



Pollution Prevention Fact Sheet

DEVELOPING A FACILITY PLAN

COMPONENTS OF A POLLUTION PREVENTION ASSESSMENT

The guidance presented in this fact sheet is not intended to be extensive instruction for each step of the pollution prevention planning process. Rather its purpose is to help the reader determine what information or analysis must be considered or included in a comprehensive pollution prevention assessment report – but it will describe how to do so in only a limited fashion.

1.0 Organize the Planning Process:

1.1 Pollution Prevention Coordinator. Pollution prevention is the responsibility of every employee at the facility, and every departmental function can contribute to these efforts. Therefore, in organizing the planning process an internal pollution prevention coordinator should be appointed to establish one or more cross-functional teams whose responsibility is (either solely or coincidentally) pollution prevention.

1.2 Role of Coordinator. *The pollution prevention coordinator* should serve as the leader of a pollution prevention team in facilitating the planning and implementation effort. This individual should be a consensus builder, and needs to be familiar with pollution prevention principals, and knowledgeable about the facility's processes. Furthermore, the coordinator should have some authority to commit resources toward investigating and evaluating pollution prevention opportunities and implementing projects.

The coordinator's responsibilities should include leading the development of the written plan, documenting the goals, and monitoring and tracking progress.

1.3 Pollution Prevention Team. The pollution prevention team should include representatives from the following functions: environmental, purchasing, engineering, maintenance, finance, and operations; it should also be given the authority to call upon other technical experts as necessary for specific support including the Florida Department of Environmental Protection Pollution Prevention Program engineers or district program coordinators. The team should be representative of both salaried and hourly employees.



2.0 Develop a Written Plan

2.1 Pollution Prevention Assessment Report. A Pollution Prevention Assessment Report, also referred to as a waste audit report, should consist of the following elements:

I. Waste Stream Assessment (see 2.2)

- A. Process map(s) of current processes and activities (see 2.2.1)
- B. Materials Accounting Summary (see 2.2.2)
- C. Written description for each process unit or activity identified in process map

II. Pollution Prevention Opportunities Assessment (see 2.3)

- A. Written description of each opportunity identified
- B. Prioritized summary of technically and financially feasible opportunities
 1. Opportunity's potential impact on the environment
 - a) *Potential material and emission reductions because of opportunity*
 - b) *Potential material and emission increases because of opportunity*
 2. Opportunity's potential impact on worker safety
 3. Estimated cost of implementing opportunity

A waste stream assessment provides baseline information on current facility processes and activities, and their associated waste streams. An opportunity assessment, should provide a comprehensive list of environmentally beneficial projects that may also improve process efficiency.

2.2 Waste Stream Assessment. The fundamental building block for identifying pollution prevention opportunities is a complete multimedia waste inventory that is keyed to the processes, activities, or events that generate wastes. This formal review of all potential waste streams and data collection process is called a waste stream assessment. Some form of analysis and accounting for waste generation is a component of nearly all federal and state planning provisions.

2.2.1 Process Mapping. A process map is a graphic representation of all inputs (raw materials, water, and energy) and outputs (products, emissions, byproducts, energy, and heat) to production, operations, and maintenance processes. All point and fugitive sources of air emissions, water discharges, and sludges or solid waste, as well as recycled materials, can be illustrated on a process map. Once this information has been documented, the process map can be used to identify opportunities to prevent pollution. Figure 2.2.1 depicts a typical process map.



Process maps should include the following information:

- all inputs and outputs of each production process;
- In-plant recycling systems;
- material storage and handling systems;
- wastewater treatment or pretreatment systems and points of discharge
- air emissions (stack or fugative) and any associated control equipment; and
- final disposition (landfill, hazardous waste landfill, fuel blending, off-site for reclamation, or recycle).

