

CHAPTER 10: Cost Effective Compliance and Pollution Prevention Techniques



Compliance activities for food processing facilities include regulatory obligations such as obtaining permits, paying fees, monitoring and reporting. Planning activities, such as emergency response, and recordkeeping may also be required and add costs. Pollution control also involves both capital and operating expenses. Depending on the wastes generated and how they are managed at a facility, a food processor may be subject to an array of requirements. Pollution prevention techniques may help cut costs, and in some instances, allows a company to drop below regulatory thresholds and thereby become free of certain regulatory requirements.

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 Michigan Department of Environmental Quality (DEQ), Environmental Science and Services Division (ESSD).

10.1 Pollution Prevention

10.1.1 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), defines P2 as preventing or reducing waste generation at the source, or the environmentally sound reuse or recycling of those wastes that cannot be prevented. In Michigan, P2 is based on voluntary, multi-media efforts that are applied where practicable, environmentally acceptable, and economically feasible. Only after P2 has been applied or considered should alternative waste treatment, release, or disposal technologies be used in accordance with Michigan regulations. Some common examples of P2 techniques that food processing facilities can use include:

- Placing catch pans near equipment hydraulic lifts.
- Making fundamental changes in the way food is cleaned and prepared.
- Stopping leaks, drips, and spills; and instituting preventative maintenance practices.
- Replacing standard motors, pumps, and lighting with high efficiency models

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"Source reduction" is defined as any practice that:

- reduces the amount of any hazardous substance, pollutant, or contaminant entering any waste stream or otherwise released into the environment (including fugitive emissions) prior to recycling, treatment or disposal; and
- reduces the hazards to public health and the environment associated with the release of such substances, pollutants, or contaminants.

This section discusses the benefits and incentives, costs of compliance, and techniques that may work at your facility.

Keep in mind that all P2 activities should be carried out in accordance with food safety requirements of the U.S. Department of Agriculture (USDA) and the Food and Drug Administration (FDA).

10.1.2 Why Practice Pollution Prevention?

Pollution prevention is about increasing operational efficiencies, reducing risks, and effectively meeting environmental responsibilities. Unlike most pollution control strategies, P2 offers important economic, regulatory, environmental, and social benefits that can often result in a more competitive business. A food processor that commits to an effective, ongoing P2 program that is dedicated to eliminating, reducing, or reusing wastes, can often:

- Reduce waste management costs.
- Reduce costs for energy, water, and raw materials.
- Minimize compliance costs associated with regulated wastes.
- Reduce future liability through reduced risks to workers, communities, and the environment.
- Improved compliance.
- Improved worker safety.
- Improved corporate image.

What will these benefits mean to your food processing facility?

• ***Reduction in the cost of operating your food processing facility***

The creation of waste that impacts the water, land, or air, and the use of certain chemicals, translates into additional dollars you must spend. When you generate waste, your operating costs increase since you must pay for items, such as waste disposal, the installation and operation of pollution control equipment, and permit fees. By reducing waste streams, you can cut the cost of operating your facility. And these cost savings should translate to **lower operating costs and increased profits**. (See Table 10.1.2 **Calculating Environmentally Induced Costs**)

Table 10.1.2 Calculating Environmentally Induced Costs

Usual Method of Calculating Environmentally Induced Costs	Correct Method of Calculating Environmentally Induced Costs
Costs of Disposal	
Fees 500,000	Fees 500,000
Disposal Costs 300,000	Disposal Costs 300,000
Total 800,000	First Total 800,000
Costs Incurred in Production	
	Logistics & Transportation 150,000
	Additional Personnel 250,000
	Additional Depreciation 200,000
	Storage 100,000
	Second Total 1,500,000
Excess Material Input	
	Purchase 4,500,000
	Correct Total 6,000,000

Example of the significance of correct calculation of environmentally induced costs (Wagner 1995).

• ***A more efficient and productive business***

In order to maintain compliance with environmental regulations, you and your staff must conduct a great number of environmental management activities. These activities cost your facility time and money. More often than not, these costs are hidden in your facility's overhead. The more waste you generate, the more your facility is regulated. So, if you spend less time on compliance activities because you have less waste to manage, your facility will have more time to process foods.

• ***Reduced risk of liability***

You will decrease your risk of liability by reducing the volume and the potential toxicity of the vapor, liquid, and solid discharges you generate. As a food processing facility, you should look at all types of waste, not just those that are currently defined as hazardous (see Section 2.4.1 for a definition of hazardous waste). Since toxicity definitions and regulations change, reducing volumes of wastes in all categories is a sound long-term management policy.

