CHAPTER 12: Pollution Prevention (P2) and Emergency Management Systems

CHAPTER 12.1: Pollution Prevention (P2)

Most of us are familiar with the old adages: "waste not, want not;" "one person's trash is another person's treasure;" and "an ounce of prevention is worth a pound of cure." By embracing the wisdom behind these approaches, pollution prevention (P2) encourages businesses to identify and act upon opportunities that benefit their operations, as well as workers, communities, and the environment.

This chapter briefly discusses the benefits, tools, and opportunities common to the P2 approach. It also summarizes pollution prevention assistance and incentive programs offered by the Department of Environmental Quality (DEQ).

12.1.1 What is Pollution Prevention?

Parts 143 and 145 of the Michigan Natural Resources and Environmental Protection Act, Public Act 451 of 1994, as amended (Act 451), define P2 as preventing or minimizing waste generation, or the environmentally sound reuse or recycling of those wastes that cannot be prevented. In Michigan, P2 is based on mostly voluntary, multi-media efforts that are applied where practical, environmentally acceptable, and economically feasible. Only after P2 has been applied or considered should waste treatment, release, or disposal technologies be used in accordance with Michigan regulations. Common examples of P2 include:

- Replacing hazardous organic solvents with non-toxic aqueous cleaners.
- Modifying manufacturing and industrial processes to eliminate the need for hazardous substances.
- Reusing treated wastewater as process water.
- Purchasing mercury-free switches, relays or other equipment.
- Deconstructing a building rather than demolition and landfilling.
- Recycling metals, solvents, oils, cardboard, wood pallets, and office paper.
- Purchasing less toxic materials that result in less hazardous wastes generated.
- Using green cleaners, glues, paints, etc. that contain less toxics and reduce employee exposure, asthma reactions and odor complaints.
- Replacing standard motors, pumps, and lighting with high efficiency models.
- Stopping leaks, drips, and spills; and instituting preventative maintenance practices.

In This Chapter…

12.1.2 Why Practice Pollution Prevention?

Pollution prevention can not only help to meet environmental goals, but also reduce waste, improve efficiencies and save money as well as reduce liability and hazardous exposures. Unlike most pollution control strategies, P2 offers important economic, regulatory, environmental, and social benefits that can often result in a more competitive business. A facility that has an effective P2 program that is eliminating, reducing, or reusing wastes, can often:

- Reduce waste treatment, transport, and disposal costs.
- Reduce costs for energy, water, and raw materials.
- Minimize compliance issues and costs associated with regulated wastes.
- Reduce future liability through reduced risks to workers, communities, and the environment.
- Avoid costs of accidents and spills.
- Improve production times.
- Enhance its public image and community relations.

In addition, don't forget that being 'green' or having a 'green' non-toxic product provides a competitive edge and opens up a new market for your products to others that are concerned about environmental and health impacts.

12.1.3 Getting Started

An excellent way to get started with any P2 effort is to draw upon the many resources available through the DEQ's P2 assistance programs, projects, and initiatives. To help you develop an action plan or start a P2 program, the following is a brief description of assistance activities, and incentive programs, including industry partnerships.

For additional information on any of the P2 assistance activities, please contact the Environmental Assistance Center at 800-662-9278, or at deq-assist@michigan.gov.

i) **Financial Assistance:** A number of DEQ financial assistance programs are available to encourage the adoption and diffusion of pollution prevention within the state.

   a) **Community Pollution Prevention Grant Program:** Provides matching grants to county governments, local health departments, municipalities, and regional planning agencies to fund community-based P2 projects.

   b) **Non-Point Source/Stormwater Grants:** Nonpoint source (NPS) pollution is pollution caused when rain, snowmelt, or wind carry pollutants off the land and into lakes, streams, wetlands, and other waterbodies. Michigan's Nonpoint Source Program provides grants to local units of government and non-profit entities to reduce nonpoint source pollution statewide. It can be used for collecting and diverting stormwater for toilet use, installation of pervious pavements, cisterns for irrigation usage, etc.

e) **Small Business Pollution Prevention Loan Program:** Low-interest loans of up to $400,000 are available to small businesses of 500 employees or less to finance projects that eliminate or minimize the generation of waste, result in environmentally sound reuse and recycling of wastes, or conserve energy or water within their organizations.

The DEQ *Grants and Loans Catalog* provides more information on the DEQ's financial assistance opportunities.

ii) **Education and Outreach:** Educational opportunities through workshops, seminars, and conferences are regularly provided by the DEQ through partnerships with businesses, trade associations, and other groups. These events disseminate information on pollution prevention, new technologies, current regulatory requirements, and compliance assistance. For the latest available workshops, go to **www.michigan.gov/deqworkshops**. In addition, the DEQ, Office of Environmental Assistance, also publishes newsletters, bulletins, fact sheets, and case studies and distributes many other P2-related documents. A list of these publications is available on the DEQ Web site at **www.deq.state.mi.us/pubcenter**.

iii) **Technical Assistance:** These programs focus on providing P2 information and technical assistance to all companies, institutions, and communities.

a) **Retired Engineer Technical Assistance Program (RETAP):** Retired professionals provide on-site P2 assistance to businesses with 500 or fewer full-time employees in Michigan. Assessments are confidential, free of charge, and strictly nonregulatory. There is no obligation to implement the recommendations provided.

b) **Recycling Assistance:** Resources are available to assist companies in their recycling efforts. These include such tools as the Michigan Recycled Materials Market Directory, Recycled Products Directory, and material exchanges.

iv) **P2 Programs:** By participating in any of the following P2 programs, a business can receive well-deserved public recognition, customized assistance, and other benefits for pollution prevention (P2) efforts. Website shortcuts for these programs are listed in 12.1-6 at the end of this chapter.

a) **Agricultural Pollution Prevention Project:** This is a collaborative effort between the agricultural industry, independent farms, DEQ and the Department of Agriculture and Rural Development to encourage agricultural facilities to undertake voluntary P2 efforts.

b) **Clean Corporate Citizen (C3) Program:** Regulated companies, municipalities, and institutions meeting certain environmental performance criteria can be designated as Clean Corporate Citizens. In return they receive positive public recognition and are entitled to certain regulatory benefits, such as streamlined air quality permit processing.

c) **The Department of Defense/State of Michigan Pollution Prevention Alliance:** Participating military installations work with the DEQ and other environmental agencies on P2 strategies to reduce pollution sources and waste in their daily operations.

d) **Environmentally Preferred Purchasing:** A program to promote the purchase and use of less toxic, 'green', environmentally preferred products by the business community and state government.

e) **Food Processing Pollution Prevention Initiative:** This program focuses on promoting P2 opportunities throughout the food processing industry.

f) **Great Lakes Sustainable Suppliers Environmental Network**: Suppliers in the Great Lakes region collaborate and innovate to create healthy, sustainable supply chains for their customers, focusing on continuous improvement to support strong economic growth, enhanced social responsibility and progressive environmental performance.

g) **Green Chemistry** : A program to promote and coordinate "green chemistry" research, development, demonstration, education, and technology transfer activities in Michigan.

h) **Green Construction and Demolition**: This program provides information on green construction, deconstruction and construction waste recycling and management.

i) **Green Lodging Michigan**: A joint DEQ and state Energy Office program designed to promote Green Lodging by encouraging hospitality facilities to adopt cost-saving "green" practices.

j) **Healthcare Pollution Prevention Partnership:** A partnership with the Michigan Health & Hospital Association that promotes P2 throughout Michigan's healthcare industry to protect health and the environment.

k) **Mercury Pollution Prevention Initiative:** The initiative promotes the elimination of nonessential uses of mercury and provides information on the proper cleanup and disposal of mercury.

l) **Michigan Business Pollution Prevention Partnership (MBP3):** Open to all businesses, associations, organizations, and agencies, MBP3 is a voluntary P2 program designed to encourage businesses to initiate or expand their P2 practices. Participants receive well-deserved public recognition for their efforts.