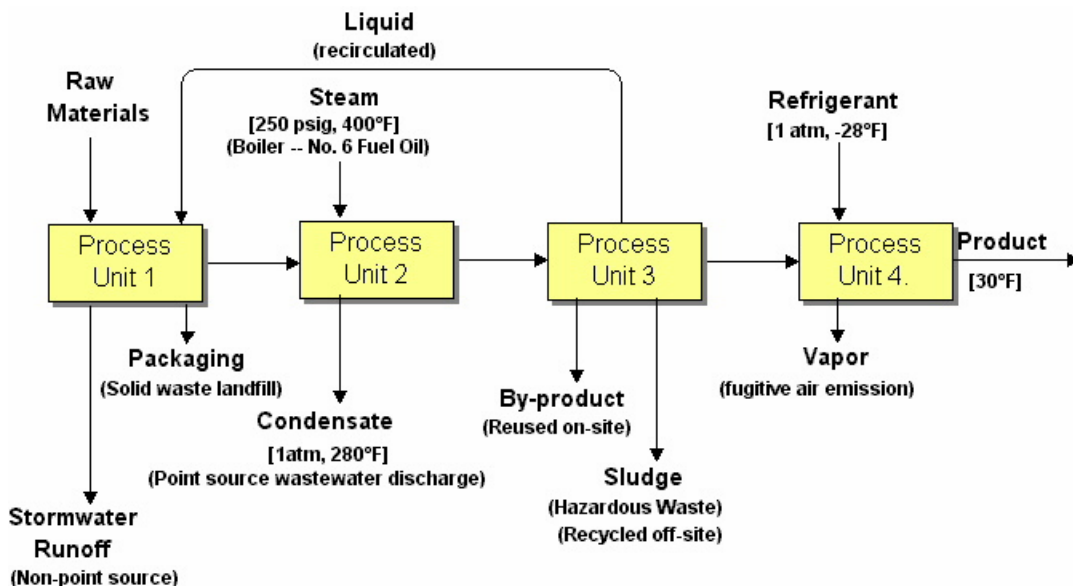


Figure 2.1.1 – A sample process map.

2.2.2 Materials Accounting Summary. Materials accounting is the most important and most complicated activity of the pollution prevention planning effort. In simple terms, it is a procedure for identifying and quantifying materials used in a process. It goes beyond preparing a simple chemical inventory, by accounting for how each material is received, handled, stored, used, reused, and released. Data for materials accounting can be compiled using direct measurement (flow meters, weigh scales, and QC/QA laboratory tests), business records (purchasing records, sales records, waste manifests, and operating reports required by regulatory agencies), mass balances, or engineering calculations. Depending on the complexities of the processes, this task can become the most intensive of the entire planning project. Thus, the team must include someone with a thorough working knowledge of the processes under consideration.



Use the process map and materials accounting to identify the following information for each chemical and production process covered by applicable planning requirements:

- chemical identity, total quantity, and quantity normalized for production rates (quantity per unit of production) for raw materials, byproducts, and emissions released to the air, water or land;
- identity and quantity of products of each manufacturing process;
- fate of each byproduct and emission, including quantities (for byproducts, include amounts recycled, treated, or disposed of on-site; for emissions, include amounts released to the air, water, or land, amounts transferred off-site to be recycled, disposed, or treated, and amounts disposed of on-site); and
- generation or release rates of byproducts, emissions, and products.

2.3 Pollution Prevention Opportunities Assessment. The process of developing detailed process maps provides an opportunity to identify all inputs (raw materials, water and energy) and outputs (products, emissions, wastes, byproducts, energy,

heat) of production, operations, and maintenance activities. This information is particularly useful for identifying pollution prevention opportunities.

2.3.1 Identification of Opportunities. The opportunity assessment should focus on prevention not only at all points in the process and within the production units, but also relative to targeted chemicals and wastes. During this phase, the coordinator is encouraged to utilize a variety of resources to help the team identify potential solutions. Internal resources may be available within the team's own facility or at another corporate facility or headquarters. External sources include FDEP Pollution Prevention Program's resource center at (850) 488-0300, as well as trade associations, consultants, academia, and technical journals.

Identify as many potential solutions as possible, including process modifications, procedural changes, raw material substitution, technology modifications, product redesign, reuse and recycling, and other chemical management opportunities. Be sure to consider actions and controls that can be implemented at various stages of the product life cycle. In this way, facility management can achieve pollution prevention prior to the process operations or prior to the raw materials entering the facility. Table 2.3.1 represents some examples of pollution prevention techniques that can be implemented at various stages of a product's life cycle.

Table 2.3.1 – Pollution prevention in each stage of a product's life cycle.