• ***Prevent pollution***

If there are fewer hazardous materials at your food processing facility, your compliance obligations will be fewer. If your workers are exposed less frequently to hazardous materials, their health and safety will not be as much at risk. In addition, you will not have to be concerned about their well being -- or your liability. Furthermore, the environment will be cleaner and you will be prepared for a regulatory agency's inspection.

10.1.3 Getting Started

An excellent way to get started with any Pollution Prevention effort is to draw upon the many resources available through 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 ESSD's assistance activities, field operations, and incentive programs, including industry partnerships.

10.1.3.a Technical Assistance:

The ESSD currently focuses on providing P2 information and technical assistance to all companies, institutions, and communities and has partnerships with specific industry sectors to promote P2 strategies.

- **Retired Engineer Technical Assistance Program (RETAP):** Retired professionals provide on-site P2 assistance to businesses with less than 500 employees. Assessments are confidential, free of charge, and nonregulatory. There is no obligation to implement the recommendations given.
- **RETAP Student Internship Program:** Engineering students from participating Michigan universities are provided to small and medium size companies to work on projects that integrate P2 practices and technologies into existing manufacturing operations.
- **Technical Assistance:** Technical assistance engineers answer pollution prevention questions. They research new and innovative technologies and develop fact sheets and case studies that describe successful P2 approaches.
- **Recycling Assistance:** Program specialists assist companies in their recycling efforts using such tools as the Michigan Recycled Materials Market Directory, Recycled Products Directory, and Michigan Materials Exchange Service.
- **Compliance Assistance:** Environmental Assistance Program staff are available to explain your regulatory requirements and help you find alternatives that may save you money and still be in compliance.

10.1.3.b Financial Assistance:

The ESSD provides a number of financial assistance programs to encourage the adoption and diffusion of pollution prevention (P2) within the state.

- **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.
- **Other DEQ Grants and Loans:** There may be other financial assistance available depending on grant cycles and company activities and site conditions.

10.1.3.c Field Operations:

Field staff are located in district offices throughout the state to offer environmental assistance at the local level. Field staff work with businesses, trade associations, educational institutions, local governments, and public health agencies to increase the adoption of P2 practices and promote environmental incentive programs.

10.1.3.d Incentive Programs:

By participating in any of the following incentive programs, a business can receive well-deserved public recognition, customized assistance, and other benefits for pollution prevention (P2) efforts. Below are some of the incentive opportunities offered through the DEQ:

- **Agricultural Pollution Prevention Project:** This is a collaborative effort between the agricultural industry, independent farms, and the Departments of Environmental Quality and Agriculture to encourage agricultural facilities to undertake voluntary P2 efforts.
 - **Clean Corporate Citizen (C3) Program:** Any business meeting certain environmental performance criteria can be designated as Clean Corporate Citizens. In return they receive positive public recognition from the Governor's Office, the Director of the Department of Environmental Quality, appropriate Senators, Representatives, and local politicians, as well as community members, and are entitled to certain regulatory benefits.
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- The logo for the Clean Corporate Citizen Program features a stylized 'C' and '3' intertwined within a triangle, with the text 'CLEAN CORPORATE CITIZEN PROGRAM' below it.
- **Energy Efficiency, Bright Ideas, and Green Lights Programs:** The DEQ has partnered with the Department of Labor and Economic Growth Energy Office, Michigan Public Services Commission and Department of Transportation to identify various energy efficiency and energy conservation programs and resources available to the public, private business and municipal government.
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- The Green Lights logo shows a lightbulb with a flame inside, with the text 'EPA Green Lights' and 'an ENERGY STAR program' below it.
- **Environmentally Preferred Purchasing:** A program to promote the purchase and use of environmentally preferred products by the business community and state government.
 - **Food Processing Pollution Prevention Initiative:** This program focuses on promoting P2 opportunities throughout the food processing industry.
 - **Green Construction and Demolition:** This program focuses on promoting P2 opportunities and practices throughout the construction industry.
 - **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.
 - **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.
 - **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.
 - **Network to Green the Supply Chain Project:** A partnership between DEQ; the Michigan Manufacturing Technology Centers, the Environmental Protection Agency; the Green Suppliers Network; and others to provide technical assistance and services to improve environmental performance in small- and medium-sized businesses who supply larger original equipment manufacturing (OEMs) customers in Michigan.
 - **Education and Outreach:** Educational opportunities through workshops, seminars, and conferences are regularly provided 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. The ESSD 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.