m) **Michigan Clean Marinas Program:** An alliance between the Michigan Boating Industries Association, Michigan Sea Grant College, and the DEQ to protect Michigan's waterways through voluntary P2 efforts by businesses.

n) **Michigan Climate Change Initiative:** An effort to mitigate the impact of global climate change in Michigan and capitalize on the economic opportunity that addressing those changes will present for the state.

o) **Michigan Great Printers Project:** A regional collaboration within the lithographic printing industry promotes P2 as the standard operating practice.

p) **Michigan Pulp, Paper and Products Pollution Prevention Program (P5 Program):** This voluntary program encourages P2 activities at pulp and paper mills in Michigan. Participating mills adopt P2 policies, establish goals, then track and report on their progress annually.

q) **Michigan Turfgrass Environmental Stewardship Program:** Targeted to Michigan's golf industry, this program is designed to advance P2 and environmental stewardship within the industry and recognize resulting environmental achievements.

r) **Neighborhood Environmental Partners:** A tiered recognition program intended to increase interaction between businesses and their neighbors, with the goal of enhancing the environment and the quality of life in the community.

s) **Shooting Range Stewardship Program:** This initiative encourages shooting ranges to develop, implement, and maintain Environmental Stewardship Plans; recognizes P2 advancements; and provides shooting ranges with valuable environmental education and outreach materials.

12.1.4 The Pollution Prevention Plan

It has been shown that a systematic approach to planning, with measurable goals, results in effective pollution prevention. An effective P2 plan can reduce waste and costs. A good plan includes gaining full support of management, committing resources, and establishing policies that support reductions of waste, resources and energy within the company. Input from all levels of your business should be called upon to contribute P2 ideas, technical assistance, and decision-making. By following the steps outlined below, you can set the stage for a successful P2 program. A successful P2 program can help achieve goals set for compliance, environmental management plans and sustainability efforts.

16 STEPS TO AN EFFECTIVE POLLUTION PREVENTION PLAN	
STEP 1	Get management's commitment and support.
STEP 2	Develop a company pollution prevention policy statement.
STEP 3	Gain ongoing, company-wide commitment.
STEP 4	Establish a pollution prevention team.
STEP 5	Select a pollution prevention coordinator.
STEP 6	Establish reduction goals for: wastes, toxics, climate change, and energy .
STEP 7	Establish priorities and procedures for conducting detailed assessments.
STEP 8	Designate an assessment team.
STEP 9	Conduct the waste assessment.
STEP 10	Identify potential pollution prevention opportunities.
STEP 11	Perform technical and economic analyses on the potential P2 opportunities.
STEP 12	Develop an implementation plan.
STEP 13	Implement the selected projects.
STEP 14	Evaluate project effectiveness annually and document results.
STEP 15	Celebrate positive results and learn from negative results.
STEP 16	Modify the plan as needed and select the next steps to be taken.

✓ *Step 1: Get management's commitment and support.*
P2 programs are only as strong and effective as the company's internal commitment. Thus, the first and most important step is making the philosophy of pollution prevention a company priority. P2 should be incorporated into every aspect of the business, including mission and policy statements, budgeting, purchasing, design, and production. A high level manager should announce the program to employees, ask for their input in identifying areas where waste, toxics, and energy usage can be reduced, and seek their participation in carrying out all P2 projects.

- ✓ *Step 2: Develop a company pollution prevention policy statement.*
  Putting the company's commitment in writing helps to legitimize the program with all employees and can lead to an attitude change that makes P2 efficiencies "an everyday part of doing business."

- ✓ *Step 3: Gain ongoing, company-wide commitment.*
  Some companies have initiated bonuses or award programs for employees who make significant contributions or savings through P2 programs. Others find that employees derive satisfaction from being actively involved in decisions that affect their production and work-related activities.

- ✓ *Step 4: Establish a pollution prevention team.*
  Once your facility establishes a clear commitment to P2, gather interested, appointed, and affected individuals for a brainstorming session (see Step 10). This group of individuals should include a cross-section from all levels of staff, including management to front-line workers in the purchasing, financial, clerical, production, maintenance, and warehousing areas.

- ✓ *Step 5: Select a pollution prevention coordinator.*
  Heading the P2 team should be a Pollution Prevention Coordinator. This P2 champion is the one who coordinates the assessments, carries forward your team recommendations, and provides oversight to the implementation of projects. This person also acts as a point person for any questions, comments, or recommendations from other employees. Putting someone in charge helps ensure the program will move forward in a timely and effective manner.

- ✓ *Step 6: Establish overall waste reduction goals.*
  The first goals need to be target goals such as achieving specific energy, toxics, or waste reductions by a set date. Then ask what steps the company needs to take to achieve this goal. Purchasing changes are probably the easiest and most powerful means of reducing toxics that result in hazardous waste and employee exposures as well as reducing energy usage.

- ✓ *Step 7: Establish priorities and procedures for conducting more detailed assessments.*
  Before conducting a waste assessment, you must determine how waste will be measured, how costs will be assessed, who should be involved, and how the assessment will proceed. Identify potential obstacles and define the means for overcoming them. These obstacles will be less likely to impede the process if there is a mechanism for addressing them as they arise.

- ✓ *Step 8: Designate a detailed assessment team(s).*
  Designate a team to perform detailed waste assessments (or an individual if staffing is tight). This team should explore waste from various sources and various types of waste.

- ✓ *Step 9: Conduct the waste assessment.*
  An in-depth, comprehensive waste assessment is critical to a successful P2 plan. Experience has shown that only after a company realizes the true costs of its wastes will it have the motivation needed for an ambitious P2 effort. Also, by assigning waste costs to specific department budgets, greater efforts to eliminate costs associated with waste are likely to occur. An in-depth waste assessment helps a business to identify:

  - Sources, compositions, and the true costs of wastes.
  - Potential P2 opportunities and the benefits of acting on these opportunities.
  - Obstacles to implementing P2 opportunities.

For a very small business, an in-house waste assessment might consist of a visual inspection of what goes into the trash dumpster, followed by research into local opportunities for recycling cardboard, office paper, plastic packaging, and other easy-to-recycle materials. Businesses with more complex operations should perform a walking tour of the facility observing the various points of waste generation and the conditions having the potential for causing accidents, health hazards, or environmental emissions. Discussions with operational staff typically reveal additional useful information. Other sources of important information include records of waste disposal costs, environmental compliance documents, and raw materials purchase invoices. Identifying the wastes that cost the most due to volume, disposal, or toxicity have good potential for P2 efforts.

MICHIGAN RETAP
RETIRED ENGINEER
TECHNICAL ASSISTANCE PROGRAM

Additionally, a business can request a **Retired Engineer Technical Assistance Program (RETAP)** assessment that identifies P2 opportunities within the facility. Businesses may also wish to have an assessment conducted by a professional technical consultant to characterize wastes and perform a cost-benefit analysis of each P2 option.

If your business wants a free, confidential assessment, contact David Herb, the RETAP coordinator at 800-662-9278 or herbd@michigan.gov.

If the facility can research the topic, there may even be a 'self audit' checklist available to identify your own areas of focus. Contact your trade associations, business forums, or others for self checklists or guidance. The West Michigan Sustainable Business Forum has a '*Self- Assessment Guide'* available free online. Other guidance for specific industries can be found in 12.1.6 at the end of this chapter.

✓ *Step 10: Identify potential pollution prevention opportunities.*

Once the information is collected and summarized, team members should discuss possible alternatives to reduce or eliminate waste or toxic-producing or energy or resource intense processes and/or ways to recycle waste streams. An initial list of P2 opportunities can typically be developed with simple brainstorming. However, for significant gains, the team should look for examples listed in the sector resources such as those listed above.

The Office Environmental Assistance (OEA) has many ways to help you identify and implement P2 opportunities. Call 800-662-9278.

