. All employees are required to see the video and to participate in an ensuing discussion about individual impacts of their jobs on the environment and ways they can improve environmental performance. In addition, standard operating procedures were evaluated to keep these procedures in line with departmental goals and objectives for ISO 14001.

Organizations Appearing in This Handbook

To obtain some insight and savvy from organizations that have undergone or are in the process of implementing ISO 14001, the authors talked with eight companies, one utility, one military installation, and two registrars to learn how they would advise others who are either considering or have embarked upon this process. Our interviewees were able to supply valuable information about their own experiences that may prove useful to organizations in the beginning stages of this process. A hypothetical company, Silicon, Inc., also appears in the text, sample documents, and interactive sections.

Advanced Waste Management Systems (A WMS) (registrar) has been an engineering and environmental consulting firm--these services are not provided to companies that seek ISO 14001 certification from AWMS--since 1985, working in central Europe, the middle east, and the far east. Richard Ellis, Ph.D., Chairman and President of AWMS, worked with the Tennessee Valley Authority, which is government-owned and supplies nuclear, coal-fired, gas turbine, and hydroelectric power to seven states, before becoming a partner and, ultimately, President of AWMS. Specializing in ISO 14001 certification, the registrar employs a full-time staff of seven, supplemented by

many contractors and subcontractors, and was registrar for Niagara Mohawk Power's ISO 14001 certifications.

Baxter International is a leading producer, developer, and distributor of health care products and services. The company offers more than 200,000 products to health care providers in over 100 countries, creating revenues of over \$6 billion per annum. Baxter's "state of the art" environmental program led to the development of an environmental accounting system, spearheaded by Bill Blackburn, Baxter's Vice President and Chief Counsel, Corporate Environment, Health and Safety. The environmental financial statement that itemizes environmental costs and savings was validated by financial staff and thoroughly reviewed by Gina Gutierrez of Yale University. As of July 1998, Baxter International has nine facilities certified to ISO 14001, with sixty additional sites that have committed to certification.

British Petroleum has set itself apart from the rest of the oil industry by taking strides to reduce emissions, carbon dioxide in particular, to reduce global warming. The company plans to have its five Alaska assets certified to ISO 14001 by the end of 1998. Norman Ingram is the field manager of the Endicott Oil Field, two man-made islands with 115 off-shore oil wells on the North Slope of Alaska in the Beaufort Sea. The main production island of 45 acres is connected to the smaller satellite drilling island of 10 acres by a five-mile man-made gravel causeway, along which runs an oil and gas pipeline that ultimately leads to the trans-Alaska pipeline. Within Alaska, BP spends more than \$5 million per year for environmental monitoring, and several times that amount to ensure that its operations fully meet or exceed laws and regulations. In support of its North Slope operations, the company has a total of 950 employees and more than 2000 contractor personnel.

Norman Ingram, Manager of the Endicott Oil Field for BP Exploration (Alaska), Inc., observes "that development and implementation of the EMS to meet the ISO 14001 standard is value-added and raises our environmental performance to a new level. This gives us increased clarity, discipline, and efficiency, and we proactively manage environmental issues instead of reacting to them. We also get consistency of environmental management systems among all our assets, eliminating duplication of effort in the five business units. Obviously, the whole goal ultimately is to reduce and prevent pollution, which leads to reduced costs. We produce waste, some of it common and a small portion hazardous waste, which is part of our business. Most businesses do the same. We spend millions of dollars in handling, managing, and disposing of this waste to meet all our corporate and regulatory requirements. If, through the process of instituting ISO 14001, we can find ways to reduce the amount of waste we create, this is obviously advantageous. "

BVQI (registrars). Randy Daugharty, Director of Business for BVQI North America, Inc., an international registrar in Jamestown, New York, indicates that registrars are currently very pressed with the demand for ISO 14001 certifications. Bureau Veritas Quality International has offices in 44 countries and has performed more than 15,000 certifications to national and international standards, such as ISO 9000, QS 9000, and ISO 14000. BVQI was the first certification body in the world to obtain accreditation for ISO 14001 certification. The registrar also provides International Register of Certified Auditors (IRCA) approved training courses in lead auditor, internal auditor, environmental lead auditor, and aerospace auditor.

Intalco Aluminum Corporation operates an aluminum smelter at Cherry Point, five miles west of Ferndale, Washington. The plant opened in 1966 and has seen almost \$50 million worth of technology upgrades since. Charlie Jurges is the environmental and technical services manager. The facility covers 320 acres and employs 1100 people. Alumina arrives by ship from Australia, is stored in four silos on the plant site, and then is trucked to the plant for smelting. Intalco operates 720 reduction cells or "pots" in three potlines and produces a variety of primary aluminum products--billets, pigs, and ingots. Pitch and coke are delivered to the plant where they are used to make the carbon anodes used in the pots. Intalco produces over 300,000 tons of aluminum per year. The plant has been so successful at controlling fluoride emissions that it has been designated a Maximum Achievable Control Technology plant by the EPA. The plant became ISO 14001-certified in September 1997.

