A G U I D E T O

# POLLUTION PREVENTION

P L A N N I N G

## Meet the Requirements of the Waste Reduction Policy Act

*Save Money, Reduce Risks, and Eliminate Waste*

TEXAS COMMISSION ON ENVIRONMENTAL QUALITY

RG-409 (4/04)

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T E X A S C O M M I S S I O N O N E N V I R O N M E N T A L Q U A L I T Y

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# Contents

# Introduction

The Waste Reduction Policy Act (WRPA) of 1991 was adopted by the Texas Legislature to reduce the volume, toxicity, adverse public health, and environmental effects of pollutants in Texas. WRPA is contained in the Texas Health and Safety Code, Sections 361.501–361.510. Rules implementing WRPA are found in Title 30 of the Texas Administrative Code (TAC) Sections 335.471–335.480 (see Appendix A). The Texas Commission on Environmental Quality (TCEQ) administers these rules.

Waste reduction is a policy mandated by the U.S. Congress in the 1984 Hazardous and Solid Waste Amendments to the Resource Conservation and Recovery Act (RCRA). This and other RCRA provisions have led to significant increases in waste management and decreases in hazardous waste generation and toxic contaminant releases.

## WHO SHOULD READ THIS GUIDE

This guide is intended for use by all WRPA reporters, including:

- Large quantity generators (LQGs) of hazardous waste
- Small quantity generators (SQGs) of hazardous waste
- Toxics Release Inventory (TRI) Form R reporters

## HOW TO USE THIS GUIDE

The guide will lead you through the following processes:

- developing a pollution prevention program for your facility,
- writing your Pollution Prevention (P2) Plan and Executive Summary, and
- completing Annual Progress Reports (APRs).

If your facility is already incorporating pollution prevention activities into plant operations, but does not currently have a P2 Plan in place, the planning process will be useful in documenting existing activities and developing new projects for your plan. If you have a current P2 Plan in place, you may use this guide to verify that all required elements have been covered in your plan, or to guide you through the process of preparing a plan, submitting the Executive Summary and filing Annual Progress Reports.

## HOW TO GET ASSISTANCE

The Pollution Prevention Industry Assistance Section (PPIA) of the TCEQ provides guidance and technical assistance to companies that must comply with WRPA. Our goal is to help companies find innovative approaches to waste reduction and management, while saving them time and money, and promoting sustainable economic growth.

PPIA strives to assist companies in maintaining compliance and reducing waste by offering educational workshops, access to our Web site (**www.P2Plan.org**), P2 technical assistance over the phone, and nonenforcement site assistance visits (SAVs). You can contact our team at 512/239-3100 if you don't understand a WRPA requirement, or need help finding ways to reduce waste.

## WHAT THIS GUIDE COVERS

This guide discusses the Texas Pollution Prevention Planning laws and takes you through every step of the Pollution Prevention Planning process, including the most difficult part; developing pollution prevention projects that will reduce waste and save money.

The guide also includes forms for documenting your P2 Plan and the progress of the P2 Plan. Since the law does not require you to submit a required form of your P2 Plan, it contains the rule that lays out each of the requirements and an example of a P2 Plan that does not use the forms.

### List of Acronyms

| | |
|---|---|
| APR | Annual Progress Report |
| CESQG | conditionally exempt small quantity generator |
| CFR | Code of Federal Regulations |
| EMS | environmental management system |
| EPA | Environmental Protection Agency |
| HAP | hazardous air pollutants |
| MSDS | Material Safety Data Sheets |
| LQG | large quantity generator |
| P2 | pollution prevention |
| RCRA | Resource Conservation and Recovery Act |
| SAV | site assistance visit |
| SR/WM | Source Reduction/Waste Minimization |
| SQG | small quantity generator |
| TCEQ | Texas Commission on Environmental Quality (formerly TNRCC) |
| TNRCC | Texas Natural Resource Conservation Commission |
| TRI | Toxics Release Inventory |
| VOC | volatile organic compound |
| WRPA | Waste Reduction Policy Act |

CHAPTER 1:

# Preventing Pollution

**Why Should You Read This Chapter?**

- Discover why pollution prevention is the preferred strategy for waste management.
- Determine if the Waste Reduction Policy Act applies to you.
- Learn how to use your required P2 Plan as a stepping stone to an environmental management system.