✓ *Step 11: Perform technical and economic analyses on potential P2 opportunities.*

Based on a set of selection criteria, an examination of the technical workability of P2 opportunities should occur, followed by an evaluation of cost and environmental impacts of each opportunity. This requires consideration of all costs and benefits involved, such as decreases in operating costs; changes in regulatory burden; future liabilities; and improvements in productivity, worker safety, environmental protection, and quality management practices.

Projects can vary from easy to hard; inexpensive to costly. When considering costs, think in terms of return on investment and long term impacts. A stock investment with a 10 percent return per year is considered good. Note that this would require 10 years for the stock to fully pay back that initial investment. If an investment in waste, resources, or energy reduction saves enough money to pay for itself in 5-7 years, that's better payback than the stock market! In addition, it is likely that costs for waste disposal, energy, water, and other resources will only increase over time, making the payback timeline even shorter.

The P2 team should investigate possible funding sources for those projects that require capital investment. A financial analysis of any project is helpful in requesting funding. Members of the financial departments should be included in this process. Options with the highest rate of return should be presented to management as final recommendations. For energy related projects, see the funding discussion under Section 12.1.5.d

✓ *Step 12: Develop an implementation plan.*

With management's decision to act upon given P2 opportunities, steps to create waste, toxics, resource and energy reduction actions must be designed. Financial and personnel resources must also be designated. An excellent financial resource is available from the Small Business Pollution Prevention Loan Program. Low-interest loans of up to $400,000 are available to small businesses of 500 employees or less, for financing P2 projects.

For additional information on the loan program, contact the Environmental Assistance Center at 800-662-9278 and ask to speak to the Small Business P2 Loan Program Manager.

It is important that each step of the implementation plan be approved by the P2 team. For each step or action to be taken, clearly indicate the following:

- Action to be implemented.
- Person or persons responsible for implementation.
- Possible barriers and ways for overcoming them.
- Time for action to be completed.

✓ *Step 13: Implement the selected projects.*

Inform all employees about the selected P2 projects and begin the implementation phase. All involved employees should have a clear understanding of the purpose of the P2 project and their role in implementing it. The pollution prevention team members should lead other employees and provide guidance in the implementation process.

✓ *Step 14: Evaluate project effectiveness and document results.*

By reviewing the program's successes and failures, managers can assess the degree to which P2 goals are being met and what the economic results have been. The comparison identifies P2 techniques that work well and those that do not. This information helps guide future P2 assessment and implementation cycles.

In order to evaluate project effectiveness, a set of baseline data (gathered during the waste assessment phase/Step 10) should be used to measure progress. Periodically conduct tests to determine if and where waste and hazards have been reduced. Results should be documented. This is a good way to determine if alternative production methods are working as expected. It is also an opportunity to re-evaluate methods and make any corrections.

✓ *Step 15:* Celebrate positive results and learn from negative results.

Once the results are known, celebrate the positive steps forward. Are you purchasing less toxic materials and reducing hazardous wastes? If so, this means you're reducing the exposure to your employees as well as the disposal costs. Post the information where employees and the public can see what you're doing to save money and protect the environment as well as the health of your employees and customers. As we all know, not all new projects are successful. If you find a P2 project isn't working as expected, determine if it can be improved or if something different is indicated or if it should be shelved until new resources are available. Learn from the experience but keep working on improvements.

✓ *Step 16:* Modify the plan as needed and select the next steps to be taken.

The pollution prevention plan should evolve as the P2 program proceeds. Goals once achieved can be expanded or new goals can be set, and policies can be revised. Maintaining a viable P2 program requires continued support and involvement from management and continuing effort from everyone involved in planning and implementation. With support and enthusiasm from respected persons within the company, employees at all levels can and will want to participate. Pollution prevention can become a part of quality management practices, contributing to the company bottom line.

12.1.5 Common Pollution Prevention Opportunities and Techniques

There are several ways to increase efficiency and prevent waste in all aspects of a business. The following is a brief review of some of the most common P2 opportunities and techniques a business can use to achieve its P2 goals. For additional ideas or more in-depth information, contact the OEA at (800) 662-9278.

12.1.5.a Cost Accounting

Experience has shown the most successful P2 programs are those that account for the true cost of wastes, including expenses for lost raw materials; staffing; needed paperwork and insurance; sample analyses; and storage, treatment, and disposal costs. Successful billing strategies to account for the true costs of wastes include the following approaches:

- Charge direct and indirect costs of all air, land, and water discharges to specific processes, products, or departments.
- Allocate treatment/disposal costs to operations/departments that generate the waste.
- Allocate utility costs to specific processes, products, operations, or departments.

Once all the true costs of the various processes or products are known, you may determine the waste, toxics, resource,and energy costs for a particular product are much larger than expected or identify the source of most of the hazardous waste. These are good areas to begin the focus of P2 efforts to reduce those costs and liability.

12.1.5.b Purchasing and Inventory Management

Remember that a purchasing policy on non-toxic and energy efficient alternatives can result in significant improvements but the purchasing staff would need guidance on what those alternatives are. Purchasing changes are probably the easiest and most powerful means of reducing toxics that result in hazardous waste and employee exposures as well as reducing energy usage. This can also impact the companies you select to purchase from. Select suppliers or manufacturers who also exhibit your same environmental commitment. Don't forget this also opens up a market for your products.

- Order products according to need. The cost associated with the disposal of surplus hazardous materials or the resulting hazardous wastes, often exceeds the purchase price of the item or raw material. A non-toxic alternative that does not generate hazardous waste may reduce those costs, risks and regulatory oversight.
- A coordinated material purchasing program can monitor all requests for products throughout the company or plant and implement efficient purchasing policies.
- An inventory control program can promote sharing of materials between common users, provide data on who is using extremely hazardous products, identify large volume users, locate unused caches of materials, and identify where waste reduction/material substitution options are viable. Inventory control should rotate stock on a first-in, first-out basis.

12.1.5.c Packaging, Shipping, and Containers

A second look at the transportation and product packaging that companies send and receive often leads to waste reduction without sacrificing product safety or quality.

- Request that deliveries be shipped in returnable/recyclable containers.
- Work with suppliers and customers to eliminate excess packaging.
- Increase your use of reusable shipping containers and recycled or recyclable packaging.
- Purchase products in bulk, in concentrated form, or in quantities matching process demand.

12.1.5.d Energy Usage and Efficiency

Energy use is often seen as a key area where, through efficiency, operating costs can be significantly and readily controlled. Energy savings can be achieved by simple changes in daily operations, maintenance practices, and worker habits, and can be implemented at little or no cost. Although more significant energy savings may involve investment in new/upgraded equipment, these simple changes typically have excellent financial returns.

The state Energy Office within the Michigan Economic Development Corporation, provides some incentives for energy efficiency and renewable energy projects. Their information is available on-line at **www.michigan.gov/energyoffice**.

Federal incentive programs are listed and explained on the following Web site:

http://energytaxincentives.org/consumers/

Most Michigan utility companies also provide a number of incentives.