10.1.4 Pollution Prevention Techniques for Food Processors

There are typical 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 ESSD at (800) 662-9278 for assistance.

10.1.4.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.

10.1.4.b Purchasing and Inventory Management

- Order products according to need. The cost associated with the disposal of surplus hazardous materials often exceeds the purchase price of the item.
- 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.

10.1.4.c Packaging, Shipping, and Containers

A look at transportation and packaging often leads to waste reduction opportunities. Below are a few simple ideas:

- Request deliveries shipped in returnable/recyclable containers.
- Transport products in returnable/recyclable containers if possible.

- Work with suppliers and customers to minimize or eliminate packaging.
- Purchase products in bulk to reduce packaging.
- Recycle packaging and waste by-products.

10.1.4.d Energy Usage and Efficiency

Energy use is often seen as a key area where operating costs can be significantly reduced. Achieving energy savings can be accomplished by changes in daily operations, maintenance practices, and worker habits. These simple changes typically have excellent financial returns because they can be implemented at little or no cost. Significant energy savings may involve investment in new equipment. If considering installing and operating an anaerobic digester to recover energy sources, see Section 3.6.4.d.5.

Basic energy efficiency opportunities include:

- Submeter energy usage for detailed information on how and where energy is used. Avoid peak usage periods, if possible, to reduce the cost of energy.
- Maintain equipment with ongoing maintenance programs.

Furnaces

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

Process Heat, Heat Recovery, and Heat Containment

- ✓ Enhance sensitivity of temperature control and cutoff.
- ✓ Recover waste-heat to heat portions of the facility.

Process Cooling: Cooling Towers and Chillers/Refrigeration

- ✓ Use a cooling tower instead of refrigeration when outside temperature allows.
- ✓ Use waste heat for absorption refrigeration.

Motors and Drives

- ✓ Develop an ongoing motor replacement program to upgrade existing motors to high efficiency motors. Where the power factor is not controlled elsewhere, choose replacement motors with high power factor.
- ✓ Use variable speed drives to control motors.

Compressed Air Systems

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

Electrical Power

- ✓ De-energize excess transformer capacity and increase the power factor by installing the proper combination of fixed and variable speeds.

Heating, Ventilation, and Air Conditioning (HVAC) Equipment

- ✓ Develop an optimal start/stop schedule for your HVAC system. Turn systems off or down during non-production times.
- ✓ Use a programmable thermostat.
- ✓ 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.

Lighting

- ✓ Remove two out of four tubes in fluorescent fixtures where lower light levels are acceptable. Disconnecting the ballast that operates these tubes will save even more energy.
- ✓ 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 lighting systems with metal halide, T8, sodium, or other high-output fluorescent system.
- ✓ Install reflectors or higher output lamps so more light is utilized.
- ✓ Install low-wattage, long-life, light-emitting, diode exit signs.
- ✓ Move light fixtures closer to vital operations (task lighting) and disconnect non-necessary fixtures.
- ✓ Use dimming controls where possible.
- ✓ Install occupancy sensors where possible.

Office Equipment

- ✓ When purchasing new equipment, buy the higher efficiency models. Equipment bearing the EPA “Energy Star” emblem is a good choice for energy efficiency. Also check the “Energy Guide” label included on many major appliances.

As shown in the table on the next page, there are many different kinds of P2 techniques. These techniques can be divided into categories, including process or equipment modification (primarily involving utilizing water conservation methods); operational and housekeeping changes; recycling/reuse; and material substitution and elimination. For the purposes of this document, each technique is placed under one of these categories.

Table 10.1.4 Overview of Pollution Prevention Techniques provides a look at several pollution prevention (P2) opportunities. It is important to remember that not every P2 technique will work at every food processing facility. You should compare and evaluate these P2 techniques to identify those that may help you meet your P2 goals. You will then need to try a select few to determine what works in your facility, but does not compromise the quality and safety of your product.

Consultation with the agencies regulating food safety is critical during the planning and evaluation of any pollution prevention technique(s) that you may adopt.