Since its inception in the early 1990s, the Waste Reduction Policy Act (WRPA) has proven that successful pollution prevention begins with planning and a strong commitment to waste management. The first group of facilities to comply with WRPA reduced hazardous waste generation by 25 percent.

Nearly half the compliant facilities reported cost savings of over $40,000 each year. By contrast, facilities without P2 Plans have increased hazardous waste generation by 7 percent. The conclusion was obvious: P2 Planning reduces waste and saves money.

Since then, facilities throughout the state have used pollution prevention planning to reduce the state's overall generation of hazardous waste and toxic chemicals. According to the WRPA reports submitted by facilities from 1993 to 2001, Texas companies have reduced the amount of hazardous waste generated by more than 76 million tons. They also prevented the release and transfer of over 400 thousand tons of toxic chemicals. Hundreds of case studies show how facilities' innovations in P2 have resulted in pollution reduction and monetary savings by decreasing waste.

There are many reasons to develop a Pollution Prevention Plan that reduces waste generation and toxic releases and transfers to the environment. Six important reasons to practice pollution prevention are:

- Economic incentives—it saves money.
- Paperwork reduction—it reduces your regulatory burden.
- Reduced liability—it lowers your risk.
- State requirements—it's the law in Texas.
- Increased public awareness—it's the right thing to do.
- Improved human health and the environment—it's our future!

## WHAT IS POLLUTION PREVENTION?

The Texas Solid Waste Disposal Act describes a preferred order of waste management strategies, known as the waste management hierarchy.

The waste management hierarchy applies to both hazardous and nonhazardous waste. This guide focuses on the most preferred categories: source reduction, recycling or reuse, and forms of treatment that neutralize or detoxify a hazardous waste.

*The Texas definition of pollution prevention highlights source reduction and waste minimization as strategies for preventing pollution.* These definitions are found in 30 TAC Chapter 335, Subchapter Q.

**Waste Management Hierarchy**

- Source reduction (most preferred)
- Recycling and reuse
- Neutralization—Treatment to destroy hazardous characteristics
- Detoxification—Treatment to reduce hazardous characteristics
- Underground injection
- Land disposal (least preferred)

**Source reduction—** any practice that "reduces the amount of any hazardous substance, pollutant, or contaminant entering a waste stream, or otherwise released to the environment (including fugitive emissions) prior to recycling, treatment, or disposal."

**Waste minimization—**any practice that "reduces the environmental or health hazards associated with hazardous wastes, pollutants, or contaminants. Examples may include reuse, recycling, neutralization, and detoxification."

Under Texas pollution prevention (P2) planning requirements, source reduction and waste minimization projects must address all activities that generate reportable hazardous wastes and/or TRI chemicals. You may also address other wastes, such as water use, solid waste, emissions, and energy consumption. Evaluation of your other wastes can increase your savings through reduced operating, recycling, and disposal costs.

**Source Reduction Success**

A wooden counter top manufacturer in Bryan, Texas, was using solvent-based glue to adhere plastic laminate to wooden counters. By switching to a water-based glue with the same convenient dry time and strength, they eliminated volatile organic compounds (VOCs) and hazardous air pollutants (HAPs) and saved $17,600 a year in hazardous waste disposal costs.

Source reduction occurs as a result of a pollution prevention project. Reportable pollution may be reduced due to plant closures, decreases in production, or regulatory changes, but these types of events are not source reduction. Source reduction only occurs when you make a change to your plant that allows you to do the same thing with less pollution.