Consumers Energy Rebates	**www.consumersenergy.com/eeprograms/**
Consumers Energy Tips	**www.consumersenergy.com/welcome.htm**
Consumers Energy –Products	**www.consumersenergy.com/products**
DTE/Mich Con	**www.yourenergysavings.com**
Lansing Board of Water & Light	**www.lbwl.com/energysavers/**
Other Municipal Utilities	**www.michigan-energy.org**

Basic energy efficiency steps to consider include:

- Submeter energy usage for detailed information on when, how, and where energy is used. Some pricing is based on time of day and peak usage. Changing or staggering startup times may save money at no cost. Knowing how and where energy is used is critical to identify major usage in order to focus P2 efforts and gain best savings.
- Maintain equipment and the facility through an ongoing maintenance program.

  i) Furnaces
  - ✓ Analyze flue gas and adjust the fuel-air ratio to increase efficiency.

  ii) Process Heat, Heat Recovery, and Heat Containment
  - ✓ Enhance sensitivity of temperature control and cutoff.
  - ✓ Use flue gas waste heat to preheat combustion air.

  iii) Process Cooling: Cooling Towers and Chillers/Refrigeration
  - ✓ Use a cooling tower instead of refrigeration when outside temperature allows.
  - ✓ Use waste heat for absorption refrigeration.

  iv) Motors and Drives
  - ✓ Develop an ongoing motor replacement program to upgrade existing motors to high efficiency motors. Where power factor is not controlled elsewhere in the shop, choose replacement motors with high power factor.
  - ✓ Use variable speed drives to control motor speeds.

  v) Compressed Air Systems
  - ✓ Compressed air is almost always the most expensive means for performing work at a facility and should only be used when essential.
  - ✓ Establish a vigorous maintenance program and check for leaks often.

  vi) Electrical Power
  - ✓ De-energize excess transformer capacity and increase power factor for facilities and equipment by installing the proper combination of fixed and variable capacitance.

  vii) Heating, Ventilation, and Air Conditioning (HVAC) Equipment
  - ✓ Develop an optimal start/stop schedule for your HVAC system.
  - ✓ Use a seven-day, programmable thermostat to coordinate system operations with loads.
  - ✓ Install variable air volume systems where practical.
  - ✓ Install an airside, rooftop, central, or waterside economizer to use outside air to cool the space when outside temperatures allow.

viii) Lighting
- ✓ Install low-mercury T-8 or T-5 fluorescent systems with electronic ballasts or LEDs (light-emitting diodes).
- ✓ Remove two out of four tubes in fluorescent fixtures where lower light levels are acceptable. Also, disconnect the ballast that operates these tubes to save even more energy. If necessary, install reflectors or higher output lamps so more light is utilized.
- ✓ Install low-wattage, long-life, LED exit signs.
- ✓ Use high-efficiency halogen, low-voltage halogen, and quartz lamps where lighting quality is critical (e.g., retail displays).
- ✓ Replace mercury vapor or other inefficient, high-intensity, discharge lighting systems with an efficient, metal halide, sodium, or other high-output fluorescent system.
- ✓ Tailor lighting levels to the task and occupants, and increase the use of "task lighting."
- ✓ Rewire fixtures or use dimming controls so unnecessary lighting can be turned off.
- ✓ Install occupancy sensors in areas of sporadic use. (Examples include supply closets and restrooms. Set the light timer delay so staff see the lights come on and recognize this effort.)
- ✓ Install light sensors near windows to shut down light sections on bright sunny days.

ix) Office Equipment
- ✓ When purchasing new equipment, buy Energy Star©, or higher efficiency models. Also compare the "Energy Guide" label included on many major appliances to determine the more efficient model.

12.1.5.e Solvents

Regulatory and cost pressures, along with related worker safety and liability issues, have led to the development of numerous alternative cleaning technologies, safer solvents, and improved cleaning and recovery equipment. In recent years, new programs have developed to certify what are 'green' cleaning materials and processes. Green Seal is one certification program and provides a list of certified green cleaners at **www.greenseal.org/findaproduct/index.cfm**. Implementing safer, green cleaning technologies has become easier and often only requires purchasing materials off the shelf or from a good supplier that also provides training. Facilities that want to do their own research will need:

- A better understanding of the chemistry, mechanics, and other fundamentals of cleaning.
- A clear determination on how clean equipment or process materials truly need to be.
- A review of upstream processes/practices and how they influence the cleaning process.
- An awareness and understanding of the pros and cons of potential alternatives.
- Some degree of modification of both up- and down-stream processes and practices.
- A significant experimentation and learning period for identifying appropriate and effective alternative cleaners, optimizing cleaner concentrations and cleaning times, adjusting equipment and process operations, and modifying employee practices.

In general, pollution prevention opportunities for solvent cleaning processes include:

i) Using alternative cleaning technologies such as:
   - ✓ Aqueous and semi-aqueous cleaning processes.
   - ✓ Thermal and steam cleaning processes.
   - ✓ Abrasive blasting using dry ice, baking soda, starch, plastic, and other media.
   - ✓ Supercritical carbon dioxide solvent cleaning.

ii) Using alternative/less hazardous solvents with low vapor pressure, low toxicity, or non-ozone-depleting characteristics such as lactic acid, dimethyl esters, DMSO, n-methyl pyrrolidone, glycol ethers, terpenes, soybean, and other bio-based solvents. Web sites that may be useful to identify alternative solvents include:
   - o Clean Gredients list of solvents at **www.cleangredients.org**
   - o Clean Productions 'GreenScreen' program is a guide for decision making towards the use of the least hazardous materials at **www.cleanproduction.org/Greenscreen.php**

iii) Extending solution life by pre-cleaning, using in-line filtration, countercurrent flows, reducing drag-out and evaporative losses, and removing sludge and surface oils/scum.

iv) Reclaiming/recycling spent solvents using distillation, filtration and vapor recovery equipment, and off-site recycling services.

v) Evaluating and modifying upstream processes and practices, solvent handling/storage practices, and employee practices for reducing solvent waste generation.

12.1.5.f Water

Water usage and wastewater discharge treatment entail substantial costs for many manufacturers. By metering water usage and regularly taking inventory of all water users, companies can reduce a major operating expense and reduce the demands on wastewater treatment facilities. Reducing water usage, generally also saves energy as it need to be pumped. Funding for some water efficiency steps may be provided by your local utility (Section 12.1.5.d). When water is used, it requires energy as it needs to be pumped. Reducing water usage also reduces the water bills as well as the amount of wastewater that requires costly treatment.

- Cleaning Systems: Replace high-volume hoses with high-pressure, low-volume cleaning systems.
- Cooling Towers: Install or replace conductivity controllers on cooling towers to reduce the amount of blowdown water wasted. A medical supplier replaced a controller on an existing tower and reduced their annual water usage by 34 percent or over 437,000 gallons. Reuse treated wastewater for cooling water. Reuse cooling tower blowdown waters for: cleaning air scrubbers; landscaping (determine if mineral concentrations are acceptable); etc.
- Equipment: Purchase water efficient equipment and appliances including cafeteria dish washers, laundry washing machines, dual flush toilets, waterless urinals, etc. See the U.S.

EPA's Waterwise Web site at: www.epa.gov/WaterSense/

- Graywater: Separate out graywater from treatment waters and sanitary wastes so they can be reused in other non-potable applications such as irrigation or toilet flushing during expansions, renovations or new construction.
- Landscaping: Use native plantings to reduce or eliminate potable water use for irrigation or reuse storm water, treated wastewater, etc.
- Non-contact Cooling Water: Once through non-contact cooling water should be replaced by a closed-loop cooling water system.
- Rinsing: Use countercurrent rinsing and equip all hoses with shut-off nozzles.
- Storm water reuse: Capture storm water and use it for irrigation, toilets or non-critical process usage.
- Valves: Install automatic shut-off valves on equipment to stop water flow when not in use.
- Wastewater Reuse: Investigate the reuse of treated wastewater for separately supplied, non-potable uses. This could include: cleaning air scrubbers; floor washing; fire response supply (confirm this is acceptable with related regulatory staff); landscaping; toilets; etc.
- Water Demand: Determine if the need for the water usage is critical or could be reduced or eliminated.
- Water Treatment Costs: Determine if the pollutants that require expensive treatment could be eliminated from the wastewater sources rather than do expensive treatment.

For more ideas, review the following documents:

- *"A Water Conservation Guide for Institutional and Industrial Users"* by New Mexico
- "*Making Every Drop Count*" Increasing Water Efficiency in California's Commercial, Industrial and Institutional (CII) Sector.