Table 10.1.4 Overview of Pollution Prevention Techniques

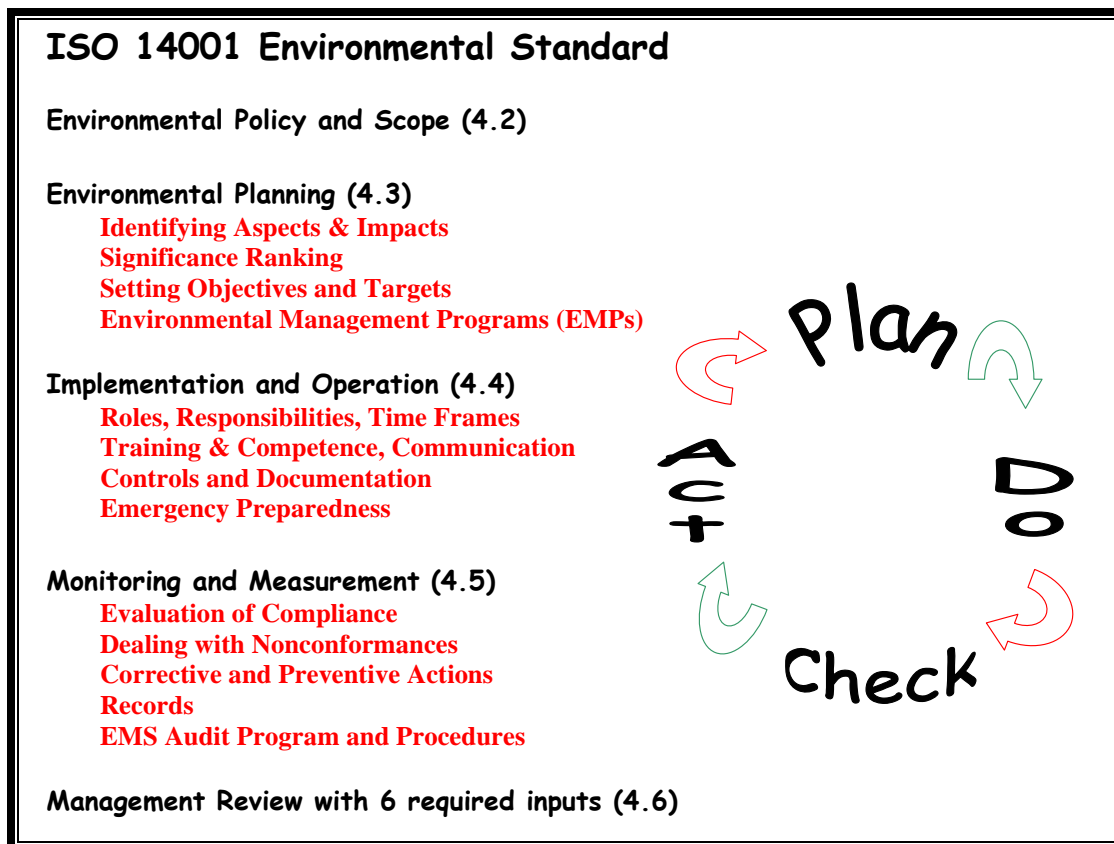
Type of P2 Technique	Technique	Process or Ancillary Activity	Ease of Implementation
Process/ equipment modification	Replacing traditional faucets	Receiving and preparation	Easy-Moderate
	Dry Caustic peeling of fruits and vegetables	Receiving and preparation	Difficult
	Water shutoff during breaks	Processing and filling	Easy
	Water control units	Processing and filling	Moderate
	Installing flow meters	Processing and filling	Easy
	Exterior area water use reduction	Storage and distribution	Easy
Operational and housekeeping changes	Placing catch pans under potential overflows/leaks	Storage	Easy
	Covering outside storage areas	Storage	Easy
	Inspections and preventive maintenance of potential discharge areas	Storage	Easy
	Secondary containment	Storage	Easy-Moderate
	Monitor liquid fill machines	Processing and filling	Easy-Moderate
	Covering outside drains during loading and unloading	Storage and distribution	Easy
	Covering inside drains (in non-production areas only)	Maintenance	Easy
	Cleaning prevention	Cleaning	Easy-Difficult
	Pre-cleaning and dry cleanup	Cleaning	Moderate
	Skim grease traps regularly	Cleaning	Easy
	Screening	Cleaning	Moderate
Minimizing pests	Cleaning	Easy-Moderate	
Recycling/reuse	Countercurrent washes	Processing and filling	Moderate
	Process water reuse	Processing and filling	Easy-Moderate
	Water recirculation units	Processing and filling	Moderate
	Water used to chill products	Processing and filling	Moderate
	Residuals management	Processing and filling, storage and distribution	Easy-Moderate
	Recycling refrigerants	Refrigeration	Moderate
	Reducing/recycling/reusing packaging	Processing and filling	Easy-Moderate
Material substitution and elimination	Laboratory inventory reduction	Laboratory	Easy
	General inventory control	Purchasing	Easy
	Using alternative refrigerants	Refrigeration	Moderate