Matsushita Semiconductor Corporation of America (also known as MASCA or Panasonic) in Puyallup, Washington, is an independent subsidiary of Matsushita Electrical Company, an international company that manufactures consumer electronics. Debra Reese is the ISO 9002/ISO 14001 manager. This manufacturing and assembly plant with 409 employees became certified to ISO 14001 on May 1, 1997. Because the company deals with materials used in electronics manufacturing, they have a history of heightened environmental awareness, which has led to environmental excellence awards. Certification to the environmental management standard was an obvious and logical next step in their continuous improvement process.

Milan Screw Products, Inc. in Milan, Michigan, already certified to ISO 9002, is currently pursuing an EMS that conforms to the ISO 14001 standard. Chuck Tellas, owner and CEO states that implementation of an ISO 14001 EMS is the logical choice as a responsible citizen, adding that third-party certification will provide credibility for their environmental management processes. The company has 28 employees and manufactures turned metal products made from steel bars. Tellas observes that employees, having gone through ISO 9002 and the accompanying culture change, are well-prepared to implement the newer management system.

Niagara Mohawk Power is an investor-owned utility that provides energy to the largest customer service territory in New York state. The company's generation mix includes nuclear, gas, oil, coal, and approximately 76 hydroelectric facilities, some of which are small peaking units. The company, which sells both electricity and gas, had revenues of about \$4 billion in 1997, and has 8,500 employees and a service area of 24,000 square miles. Four fossil-fuel stations and two nuclear powered stations have been certified to ISO 14001. Christopher R. Kolarz, director, NM Environmental explains that Niagara Mohawk had the first fossil-fired and nuclear facilities to be certified to ISO 14001 in the United States. Being first allowed NM to be innovative and creative in structuring the EMS.

Rockwell Automation, with several facilities in the Cleveland, Ohio area, produces automation for manufacturing worldwide and has 25,000 employees in 71 plants in 74 countries. The company's industrial automation is used in transportation, metals, manufacturing, petroleum and mining, food production, waste water treatment, mass transit, and entertainment industries. Rockwell Automation has sixteen facilities certified to ISO 14001. Roger Hartel is the vice president for environment, safety and health, security, and quality. The company decided that the issues of environment and safety deserved a rigorous closed-loop process. The company guidelines were turned into auditable, measurable policies and procedures.

Tivoly, Inc. in Derby Line, Vermont, is a metal-cutting tool company that makes taps, dies, reamers, and counterbores, and has 170 employees at this location, with other sites in France and Spain. Philippe Bourg is the chief of operations. Already certified to ISO 9002, the company obtained ISO 14001 certification in July 1997. Because Derby Line is a village in a pastoral setting of dairy farms, fields, and woods near the Canadian border, Tivoly finds that this "Northeast Kingdom" location--in northern Vermont--has been a driver for a strong EMS and ISO 14001.

Whidbey Island Naval Air Station in Washington state has 2,500 Navy and civil service personnel on base, along with a tenant population of 7,000. Chosen as an ISO 14001 pilot project for the Navy and the Department of Defense, the environmental staff of fifteen and accompanying cross-functional team members estimate that they are about one-third of the way through the implementation process at this writing. Kathy Souders is the Environmental Manager in charge of development of the EMS. While the team functions well, their task is made more difficult by military downsizing and restructuring.

Recap

Instead of managing environmental issues in reaction to outside pressures, environmental management is now an integral part of doing business, which can be a competitive advantage. An accountant can participate in a multi-functional team approach for evaluating existing environmental impacts and developing an environmental management system (EMS) that encompasses all departments and functions in the company. By working with the team, the accountant can also assist in the development of mechanisms to measure the financial and environmental benefits of an EMS.

The foundations of environmental management systems can be traced back to quality management systems, which were established by W. Edwards Deming. His effective concept that included a plan-do-check-act cycle was refined into ISO 9000 quality management standards by the International Organization for Standardization in 1987. ISO 14001 followed in 1996 and is rapidly gaining momentum as a potential prerequisite for conducting international trade. In addition to efficiencies created by implementation of the standard, a company can experience positive cultural change within the organization.

Review Questions

1. What is an environmental management system?
 - (a) A required federal regulation
 - (b) ISO 14000
 - (c) A process to manage an organization's environmental impacts
 - (d) Part of a quality system

2. Dr. Deming is well known for:
 - (a) Developing the ISO 9000 quality standards
 - (b) The PDCA cycle
 - (c) Introducing cost saving methods at Xerox Corporation
 - (d) World trade issues

3. ISO 14001 is the standard for:
 - (a) Environmental management systems
 - (b) Quality management systems
 - (c) Reduced environmental risk
 - (d) Ecolabeling

Answers

1.c, 2.b, 3.a