12.1.6 WHERE TO GO FOR HELP

SUBJECT: **Pollution Prevention (P2) Program Assistance**

CONTACT: DEQ, Office of Environmental Assistance
800-662-9278
www.michigan.gov/p2

P2 General Resource Web sites

The following Web sites are great for researching any P2 topic:

- Great Lakes Regional Pollution Prevention Roundtable (**www.glrppr.org/**)
- P2RX –Pollution Prevention Resource Exchange (**www.p2rx.org/**)
- National Compliance Assistance Centers (**www.assistancecenters.net**)
- U.S. EPA Industry Sector Profiles (**www.epa.gov/compliance/resources/publications/assistance/sectors/notebooks/index.html**)

Contact the Office of Pollution Prevention and Compliance Assistance for P2 program assistance at 800-662-9278 or by email at: deq-assist@michigan.gov. Environmental publications can be found at: **www.deq.state.mi.us/pubcenter**. In addition, the OEA and partners provide guidance for the following topics.

- Agriculture
  - Michigan Agriculture Pollution Prevention Directory
- Auto Body - Michigan Auto Body Environmental Compliance Workbook
- Construction & Demolition
- Energy –Efficiency & Renewable
- Food Processing
  - Michigan Fruit and Vegetable Processor's Guide
- Marinas - Michigan Clean Marinas
- Parks
- Purchasing – Environmental Purchasing
- Printers – Great Printers
  - Regulatory Guide for Michigan's Lithographic Printing Industry
- Restaurant P2
- Schools – Healthy Schools
- Suppliers – Sustainable Supplier Network
- Sustainability
- Shooting Range Stewardship
- Tourism – Green Lodging
- Transportation – Mobile Sources (Anti-Idling & Clean Diesel)
- Turfgrass Stewardship
- Waste Audits

P2 Web site Shortcuts

To assist industry and the public in accessing and sharing the DEQ Web sites, below is a list of commonly used P2 Web sites and their shortcut addresses.

Agriculture P2	www.michigan.gov/deqp2partnerships
Brownfield Programs	www.michigan.gov/brownfields
C3 – Clean Corporate Citizen	www.michigan.gov/deqc3
Electronic Waste	www.michigan.gov/electronicwaste
Energy	www.michigan.gov/energyoffice
Environmental Education	www.michigan.gov/environmentaled
Environmental, Health, and Safety Guide	www.michigan.gov/ehsguide
Golfing -Turfgrass Stewardship	www.mtesp.org
Grants & Loans	www.michigan.gov/deqgrantsandloans
Green Chemistry	www.michigan.gov/greenchemistry
Green Construction & Recycling	www.michigan.gov/deqconstruction
Green Lodging Environmental Resources	 www.michigan.gov/p2industry
Certification Program	www.michigan.gov/greenlodging
Healthcare	www.michigan.gov/p2industry
Marinas	www.miseagrant.umich.edu/cmp/
MBP3 – Michigan Business Pollution Prevention Program	www.michigan.gov/p2industry
Mercury P2	www.michigan.gov/mercuryp2
Neighborhood Environmental Partners	www.michigan.gov/deqnep
NonPoint Source Pollution Grants	www.michigan.gov/nps
Office of Environmental Assistance (OEA)	www.michigan.gov/deqoea
P2	www.michigan.gov/p2
P2 Citizens	www.michigan.gov/p2citizens
P2 Community	www.michigan.gov/p2community
P2 Industry	www.michigan.gov/p2industry
P2 Small Business Loans	www.michigan.gov/p2loan
Printers	www.michigan.gov/p2industry
Publications – DEQ Environmental Resources	www.deq.state.mi.us/pubcenter
Purchasing	www.michigan.gov/p2industry
Recreational Stewardship	www.michigan.gov/p2community
Recycling	www.michigan.gov/deqrecycling
Recycling Contacts	www.michigan.gov/deqrecyclingcontacts
Restaurant P2	www.michigan.gov/p2industry
RETAP	www.michigan.gov/retap
RMMD – Recycled Materials Market Directory	www.michigan.gov/rmmd
Schools – Health	www.michigan.gov/p2community
Shooting Range Stewardship	www.michigan.gov/p2industry
Supplier –Sustainability	www.michigan.gov/p2industry
Sustainability	www.michigan.gov/p2community
Workshops	www.michigan.gov/deqworkshops

SECTION ONE – ENVIRONMENTAL REGULATIONS

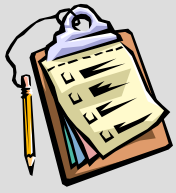
CHAPTER 12.2 Environmental Management Systems

12.2.1 What is an Environmental Management System?

An Environmental Management System (EMS) is one of several structured management tools designed to provide a consistent approach to your activities, products and services that are within your control and influence. The EMS helps identify, control, and monitor the activities at your facility that could impact the environment. It is a system that encourages your facility to incorporate environmental issues into everyday operations at all functions and levels. An EMS provides you with a structure for overseeing your programs. It does not, however, tell you what to manage. You make the decisions on what to manage based on your business needs, your resources, and your identification of significant activities. The idea is to integrate all of your environmental responsibilities into the daily decision making and overall management of operations at your facility to increase effectiveness and efficiency.

Several countries throughout the world originally developed the idea of EMS to improve environmental performance, to create a more "level playing ground" in the world market, to provide a competitive advantage, and to give credibility to environmental programs. An EMS is practical for a very wide variety of operations including small businesses, large industry, educational institutions, and government agencies.

There is no one type of EMS, but there are standards or formats that you can follow in developing your system. The most well-known and widely used EMS standard in the United States is the ISO 14001 standard. The International Organization for Standardization (ISO), consisting of representatives from industry, government, non-governmental organizations, and other entities, finalized the ISO 14001 EMS standard in September 1996 and approved an update in November 2004. The intent of this standard is to produce a single framework for any EMS which can accommodate varied applications all over the world. It is a standard that is harmonizing environmental management practices and requirements around the globe.



An EMS Audit Guide has been provided at the end of this chapter (pages 12.2-5 to 12.2-15). You can use this guide to help your company develop an EMS that meets the ISO 14001 standard.

In This Chapter…

All EMS standards have these same basic components, which are identified below. The EMS Audit Guide on pages 12.2-5 through 12.2-15 outlines these components in detail.

ISO 14001 Environmental Standard

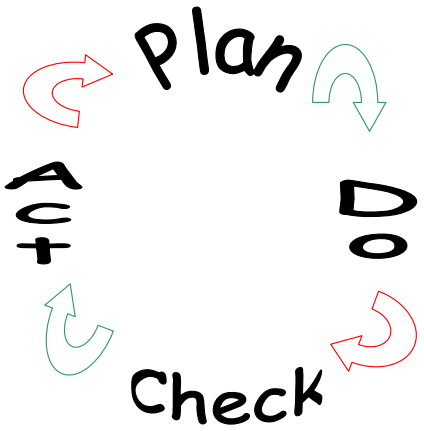
Environmental Policy and Scope (4.2)

Environmental Planning (4.3)
- Identifying Aspects & Impacts
- Significance Ranking
- Setting Objectives and Targets
- Environmental Management Programs (EMPs)

Implementation and Operation (4.4)
- Roles, Responsibilities, Time Frames
- Training & Competence, Communication
- Controls and Documentation
- Emergency Preparedness

Monitoring and Measurement (4.5)
- Evaluation of Compliance
- Dealing with Nonconformances
- Corrective and Preventive Actions
- Records
- EMS Audit Program and Procedures

Management Review with 6 required inputs (4.6)



Implementation of an EMS does not substitute for compliance with regulations but can improve your compliance record and help you address issues that are not covered by regulation. In short, environmental management is an ongoing improvement process propelled by the desire to comply with regulations and operate cost effectively. Fully developing and integrating an EMS into your day-to-day management processes and operations is a more effective way of doing business.

12.2.2 What is a Responsible Care Management System?

The Responsible Care 14001 and the Responsible Care Management System (RCMS) are business tools developed by the American Chemistry Council. The original version of the Responsible Care standard has been in place since late 1980s. Both Responsible Care systems go beyond the scope of a typical Environmental Management System. An ISO 14001 Environmental Management System typically does not include off-property activities, employee health and safety, and consideration and engagement of the local community and stakeholders. In addition to these elements, Responsible Care also considers the environmental risks associated with suppliers and distributors and security. Both versions are comprehensive environmental, health, safety and security performance improvement initiatives.