## WHY P2?

Pollution prevention offers many benefits to both the environment and to businesses.

### P2 Is Texas Law

Texas state policy on pollutants and contaminants is to reduce pollution at its source and to minimize the impact of pollution, thus reducing the risk to public health and the environment. WRPA is a law that helps Texas achieve that goal.

Noncompliance with WRPA and other environmental laws can result in serious penalties and fines.

### P2 Is Paperwork Reduction

The paperwork required for environmental reporting and record keeping can be extensive. Generating and releasing large quantities of hazardous wastes and toxic chemicals result in increased permit requirements. This paperwork can cost you time and money.

Fortunately, as you lessen environmental impacts, you can also reduce—even eliminate—many reporting requirements. Integration of P2 techniques may even help you drop below reporting thresholds for other requirements.

**Lone Star Success**

An East Texas manufacturer estimates that one month of P2 Planning saved the business four months of paperwork for Title III and Title V regulatory programs. By following the P2 Planning process for both TRI and hazardous waste, and by targeting projects that reduced volatile organic compounds (VOCs), they avoided triggering reporting thresholds of the two regulatory programs, saving valuable time and money.

#### *Reduction of Hazardous Waste Regulatory Requirements*

If your facility reduces hazardous waste generation enough to change generator status, you may reap even greater benefits. For example, if your facility is a large quantity generator (LQG) and becomes a small quantity generator (SQG), you may benefit from increased storage time and fewer pollution prevention requirements (see Chapter 2 for details on WRPA requirements). If your facility is already an SQG, your WRPA regulatory burden could be eliminated by becoming a conditionally exempt small quantity generator (CESQG).

It pays to be aware of your generator status and to try to reduce it to a lower level. As you switch to less hazardous materials, incorporate cleaner processes, and reduce your overall environmental impacts, you can reduce your regulatory burden.

#### *Reduction of TRI Requirements*

Those who report on the EPA's TRI Form R can also reduce paperwork through P2 planning. Each reportable TRI chemical requires a separate Form R. If your facility reduces reportable chemicals that are managed or released to levels that are below the reporting thresholds, you may be able to use Form A. It is significantly shorter and easier to complete and is not required by WRPA. For more information on TRI, see "What is Toxics Release Inventory" in Chapter 2.

No matter what type of waste you generate, release, or transfer, you will find that integrating the planning process into facility operations helps you find ways to reduce or even eliminate the need to report hazardous waste and TRI under WRPA. In fact, a facility with a TCEQ-approved environmental management system (EMS) can opt out of WRPA planning and annual reporting.

### P2 Saves Money

Pollution control and waste management cost you money. Hundreds of facilities have proven that preventing pollution at its source saves industry millions in operating costs and has a quick payback period. Pollution control, which is often more expensive to implement, almost never pays for itself, and rarely reduces operating costs.

Despite this trend, many companies are reluctant to try innovative P2 ideas, and often choose expensive pollution control methods over money-saving reduction efforts. When all critical decision-making factors are taken into account (see Chapter 6) during the P2 Planning process, companies are able to make better management decisions, and they begin saving money almost immediately. Texas facilities have reported big savings from developing practical Pollution Prevention Plans under WRPA.

**WRPA P2 Plans Work**

An independent survey of Texas facilities with WRPA P2 Plans indicates:

- 80 percent considered the plan to be useful to their facility.
- 77 percent broke even, or had a cost savings due to P2 projects.
- 48 percent had a net cost savings of more than $40,000 per year from P2 projects.
- 33 percent of LQGs expect to become CESQGs over the next three years!

### P2 Reduces Your Risk

Once your facility generates a hazardous waste, you are legally responsible for the proper management of that waste forever. Federal and state laws target hazardous waste generators as being at least partially responsible for the cleanup of wastes that leak from disposal sites.