10.2 Eco-Efficient Systems

An eco-efficient system provides you with a consistent structure for overseeing your business. You make the decisions on what to manage based on your business needs and available resources. The idea is to integrate environmental factors into the daily decision making to reduce risks and increase efficiency.

10.2.1 What is an Environmental Management System?

There is no one type of system, but there are standards or formats that you can follow. The most well-known and widely Environmental Management System (EMS) standard in the United States is the ISO 14001 standard. 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. All EMS standards have these same basic components, which are identified below.



Implementation of a management system does not substitute for compliance with environmental regulations but can improve your compliance record and help you address issues that are not covered by regulation. In short, a consistent approach to managing your business leads to success.

10.2.2 What are the benefits of developing an eco-efficient system?

Developing and implementing an eco-efficient system helps you bring environmental factors into daily business decisions. In so doing, you are well on the way to an economically thriving business. In case after case businesses report the following:

- ✓ **Reduce costs** –Improvements in operating efficiency lead to reduced costs and avoidance of potential risks.
- ✓ **Assume a competitive advantage** – There is an expanding “green” market in the world. Using an eco-efficient system demonstrates that your business cares about the environment.
- ✓ **Improved image with stakeholders** –Your neighbors, local politicians, environmental regulators, and community groups will recognize your efforts.
- ✓ **Enhance regulatory compliance** – A systematic approach to management can help improve regulatory compliance and reduce liability from noncompliance. The adoption of procedures and work instructions and additional training programs typically adds stability to business operations.
- ✓ **Improve environmental performance** – The systematic identification of potential environmental impacts and continual improvement goals will ultimately lead to improved performance, a cleaner environment, and a sustainable community.

10.3 Eco-Environmental Self-Assessment Guide for the Fruit & Vegetable Industry

The following checklist is designed to test performance in pollution prevention, waste reduction and recycling. It is not an assessment of compliance with environmental regulations. The purpose of this self-assessment is to lay the framework design an eco-efficient system to manage your business while exploring opportunities that will benefit you and the environment.

Note: All pollution prevention activities should be carried out in accordance with food safety requirements and regulations.

Review each question and check the appropriate box. A “yes” answer indicates that you have considered environmental measures in your day-to-day operations. Should you check “no” or “???” , make notes or generate some questions to further research opportunities to improve in that area. If the question does not apply to your facility, simply write “na” in one of the columns.

10.3.1 Reduce, Recycle and Prevent Packaging Waste

	Yes	No	???	Comments
Have you conducted a waste audit identifying the types and amounts of waste generated on-site; locations and reasons why they are generated; cost of disposal; and economical waste reduction solutions? See Section 2.1.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Have suppliers been encouraged to offer products with reduced or minimal packaging?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Have suppliers been encouraged to offer products with reusable packaging?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
If you ship products, have returnable and reusable containers, or the use of fewer layers of packaging materials, been considered?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Do you inspect all shipments of materials at the time of delivery and return unacceptable and damaged materials to the supplier?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Do you choose products that come in reusable packaging, concentrated forms or that are offered in bulk quantities?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Do you date all food products and use the first-in, first-out method of inventory control?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Are all containers and packages clearly labeled to indicate contents, storage, handling and expiration dates?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Does a waste reduction program exist that outlines policies and procedures for dealing with waste and assigns responsibilities for all waste-related activities?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Is waste reduction training given to all employees? (Training should be repeated on a regular basis and provided for all new employees. It should include waste awareness, the impact of various food wastes on the wastewater stream and proper waste-handling methods.)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Are employees trained in the concepts of pollution prevention and how to perform their jobs in order to reduce waste and promote recycling?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Do you purchase smaller containers of infrequently used materials?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Are metals, paper, glass, and plastic segregated for recycling?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Are your packaging materials and other supplies made from recycled materials?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Are paper products such as toilet paper, paper towels, napkins and bags made from recycled paper?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Do you have recycling containers conveniently located in the employee eating area for their use?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Have reusable trays, dishware and silverware been substituted for disposable products?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Do you use refillable dispensers for ketchup, salt, mustard and other condiments?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Is the grease from pots, pans, grills, and deep fat fryers kept out of drains and handled separately? See Section 2.4.9.o	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	