12.2.3 What are the Benefits of an Environmental Management System?

Developing and implementing an EMS for your Michigan business can help improve the triple bottom line of your operation; economic, environmental, and social. It can also help you qualify for Clean Corporate Citizen (C3) designation. As a C3 designee, your facility can take advantage of regulatory benefits from the state's air, surface water, groundwater, and storage tank programs.

For more information on the C3 Program and regulatory benefits, contact the Environmental Assistance Center at 800-662-9278.

By bringing environmental factors into daily business decisions, implementation of an EMS helps do the following:

- ✓ **Reduce costs** – Facilities that have implemented an EMS report improved operating efficiency through focus on important issues, development of standard procedures, and increased employee training. Most companies have reported reduced costs through the systematic process of identifying potential risks and impacts. Some facilities have earned favorable status on financial indexes because they have reduced their legal liability, reduced the likelihood of catastrophic occurrences, and improved environmental and social responsibility.

- ✓ **Assume a competitive advantage** – There is an expanding "green" market in the world. Consumers and manufacturers are giving preference to products from environmentally responsible suppliers. An EMS can help obtain that "green" image. A number of larger companies in the U.S., especially in the automotive and electronic fields, have mature systems and are now requiring that their suppliers implement an EMS.

- ✓ **Improved image with stakeholders** – An EMS can improve your image and give credibility to your environmental programs. Your local politicians, environmental regulators, and community groups see development of an EMS as an indication of willingness to be a responsible citizen and go beyond compliance. Accordingly, they will recognize and reward these efforts.

- ✓ **Enhance regulatory compliance** – An EMS can help improve regulatory compliance and reduce liability from noncompliance. The adoption of procedures and work instructions and additional training programs typically adds consistency and stability to business operations. It enables improved control over potential impacts and helps anticipate and control upsets.

- ✓ **Improve environmental performance** – The systematic identification of potential environmental impacts and continual improvement goals lead to more efficient business operations. Achieving these goals will ultimately lead to improved performance, a cleaner environment, and a sustainable community.

12.2.4 What are the Stages of Environmental Management System Development?

Typically, an EMS undergoes three states of maturity:

1) In the years 0 – 2, the EMS is **developed and implemented (internal value systems)**
    a. Large changes are typically avoided in these years
    b. Tends to be re-active, often focusing on "end-of-pipe" controls
    c. Staff strive to fully understand ISO 14001 (or other) requirements
    d. The system focuses on learning how to communicate to stakeholders
    e. It establishes what and how to disclose information to the public
    f. It tends to be driven by one person (typically the EH & S leader)
    g. There is limited involvement and/or buy-in
    h. Determination of significant aspects and hazards is often complex and time consuming
    i. Management provides resources, but their involvement is minimal
    j. Very simple metrics are used to report results toward goals

2) The years 2 – 5 can be described as **deployment**
    a. Linkages within the system are strengthened
    b. EMSs are in conformance with standard requirements
    c. Benefits (social, environmental, financial) are demonstrated
    d. Alignment with other requirements and systems becomes integrated (quality, health, safety, security, environmental, purchasing, etc.)
    e. Consistent metric systems for reporting are developed to measure results and trends
    f. It moves away from a one-person driven system to include a cross-functional team
    g. Objective and targets tend to be modest
    h. Corrective and preventative action processes tend to be weak
    i. Communication and reporting systems are being refined
    j. Cultural change is starting

3) Five+ years the EMS is **mature or an external value** system
    a. Stakeholders are involved with EMS review
    b. The organization achieves and maintains high levels of performance
    c. Value is demonstrated
    d. Efficiency through process improvements is a primary activity
    e. Inclusion of collected data in strategic planning takes place
    f. Corrective and preventive action processes are well established
    g. Objectives and targets are "stretch" goals
    h. There is a high level of management involvement
    i. The management system serves as a launch pad for new initiatives
    j. Metrics are well established and support business goals
    k. Employees are held accountable for performance
    l. Management is committed to environmental protection (including the allocation of resources and time and the assignment of responsibility)

Environmental Management System Audit Guide

Based on the following: ISO 14001:2004

ISO 14001 4.1 General Requirements 4.2 Policy

Requirement	*Audit Question*	Score	Comments
ISO 14001:2004 4.1 – General Requirements The organization shall establish, document, implement, maintain and continually improve a management system. The organization shall define and document the scope of its management system.	Does the organization have an environmental policy that was developed by senior management?	☐100% ☐ 50-99% ☐1-49% ☐0%	
	Is there evidence that the policy has been communicated to the organization's employees and stakeholders, including members of the public?	☐100% ☐ 50-99% ☐1-49% ☐0%	
	Is there evidence that the scope of the environmental management system has been defined?	☐100% ☐ 50-99% ☐1-49% ☐0%	
ISO 14001:2004 4.2 - Policy a) The policy shall be relevant to the nature, scale and impact of the organization's operations, products and processes.	Is the policy relevant to the organization's operations, products and processes?	☐100% ☐ 50-99% ☐1-49% ☐0%	
b) The policy shall include a commitment to continual improvement and prevention of pollution.	Does the policy include a commitment to continual improvement and prevention of pollution?	☐100% ☐ 50-99% ☐1-49% ☐0%	
c) The policy shall include a commitment to comply with applicable legal requirements and with other requirements to which the organization is subject or subscribes.	Does the policy include a commitment to comply with all relevant environmental legislation and regulations?	☐100% ☐ 50-99% ☐1-49% ☐0%	
ISO 14001:2004 4.2 – Policy The policy shall set a framework for establishing and reviewing goals, objectives and targets.	Does the policy set a framework for establishing and reviewing goals, objectives & targets?	☐100% ☐ 50-99% ☐1-49% ☐0%	
The policy shall be documented, implemented and maintained. The policy shall be supported by a demonstration of visible leadership, commitment and involvement by top management.	Is the most current policy document signed, dated and approved by top management?	☐100% ☐ 50-99% ☐1-49% ☐0%	
ISO 14001:2004 4.2 – Policy The policy shall promote openness with stakeholders.	Does the policy promote openness with stakeholders and is it made available to the public?	☐100% ☐ 50-99% ☐1-49% ☐0%	

Environmental Management System Audit Guide (continued)

ISO 14001 4.3 - Planning

Requirement	*Audit Question*	*Score*	*Comments*
ISO 14001:2004 4.3.1 – Aspects and 4.3.2 Legal and Other Requirements The organization shall establish, implement and maintain a procedure(s) a) to identify the aspects of its activities, products and services within the defined scope of the management system that it can control and those that it can influence taking into account planned or new developments, or new or modified activities, products and services, and b) to determine those aspects that have or can have significant impact(s) on the environment.	Does the management system have a clear procedure for identifying potential health, safety, security and environmental aspects and significant impacts?	☐100% ☐ 50-99% ☐1-49% ☐0%	
	Are the aspects and significant impacts appropriate for the type and size of the industry?	☐100% ☐ 50-99% ☐1-49% ☐0%	
	Did the facility consider the significant aspects, legal requirements, stakeholder perspectives and opportunities for improvement in setting, implementing and maintaining its goals?	☐100% ☐ 50-99% ☐1-49% ☐0%	
ISO 14001:2004 4.3.3 – Objectives, Targets and Programs The organization shall establish, implement and maintain documented objectives and targets at relevant functions and levels within the organization which considers technological options, operational and business requirements and which reflect the commitment to continual improvement.	Is there documented proof that the aspect list and significance ranking are up to date?	☐100% ☐ 50-99% ☐1-49% ☐0%	
	Does the organization have measurable goals, objectives and targets for relevant aspects, with assigned time frames and responsibilities for accomplishment?	☐100% ☐ 50-99% ☐1-49% ☐0%	
	Do all goals, objectives and targets consider technological options, operational and business requirements and reflect the organization's commitment to continual improvement?	☐100% ☐ 50-99% ☐1-49% ☐0%	