Hazardous chemicals pose immediate health concerns because they are caustic, flammable, or have some other hazardous characteristic. Even a small spill of some chemicals can contaminate the groundwater and lead to costly remediation projects. By reducing your handling of toxic chemicals, you can:

- reduce your long-term liability and health and safety risks;
- avoid using off-site treatment, storage, or disposal that could cause financial liability when operators mismanage waste and design improper disposal facilities;
- gain better insurance options, which may not be available to high-risk facilities with higher treatment and disposal costs;

- reduce your expenses by reducing the cause of your liability—your hazardous waste and toxic releases and transfers.

### P2 Is the Right Thing to Do

With the availability of the Internet, the public is more informed than ever before about environmental issues. People are more aware of the potential effects that hazardous waste and other forms of pollution can have on their health.

Under Texas state law the public has the right to participate in any hearings your company may have in the future. This includes permit hearings, which can significantly delay, or even prevent, the issuance of a permit. Therefore, companies that are environmentally aware and work toward waste reduction can improve their working relationship with the public, their neighbors, and their customers. In addition, pollution prevention allows you to profit while doing the right thing.

Following is a summary of the benefits of voluntary P2 Planning:

- improves your company's environmental image;
- shows regulators and the community that you care about compliance with Texas laws and the environment; and
- protects our health and our environment.

**Lone Star Success**

A Nuevo Laredo facility worked through its vendors to receive 90 percent of all chemical deliverables in returnable totes. This reduced drum disposal by approximately 250 drums per year, for a savings of $5,000 annually. Since drums must be rinsed before disposal, the facility also reduced wastewater generation by 45,000 gallons per year.

## ENVIRONMENTAL MANAGEMENT SYSTEMS

The requirements of WRPA provide an excellent starting point for companies to reduce their environmental impact by reducing the generation of industrial hazardous waste and toxic chemical releases and transfers. Under House Bill 2997, the 77th Legislature authorized the TCEQ to provide regulatory incentives for environmental management systems that meet certain minimum standards. The TCEQ adopted the final rules under Title 30 of the Texas Administrative Code (TAC), Chapter 90, Subchapter C. As a result of HB 2997, TCEQ updated the Clean Texas, Cleaner World program to incorporate performance-based environmental management systems.

The top two levels of Clean Texas, Cleaner World—Lone Star leader and National leader—require the implementation of an Environmental Management System (EMS). Through the implementation of a performance based EMS, an organization can achieve sustainable use of natural resources and reduction of industrial impacts to air, water, soil, wildlife, human health, communities, and the environment.

CLEAN TEXAS
CLEANER WORLD

Get Web information about environmental management systems and incentives at **abouttexasems.org**.

### Benefits of Implementing an EMS

An EMS is more than a piece of paper created by one employee in your Environmental Health and Safety Department. An EMS is everyone at a facility—management and employees—shifting environmental focus toward a recognition of the critical role environment plays in every business process.

**Table 1. Benefits and Incentives of Implementing an EMS**

| What Does an EMS Do? |
|---|
| An EMS integrates environmental programs into every aspect of operations at a facility, so that:<br>▼ Operational decisions are based on consideration of environmental impacts<br>▼ All employees are committed to reducing environmental impacts |
| **How Does That Help You?** |
| WRPA and EMS programs both provide guidance on how to manage environmental issues in a way that:<br>▼ Improves compliance<br>▼ Reduces environmental impact<br>▼ Reduces risk and liability<br>▼ Reduces costs |
| **What Will You Get for Your Effort?** |
| Approval of your EMS by the TCEQ can result in a wide variety of incentives, including:<br>▼ Exemption from WRPA planning and reporting<br>▼ Decreased inspections<br>▼ Positive points for compliance history |

Since WRPA and EMS both require documentation of the way you intend to manage environmental impacts, the TCEQ encourages (but does not require) all WRPA reporting facilities to expand their environmental management approach beyond source reduction and waste minimization. By expanding your required Pollution Prevention Plan to meet the minimum standards of an EMS, you may be able to reap significant regulatory incentives.