Stage	Action or Control	Examples and Comments
Design	Avoid Using undesirable materials Design out toxics and hazards Substitute lower-risk materials Redesign product or process Design for disassembly	Water-based vs. solvent coatings Alkaline vs. cyanide electroplating Aqueous vs. solvent metal cleaning Plastic vs. painted metal parts Metal vs. plastic parts
Procurement	Environmental review before ordering Approved materials only Minimize inventories Order recyclable/reusable packaging Obtain proper purity materials	Prevents compliance issues Avoids waste disposal problems No "expired" material disposal Returnable shipping cases
Receiving, Storage, Distribution	Assure labeling of all containers Limit number of storage areas Limit number of material transfers	Unknowns become wastes More control Less opportunity for spillage and waste
Manufacturing	Conserve raw materials Minimize use of water and utilities Conserve energy Automation improvements	Recovery systems, closed loops Flow restrictors, regulators Higher efficiency equipment and lighting
Waste Management	Reclaim Recycle Sell or trade Segregate	Solvent distillation Paper, glass, metals, plastics, etc. Waste exchange Keep valuables out of trash; keep nonhazardous wastes out of hazardous waste

2.3.2 Prioritization of Opportunities. Once the team has identified possible ways to eliminate or reduce wastes, they should then prioritize the projects to determine which can be implemented and which require further evaluation. In considering alternatives, the team should keep in mind the

Florida Department of Environmental Protection's waste management hierarchy -- that is, place the highest priority on solutions involving source reduction, followed by in-process or on-site recycling, with off-site recycling and treatment techniques considered as a last resort. If the reader is writing a pollution prevention report to meet the terms and conditions of a consent order, other recycling and treatment techniques are not an option.

2.3.3 Evaluation of Opportunities. At this point, the team must begin to evaluate the different pollution prevention opportunities on their own merits, against one another, and against the current situation. Within most businesses there is competition for available resources, requiring the team to prioritize the facility's needs based on both a technical and financial evaluation. Pollution Prevention projects must be technically and economically feasible.



As the team explores potential solutions, document those that the team seriously considers. Such records can serve multiple functions. For example, they can serve as a basis for documenting associated business costs and savings; they can indicate whether a decision was made to proceed with the project, and explain the reason for not proceeding with a project (this could save future team members considerable work; and they can be used to document the assigned priority of the project).

2.3.3.1 Technical analysis. The technical analysis phase of the assessment should help the team anticipate any technical barriers to implementing projects under consideration. The team will need to gather information about the facility's operations, and do considerable research on the equipment or materials to ensure that the project will work in a specific application. Typical questions to ask as part of the technical evaluation:

- Will it eliminate or reduce waste?
- What is the track record of the equipment and the vendor?
- What are potential adverse effects of other production machinery or processes?
- What are potential affects on product quality?
- What changes in utilities will be necessary?
- What training will be required?

2.3.3.2 Financial Analysis. There are often hidden costs not frequently captured in routine economic analyses, but which can significantly contribute to either the cost of maintaining the current situation or to the potential savings associated with alternative projects. Table 2.3.1.2 outlines potential investment and operating costs associated with pollution prevention projects.



There may be circumstances where the potential savings associated with an alternative are so obvious based on only a limited set of factors (e.g. avoided disposal costs) that it would be unnecessary to develop all relevant costs. On the other hand, there may be circumstances in which the economic benefits of a

potential project may not be fully understood unless a more prescriptive methodology is followed.

Table 2.3.1.2 - Investment and operating costs associated with pollution prevention projects.

Investment Costs	Operating Costs	
<i>Equipment* and Startup</i>	<i>Direct Costs or Savings</i>	<i>Indirect Costs or Savings</i>
New Process Equipment Monitoring Equipment Protective Equipment Floor Redesign And Preparation Equipment Removal Or Sale Structural And Electrical Changes Utility Connection/Systems New Training	Direct Labor (Compensation and Benefits) Worker Compensation Claims Raw Materials Operating Supplies Utilities Permitting Insurance Fees and Taxes Equipment Maintenance Outside Lab Services Waste Treatment Supplies Hazardous Waste Disposal NonHazardous Waste Disposal Depreciation Tax Savings	Tooling Requirements Material Handling Notification of Incidents Reporting and Recordkeeping Manifesting and Labeling Inspecting and Monitoring Training Medical Surveillance Emergency Preparedness Waste Storage
* Including Installation		

This fact sheet has been assembled by Florida's Pollution Prevention Program, a free, non-regulatory service to help industries prevent pollution at the source while saving money. Confidentiality can be requested for proprietary and financial data. For additional information, contact the Pollution Prevention Program c/o the State of Florida Department of Environmental Protection, 2600 Blair Stone Road, Tallahassee, FL 32399-2400, or call 850-488-0300 (fax 850-921-8061).