Environmental Management System Audit Guide (continued)

ISO 14001 4.4 – Implementation and Operation

Requirement	*Audit Question*	*Score*	*Comments*
ISO 14001:2004 4.4.1 – Implementation and Operation The organization shall have a process to identify and assess program and organizational needs. Management shall ensure the allocation of essential resources to establish, implement, maintain and improve the management system.	Does the organization have a process to ensure human resources and specialized skills, organizational infrastructure, technology and financial resources have been allocated to meet goals, objectives and targets?	☐100% ☐ 50-99% ☐1-49% ☐0%	
Roles, responsibilities and authorities shall be defined, documented and communicated in order to facilitate effective management.	Is there evidence that roles, responsibilities, and authorities have been defined and communicated in order to meet goals, objectives and targets?	☐100% ☐ 50-99% ☐1-49% ☐0%	
	Have specific management representatives been appointed who have defined roles, responsibilities and authorities to ensure that the management system has been established, implemented and maintained in accordance with the requirements of the applicable standard(s)?	☐100% ☐ 50-99% ☐1-49% ☐0%	
	Is there evidence that the appointed representatives have reported to top management on the performance of the management system including recommendations for improvement?	☐100% ☐ 50-99% ☐1-49% ☐0%	

Environmental Management System Audit Guide (continued)

ISO 14001 4.4 Implementation and Operation

Requirement	*Audit Question*	*Score*	*Comments*
ISO 14001:2004 4.4.4 - Documentation The organization shall establish and maintain a documented management system that is legible, dated, and readily identifiable. The management system documentation shall include: a) the policy, goals, objectives and targets. b) description of the scope of the management system. c) description of the main elements of the management system and their interaction, with related documents. *d)* documents, including records, required by the applicable standard(s) documents, including records, determined by the organization to be necessary to ensure the effective planning, operation and control of processes that relate to its significant aspects and hazards.	Does the organization have a documented management system that is legible, dated and readily identifiable? Does the documentation include the policy, goals, objectives and targets, description of the scope and main elements of the management system? Does the documentation include records required and necessary to ensure the effective planning, operation and control of processes that relate to its significant aspects and hazards?	☐100% ☐ 50-99% ☐1-49% ☐0% ☐100% ☐ 50-99% ☐1-49% ☐0% ☐100% ☐ 50-99% ☐1-49% ☐0%	

Environmental Management System Audit Guide (continued)

ISO 14001 4.4 Implementation and Operation

Requirement	*Audit Question*	*Score*	*Comments*
ISO 14001 4.4.3 - Communication			
With respect to the organization's impact on the environment, the organization shall establish, implement and maintain a procedure(s) for a) internal communication among the various levels and functions of the organization. b) receiving, documenting and responding to relevant communication from external interested parties (stakeholders).	Is there a process for, and records of, communication with employees and/or other stakeholders regarding responsibilities and accountabilities specified in the management system?	☐100% ☐ 50-99% ☐1-49% ☐0%	
	Is there documentation supporting the organization's decision whether to communicate to external parties?	☐100% ☐ 50-99% ☐1-49% ☐0%	
The organization shall decide whether to communicate externally about its significant environmental aspects, and shall document its decision. If the decision is to communicate, the organization shall establish and implement a method(s) for this external communication.	If so, is there evidence of an established method of communication?	☐100% ☐ 50-99% ☐1-49% ☐0%	
The organization shall regularly evaluate the effectiveness of its communications programs with its stakeholders.	Does the organization regularly evaluate the effectiveness of its communications programs with its stakeholders?	☐100% ☐ 50-99% ☐1-49% ☐0%	

Environmental Management System Audit Guide (continued)

ISO 14001 4.4 Implementation and Operation

Requirement	*Audit Question*	Score	Comments
ISO 14001:2004 4.4.2 – Competence, Training and Awareness The organization shall have a process in place to identify training needs and establish and maintain effective training of the management system and related job requirements.	Does the organization have a process in place to identify training needs?	☐100% ☐ 50-99% ☐1-49% ☐0%	
The organization shall establish and maintain employee involvement in the development, communication and implementation of the management system.	Are there records to show that employees have been trained on the management system and related job requirements?	☐100% ☐ 50-99% ☐1-49% ☐0%	
The organization shall ensure that any person(s) performing tasks for it or on its behalf that have the potential to cause a significant impact(s) identified by the organization is (are) competent on the basis of appropriate education, training, or experience, and shall retail associated records.	Is there evidence of ongoing employee involvement in the development, implementation and maintenance of the management system?	☐100% ☐ 50-99% ☐1-49% ☐0%	
The organization shall establish, implement and maintain a procedure(s) to make persons working for it or on its behalf aware of: a) the importance of conformity with the policy and procedures and with the requirements of the management system. b) the significant aspects and related potential impacts associated with their work and the benefits of improved personal performance. c) their roles and responsibilities in achieving conformity with the requirements of the management system. d) the potential consequences of departure from specified procedures.	Are there records to show that any person(s) performing tasks for the organization or on its behalf are competent based on appropriate education, training, or experience? Is there evidence that person(s) working for the organization or on its behalf are aware of the importance of conformity with the management system; the significant aspects and related potential impacts associated with their work; their roles, responsibilities, and potential consequences of departure from specified procedures?	☐100% ☐ 50-99% ☐1-49% ☐0% ☐100% ☐ 50-99% ☐1-49% ☐0%	

Environmental Management System Audit Guide (continued)

ISO 14001 4.4 Implementation and Operation

Requirement	*Audit Question*	*Score*	*Comments*
ISO 14001:2004, 4.4.6 – Operational Control The organization shall identify and plan those operations that are associated with the identified significant aspects consistent with its policy, objectives and targets in order to ensure that they are carried out under special conditions by, a) establishing, implementing and maintaining a documented procedure(s) to monitor, measure and control situations where their absence could lead to deviation from the environmental policy, objectives and targets. b) stipulating the operating criteria in the procedure(s). c) establishing, implementing and maintaining procedures related to the identified significant aspects of goods and services used by the organization and communicating applicable procedures and requirements to suppliers, including contractors.	Does the organization identify operations or activities that have real or potential significant impacts?	☐100% ☐ 50-99% ☐1-49% ☐0%	
	Does the organization demonstrate procedures for monitoring the operations, assuring acceptability, prompt correction, reviewing the records, and reporting on related actions?	☐100% ☐ 50-99% ☐1-49% ☐0%	
	Does the organization monitor and measure applicable requirements on a regular basis? (Must have evidence.)	☐100% ☐ 50-99% ☐1-49% ☐0%	
ISO 14001:2004, 4.4.7 – Emergency Preparedness and Response The organization shall establish, implement and maintain a procedure(s) to identify potential emergency situations and potential accidents that can have an impact(s) on the environment and how it will respond to them.	Does the organization periodically test emergency preparedness plans?	☐100% ☐ 50-99% ☐1-49% ☐0%	
	Does the organization periodically review and, where necessary, revise its emergency preparedness and response procedures?	☐100% ☐ 50-99% ☐1-49% ☐0%	
	Have emergency preparedness and response procedures been revised because an emergency situation or accident occurred?	☐100% ☐ 50-99% ☐1-49% ☐0%	

Environmental Management System Audit Guide (continued)