Developing an environmental management system that is approved by the TCEQ can lead to significant regulatory incentives, but Texas does not require an EMS.

Creating an EMS that meets TCEQ standards provides a unique opportunity to achieve the following benefits:

- Reduce your environmental impacts and hazardous waste
- Improve production efficiency and profitability
- Reduce liability
- Decrease your regulatory burden through TCEQ incentives.

### Getting Help with an EMS

If you are already WRPA compliant and would like assistance creating an EMS, visit **www.abouttexasems.org**. The TCEQ has developed guidance documents to help you through the EMS planning, implementation, documentation, evaluation, and approval process.

These and other publications are available on both the EMS Web site and the TCEQ Web site, **www.tceq.state.tx.us**, under the "Forms and Publications" navigation link. You will also find a *Declaration of Commitment for Clean Texas, Cleaner World certified leader levels*, Form TCEQ 20032.

**Fast Facts**

- WRPA is a state law with specific requirements for hazardous waste generators and TRI Form R reporters.
- Pollution Prevention saves you money, protects the environment, and reduces your liability and regulatory burden.

CHAPTER 2:

# Complying with the Waste Reduction Policy Act

**Why Should You Read This Chapter?**
- Learn WRPA requirements for LQGs, SQGs, and those who report on EPA's TRI Form R.
- Understand Texas requirements for pollution prevention (P2) planning.

The Waste Reduction Policy Act (WRPA) requires facilities that report on the Annual Waste Summary (TCEQ-0436A) or the EPA's TRI Form R to prepare a five-year Pollution Prevention Plan and to submit an Executive Summary of that plan to the TCEQ. WRPA also requires a portion of these facilities to report annually on their P2 progress.

## WHO IS SUBJECT TO WRPA REQUIREMENTS?

There are many different kinds of facilities that report under WRPA. Examples include, but are not limited to, automobile repair facilities, machine parts manufacturers, and petrochemical plants. Such facilities have the following in common: they generate enough hazardous waste to report on the Annual Waste Summary; or they manufacture, process, or otherwise use enough toxic chemicals to report on the TRI Form R.

WRPA applies to:
- Large quantity generators (LQGs) of hazardous waste
- Small quantity generators (SQGs) of hazardous waste
- Facilities that report on the TRI Form R

Facilities that are SQGs of hazardous waste and do not report on the TRI Form R have fewer requirements under WRPA, but they still must prepare a plan.

*The Waste Reduction Policy Act does not apply to conditionally exempt small-quantity generators (CESQGs)* ***if*** *they don't report on the TRI Form R.*

## HAZARDOUS WASTE BASICS

"Hazardous waste" is any waste that is defined as being hazardous in Title 40 of the Code of Federal Regulations (40 CFR), Section 261.3. There are two different ways that a waste can be designated as hazardous:
- It can be "listed" as hazardous.
- It can have hazardous characteristics.

### What Category Does My Waste Belong To?

It is your responsibility to find out if your shop generates hazardous waste. A good time to do this is during the walk-through of your facility (see Chapter 3). Here are three ways to identify hazardous waste:
- **Process knowledge.** Use Material Safety Data Sheets and product labels to determine what is in your waste. Check whether any part of your waste is on the EPA lists or has hazardous characteristics (see Web site listed in the next section). Make written notes about how you classified each waste stream. Keep your notes in a file to support your waste determination.
- **Testing.** Arrange for a lab test to determine if your waste is hazardous.
- **Combination.** Arrive at your decision using a combination of the previous two.

Remember, you should create and keep on site a written hazardous waste determination for each waste. You only need to do a determination once for each waste stream, unless you generate a new waste or your waste changes in composition or concentration.