10.3.2 Composting and Land Spreading

	Yes	No	???	Comments
Have you considered on-site composting of organic materials? See Section 2.2.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
If on-site composting is not possible, have you considered collecting and sending organic wastes to a composting facility? See Section 2.2.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Have you considered land spreading of organic wastes which would keep them out of the landfill while enhancing soil conditions? See Section 2.2.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	

10.3.3 Food Processing Operations and Cleanup Procedures

	Yes	No	???	Comments
Have the types and amounts of edible and inedible food waste that is generated at your facility been determined?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Are excess edible foods kept separate from inedible food wastes and routed to a local food bank or food donor program?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Are inedible food wastes used for composting or land spreading and kept separate? See Section 2.2.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Have you considered using dedicated mixing lines for certain products to reduce change-over cleanups?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Does spillage occur from overfilling or mixing activities?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
To prevent waste product from entering drains and to reduce the use of cleanup materials, are catch basins being used for collection?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Are bins or containers available for inedible food waste?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Have opportunities been explored for recirculating clean rinse water (i.e. collecting rinse water for use as a prewash for the next cleaning cycle.)?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Are there screens on floor drains to prevent the release of food by-products to the sewer? See Chapter 3.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Prior to the use of water for cleanup, do you use dry cleanup procedures (i.e. scrapers, shovels, brooms, squeegees, or absorbents) to prevent the bulk of food materials from being washed down drains? (Food materials discharged to the sewer can cause an increase of biological oxygen demand (BOD) to wastewater. The higher the BOD level, the more wastewater treatment is required, which increases your costs.) See Chapter 3.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
When water is needed for cleanup, are high-pressure spray washes used in order to conserve water?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Are hoses that are used for cleanup equipped with nozzles enabling easy shut off?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Have either non-toxic or less-toxic cleaning supplies been identified? And are they used?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	

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When detergents/cleaners are needed, have you explored the possibility of using one multi-purpose cleaner rather than several different cleaners that are job specific?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
If you discharge to a municipal sewer, have you contacted the local wastewater treatment plant for possible requirements concerning grease trap management? See Section 2.4.9.o for grease trap waste disposal.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Have you determined whether your facility is required to have a National Pollutant Discharge Elimination (NPDES), groundwater discharge permit, or storm water discharge permit? See Chapter 3.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	

10.3.4 Preventative Maintenance

	Yes	No	???	Comments
Are storage and work areas clean and well organized?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Are procedures and equipment in place to prevent raw material or products spills from occurring in outside areas? See Chapter 6.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Is there loss of product due to improper or malfunctioning equipment (i.e. leaking lines, pumps, valves)?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Is equipment such as refrigerators, freezers, or air conditioners checked and serviced on a regular basis to avoid breakdowns and reduce energy costs? See Section 6.2.5 for related risk management program.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Can lighting or refrigeration systems be upgraded to increase energy efficiency?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Do you have a water conservation program which includes items like shutting off water during breaks to prevent it from being left on while unattended?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Have all leaks in pumps, piping, valves and tanks been repaired to conserve water?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Are storage containers for food material (i.e. waste, product or raw material) rigid, watertight and rodent proof?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Is your outside storage area for waste containers, product storage bins or cleaning chemicals covered and paved to reduce cleanup and potential discharges to storm drains? (This can be accomplished by constructing a roofed storage area or use of secondary containment.) See Chapter 2.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
In your outside storage area for products chemicals and waste designed to prevent runoff into storm drains? See Chapter 4.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Have you considered storing materials inside a building?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Are dumpsters and compactors inspected for leaks?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Have all employees been trained in spill and incident prevention? See Chapter 6.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	

10.3.5 Pesticide Use

	Yes	No	???	Comments
Have you developed and implemented an integrated pest management plan that reduces to the greatest extent possible the use of chemical pesticides?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Have all employees been trained on integrated pest management policies and procedures?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Is it possible to reduce the amount of pesticide applications and/or use nonchemical pest control methods?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Are the food preparation and storage areas within the facility clean and free from residues that would attract or harbor pest infestations?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Have all the structures on the premises been inspected to identify needed repairs that could reduce or prevent pest infestations?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Have litter, waste refuse and uncut weeds and grass within the immediate vicinity of the buildings been removed to reduce rodent and insect populations?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Is there proper water drainage around the building to prevent breeding conditions for insects?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Have unwanted pesticides and rodent control products been properly disposed of? See Section 2.4.1.c	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	