ISO 14001 4.4 Implementation and Operation;
ISO 14001 4.5 Checking

Requirement	*Audit Question*	Score	Comments
ISO 14001:2004 4.4.5 Control of Documents, and 4.5.4 Control of Records, The organization shall establish and maintain procedures for the identification, storage, protection, retrieval, retention, and disposal of relevant management system records, including training records, and the results of audits and reviews to demonstrate conformity with the management system. Records shall remain legible, identifiable and traceable. The organization shall establish, implement and maintain a procedure(s) to a) approve documents for adequacy prior to issue. b) reviews and update as necessary and re-approve documents. c) ensure that changes and the current revision status of documents are identified. d) ensure that relevant versions of applicable documents are available at points of use. e) ensure that documents remain legible and readily identifiable. f) ensure that documents of external origin determined by the organization to be necessary the planning and operation of the management system are identified and their distribution controlled. g) prevent the unintended use of obsolete documents and apply suitable identification to them if they are retained for any purpose.	Does the organization establish recordkeeping and reporting procedures that demonstrate effective document control? Does the organization demonstrate that the most current versions of documents and records are available at the point of use? Are records legible, stored properly, retained for the required time period? Are obsolete documents identified as such?	☐100% ☐ 50-99% ☐1-49% ☐0% ☐100% ☐ 50-99% ☐1-49% ☐0% ☐100% ☐ 50-99% ☐1-49% ☐0% ☐100% ☐ 50-99% ☐1-49% ☐0%	

Environmental Management System Audit Guide (continued)

ISO 14001 4.5 Checking

Requirement	*Audit Question*	Score	Comments
ISO 14001 4.5.1 Monitoring and Measurement The organization shall regularly monitor and measure the key characteristics of its operations, products and activities that can have a significant impact on the environment. The procedure(s) shall include the documenting of information to monitor performance, applicable operational controls and conformity with the management system's goals, objectives, metrics and targets. The organization shall ensure that calibrated or verified monitoring and measurement equipment is used and maintained and shall retain associated records.	Has the organization identified the key characteristics of its operations, products and activities that can have a significant impact on the environment? Does the organization analyze management system performance metrics and trends? Are there records of verification and/or calibration of monitoring and measurement equipment?	☐100% ☐ 50-99% ☐1-49% ☐0% ☐100% ☐ 50-99% ☐1-49% ☐0% ☐100% ☐ 50-99% ☐1-49% ☐0%	
ISO 14001:2004 4.5.2 Evaluation of Compliance Consistent with its commitment to compliance, the organization shall establish, implement and maintain a procedure(s) for periodically evaluating compliance with all applicable legal requirements and other requirements to which it subscribes. Records of the results of the periodic evaluations shall be kept.	Is there evidence that environmental compliance audits with legal and other requirements to which the organization subscribes have been performed on a regular basis? Has this evidence been reviewed by top management?	☐100% ☐ 50-99% ☐1-49% ☐0% ☐100% ☐ 50-99% ☐1-49% ☐0%	

Environmental Management System Audit Guide (continued)

ISO 14001 4.5 Checking

Requirement	*Audit Question*	Score	Comments
Corrective and Preventive Action, and ISO 14001:2004 4.5.3 Nonconformity, Corrective, and Preventive Action The organization shall establish, implement and maintain a procedure(s) for mitigating actual and potential nonconformity(ies) with the management system and for taking corrective action and preventive action. The organization shall identify and investigate incidents and accidents, mitigate any adverse impacts, identify root causes, complete corrective actions, and share key findings with relevant stakeholders.	Does the organization have a process for identifying actual and potential nonconformances and for taking corrective and preventive action? Have past nonconformances been adequately addressed through closed-out corrective action reports? Have past incidents or accidents been adequately investigated, documented and communicated? Are corrective actions appropriate to the magnitude of the problems and impacts encountered? Does the management system reflect necessary changes as a result of past corrective and preventive actions?	☐100% ☐ 50-99% ☐1-49% ☐0% ☐100% ☐ 50-99% ☐1-49% ☐0% ☐100% ☐ 50-99% ☐1-49% ☐0% ☐100% ☐ 50-99% ☐1-49% ☐0% ☐100% ☐ 50-99% ☐1-49% ☐0%	
ISO 14001:2004 4.5.5 *Internal* Audit The organization shall ensure that internal audits of the management system are conducted at planned intervals to a) determine whether the management system conforms to the appropriate standard, and has been properly implemented and maintained. b) audit procedures shall be established, implemented and maintained that address the responsibilities and requirements for planning and conducting audits, reporting results, retaining records, determination of audit criteria, scope, frequency and methods. The organization shall conduct audits of performance carriers, suppliers, distributors, customers, contractors, and third party providers.	Have internal audits been conducted on a regular basis to evaluate the effectiveness of the management system? Have results of internal audits been recorded and provided to top management? Is there evidence that internal auditors are objective and impartial? Are audit criteria, scope, frequency and methods defined? Does the organization have a process for conducting reviews of their contractors, suppliers and others working for the organization or on its behalf?	☐100% ☐ 50-99% ☐1-49% ☐0% ☐100% ☐ 50-99% ☐1-49% ☐0% ☐100% ☐ 50-99% ☐1-49% ☐0% ☐100% ☐ 50-99% ☐1-49% ☐0% ☐100% ☐ 50-99% ☐1-49% ☐0%	

Environmental Management System Audit Guide (continued)

ISO 14001- 4.6 Management Review

Requirement	*Audit Question*	*Score*	*Comments*
ISO 14001:2004, 4.6 – Management Review Top management shall review the organization's management system, at planned intervals, to ensure its continuing suitability, adequacy and effectiveness. Reviews shall include assessing opportunities for improvement and the need for changes to the policy, goals, objectives and targets.	Does the organization have a procedure for conducting management reviews of the management system?	☐100% ☐ 50-99% ☐1-49% ☐0%	
	Have management reviews been conducted according to the prescribed schedule?	☐100% ☐ 50-99% ☐1-49% ☐0%	
	Are records of management review retained?	☐100% ☐ 50-99% ☐1-49% ☐0%	
	Does the organization have a process for periodic reporting to stakeholders on the performance of the management system?	☐100% ☐ 50-99% ☐1-49% ☐0%	
	Is management given the results of internal audits and evaluations of compliance with legal requirements and other requirements to which the organization subscribes?	☐100% ☐ 50-99% ☐1-49% ☐0%	
	Does management review include: performance of the management system, extent to which objectives and targets have been met, status of corrective and preventive actions, follow up actions from previous management reviews, and an explanation of changed circumstances, including developments in legal and other requirements related to aspects?	☐100% ☐ 50-99% ☐1-49% ☐0%	
	Does management review include recommendations for improvement?	☐100% ☐ 50-99% ☐1-49% ☐0%	
	Do outputs from management review include any decisions and actions related to possible changes to the management system?	☐100% ☐ 50-99% ☐1-49% ☐0%	

WHERE TO GO FOR HELP

EMS Resources

SUBJECT: **EMS Development and Michigan's Clean Corporate Citizen (C3) Program**

CONTACT: DEQ, Office of Environmental Assistance
800-662-9278
www.michigan.gov/deqc3

SUBJECT: **EMS Guidebooks: "Environmental Management System Guidance Manual"**

CONTACT: DEQ, Office of Environmetnal Assistance
800-662-9278
www.michigan.gov/deqc3

SUBJECT: **EMS Standards**

CONTACT: American National Standards Institute (ANSI)
212-342-4900
www.ansi.org

SUBJECT: **EMS Standards**

CONTACT: Registrar Accreditation Board (RAB)
888-722-2440
www.anab.org

SUBJECT: **Organizations**

CONTACTS: U.S. Environmental Protection Agency (U.S. EPA)
www.epa.gov

Multi-State Working Group for Environmental Issues
www.mswg.org

The Global Reporting Initiative
www.globalreporting.org

SUBJECT: **Responsible Care Management Systems**

CONTACTS: **www.responsiblecare-us.com**

American Chemistry Council
www.americanchemistry.com
www.accnewsmedia.com

U.S. Department of Labor's Occupational Safety and Health Administration
www.osha.gov/dcsp/compliance_assistance/quickstarts/general_industry/gi_step1.html
http://stats.bls.gov/iif/home.htm

U.S. Department of Transportation Hazardous Materials Transportation Statistics
http://hazmat.dot.gov/pubs/inc/hmisframe.htm