### Listed Hazardous Wastes

The EPA has placed more than 400 chemicals and products on four lists. When these chemicals or products are disposed of, you must handle them as hazardous wastes. These lists are designated by the letters F, K, P, or U.

Following are general descriptions:
- F and K lists include hazardous wastes produced during certain industrial processes. The F list includes chemicals from nonspecific sources, such as used solvents. The K list details hazardous wastes produced from specific sources, such as the production of pesticides.
- P-list wastes are "acutely hazardous." They are a small subset of hazardous wastes that are considered especially harmful even in small quantities. A surface coater does not usually create acutely hazardous wastes in its processes. However, you may have P-list wastes if you use certain pesticides on your property, such as methyl parathion.
- U-list wastes are generally toxic, though they may also have other hazardous characteristics. For instance, unused acetone is on the U list.

A complete list of the listed wastes can be found in 40 CFR 261, Subpart D. You can find these lists on the EPA Web site: **www.epa.gov**.

### Characteristic Hazardous Wastes

The EPA has identified four characteristics that make a waste hazardous. There is a "TRIC" to remembering these characteristics: toxicity, reactivity, ignitability, corrosivity.

Following is information on the four characteristics:

- **Toxicity–**waste containing specific concentration levels of contaminants listed by the EPA. The toxicity characteristic leaching procedure (TCLP) is used to determine whether a waste is toxic. A laboratory can perform this test for a fee. Examples of wastes that could test positive for the toxicity characteristic include paints with cadmium or lead.
- **Reactivity–**waste that is unstable or undergoes a rapid, violent chemical reaction when in contact with water or other materials. Peroxides and some bleaches are examples.
- **Ignitability–**waste with a flash point of less than 140° F and easily combustible or flammable–for example, solvents.
- **Corrosivity–**liquid waste that has a pH less than or equal to 2, or greater than or equal to 12.5. Examples include hydrochloric acid or sodium hydroxide. Liquid wastes are also considered corrosive if they corrode steel at a rate greater than 6.35 mm/year.

Some wastes can be both a listed and characteristic hazardous waste. For example, spent solvents might be found on the F list and might also exhibit the characteristic of ignitability.

### Getting Information on Hazardous Waste

For more information on hazardous waste registration and reporting, you can contact the TCEQ Registration and Reporting Help Line at 512/239-6413; for waste determination and classification assistance, call 512/239-6412.

## TRI BASICS

Certain facilities that use or produce toxic chemicals above specific thresholds are required to report annually under the Emergency Planning and Community Right-to-Know Act. EPCRA is also known as Title III of the Superfund Amendment and Reauthorization Act, Section 313.

Toxics Release Inventory (TRI) reports must be sent to both the U.S. Environmental Protection Agency (EPA) and the TCEQ. TRI reports are used to inform the public and government officials of on-site releases, off-site transfers, and other waste management activities at each facility.

A facility must file TRI reports if it meets all three of the following criteria:

- Has 10 or more full-time employees.
- Is one of 27 specific industries (includes the manufacturing sectors and seven other industries).
- Manufactures or processes more than 25,000 pounds/year per TRI listed chemical, or uses more than 10,000 pounds/year per TRI listed chemical; **or** manufactures, processes, or uses more than 10 or 100 pounds/year, depending on the chemical, or 0.1 grams/year of any persistent, bioaccumulative, toxic (PBT) chemical. These chemicals include mercury, PCBs, dioxins, and lead. These chemicals tend to persist in the environment or build up in food chains. **You can only report PBTs on Form R's.**

The TRI list includes about 650 chemicals. If you think you use one of these chemicals, check the EPA's Web site, **www.epa.gov/tri/chemical**.

### Form R Versus Form A

Facilities reporting under the EPA's Toxics Release Inventory (TRI) submit their information on either the Form R or Form A. Knowing about the differences can lead to significant reductions in your paperwork under TRI and WRPA requirements (see Table 2).