10.4 Pollution Prevention Case Studies

RETAP Intern P2 Case Studies in the Fruit & Vegetable Industry

PEARSON FOODS CORPORATION, Grand Rapids, Michigan
 Project Title: Water Conservation Project

Pearson Foods Corporation operates a number of food processing, alfalfa, and bean sprout growing operations that are water intensive. Pearson Foods implemented an employee training program consisting of work practice standards that reduced water consumption by 5,000 gallons per day, with associated cost savings of approximately \$8,000 per year. They also installed an electronic eye on one of the production lines used to package carrots and celery sticks that actuated a water valve to shutoff water when the packaging process was interrupted. The installation reduced water consumption by 2,500 gallons per day, with an associated cost savings of \$3,500 per year.

In addition, instead of sending the cardboard shipping materials to the landfill as solid waste at a cost of \$76 per ton, they instituted a recycling program. Now, the recycler pays the company \$35 per ton for the corrugated material, resulting in a combined cost savings and net profit of \$32,000 per year.

BIRD'S EYE FOODS, Fennville, Michigan

Project Title: Reduced Water Consumption and Biological Oxygen Demand (BOD) Loading

Bird's Eye Foods is a cannery located in Fennville, Michigan. The company processes pie fillings and vegetables that are packaged in a variety of media (cans, laminated pouches, etc.) for regional distribution. Their major operations consist of cookers, fillers, storage containers, pneumatic transport stations, hydro sieves, and other related equipment.

To reduce water consumption, they began by conducting a water balance study and established baseline water consumption data and actual needs throughout the plant. The study identified excessive water users and recommended flow adjustments that did not sacrifice production performance.

In addition to the study, they conducted preliminary design work for a closed loop cooling tower that allowed the recirculation of water with the potential of significant water/cost savings. Projected construction costs for the project were approximately \$110,000 with an anticipated pay-back of approximately 19 months.

Another area of concern identified by the company was the wastewater discharge and treatment system consisting of a series of lagoons and spray irrigation fields. High BOD levels were detected in the discharged water. They identified a number of pump seal leaks which were contributing to high BOD loading. By repairing the leaks the company saved approximately \$40,000 per year in treatment costs.

MICHIGAN STATE UNIVERSITY – EXTENSION, Grand Haven, Michigan

Project Title: Compost Tea Project

The MSU, Ottawa Extension Office located in Grand Haven, Michigan, researched, designed, and tested an innovative method to prevent fungi growth from destroying various types of apples. This project is an innovative approach to assist farmers with new technology that promotes P2 Best Management Practices for agricultural related activities.

The results of the study determined that a compost tea could be used as a substitute to chemical fungicides. Michigan is ranked as the third largest apple producing state in the country; an industry that contributes over \$500 million a year to Michigan's economy. Up to 5 percent (\$2.3 million) yield loss is associated to apple scab and powdery mildew. Past practice for preventing fungi growth required application of hazardous chemicals that can cost over \$600 per acre. The cost of using compost tea is roughly \$25 an acre.

With today's trend of developing farm land into housing projects, human exposure due to wind drifts (skin contact, inhalation, or ingestion), and ground and water contamination are of growing concern. Compost tea is a cost-effective, natural alternative to fight fungus without the risks of human hazard.

GERBER PRODUCTS COMPANY, Fremont, Michigan

This case study can be found on the Michigan Department of Environmental Quality web site located at www.michigan.gov/deq

WHERE TO GO FOR HELP

SUBJECT: Pollution Prevention Field Program
Food Processing P2 Program
Food Processing P2-E2

CONTACT: DEQ, Environmental Science and Services Division
Laura Rauwerda (616) 356-0034
http://www.michigan.gov/deq/0,1607,7-135-3585_4127_11417---,00.html

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

CONTACT: DEQ, Environmental Science and Services Division
Kelie Bond (517) 241-7969
www.michigan.gov/deqc3

PUBLICATIONS: Environmental Management System Guidance Manual

SUBJECT: EMS Standards

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

Registrar Accreditation Board (RAP)
(888) 722-2440
www.anab.org