The TRI Form R is a five-page document seeking information on the facility and on a specific chemical. One Form R must be submitted for each TRI chemical reported by the company.

If a facility has small amounts of a TRI chemical in its waste, it may be eligible to report on the two-page TRI Form A (also known as alternate threshold). Form A reports do not trigger WRPA planning and reporting requirements. In addition, you can report multiple chemicals on one Form A. So if you can use the techniques in this book to get below the Form R threshold, you may be able to reduce your TRI and WRPA reporting requirements.

***Note***: Some facilities report on Form R reports for some chemicals and on Form A reports for others. If you submit even one Form R for one chemical, WRPA applies to you.

### Getting Help with the TRI

If you need more help with the TRI, call the EPCRA hot line, maintained by the EPA at 1-800-424-9346. You can also call the Texas TRI hot line at 512/239-4TRI.

## WRPA REQUIREMENTS

Under Texas law, all SQGs, LQGs, and TRI Form R reporters must prepare a P2 Plan, keep a copy of that plan on site for inspection, and submit an Executive Summary with a signed Certificate of Completeness and Correctness of that plan to the TCEQ. **The P2 Plan is the core of WRPA requirements and should be an intricate part of your facility's operating procedures.**

LQGs and/or TRI Form R reporters must also submit Annual Progress Reports (APRs) to the TCEQ. The purpose of the APR is to track progress toward your facility's goals, and to quantify the success of your projects. If you are unable to report source reduction in any year, you may need to review your projects to find a more successful pollution prevention option and update your plan.

### Who Is Required to Report?

Use Table 2 to find out if you are required to report. Locate your TRI requirements on the top row and match them to the applicable hazardous waste requirement on the left side of the table.

**Table 2. Basic WRPA Requirements by Facility Type**

| Generator Status | TRI Form A or Do Not Report TRI | TRI Form R |
|---|---|---|
| **Do not report Annual Waste Summary** | No requirements under WRPA | Prepare a P2 Plan, keep it on site. Submit the Executive Summary and a signed Certificate. Submit APRs. |
| **CESQG** | No requirements under WRPA | |
| **SQG** | Prepare a P2 Plan, keep it on site. Submit the Executive Summary and a signed Certificate. No APRs required. | |
| **LQG** | Prepare a P2 Plan, keep it on site. Submit the Executive Summary and a signed Certificate. Submit APRs. | |

The most important requirement under WRPA is preparing a P2 Plan and keeping it on site and available for an inspector. Companies often make the mistake of completing only the Annual Progress Reports (APRs), without ever completing a P2 Plan. (APRs are based on the P2 Plan, and have no meaning without projects and goals to measure.) Other companies misplace their P2 Plan as personnel change, or they forget to renew their plan at the end of the five-year cycle.

If your company grows significantly, causing waste to increase, you may need to revise your plan before the end of the five-year cycle. Exact requirements are located in Appendix A, 30 TAC, Chapter 335, Subchapter Q Rules, and have been summarized for your convenience in Table 2.

Failure to have a complete P2 Plan in place is a violation of the Texas Administrative Code and is subject to penalties of up to $10,000 per violation per day.

### Using Worksheets in P2 Planning

Several worksheets have been provided throughout this guide to lead you through the planning process. These worksheets are not required, but are available for your convenience and use in your final documentation for the TCEQ. The APR form is required for all LQGs and TRI reporters. All WRPA requirements, corresponding worksheets, and required forms have been summarized in Table 3.

## THE P2 PLANNING PROCESS

Now that you are familiar with the requirements of WRPA, you'll need to understand the overall process of pollution prevention planning. There are many ways to approach the planning process, and each facility may develop its own unique approach, as long as the required elements are covered. The TCEQ has developed a seven-step approach.

**Seven Steps to Pollution Prevention Planning**
Step 1—Identify your processes and wastes
Step 2—Prioritize your wastes
Step 3—Identify your options
Step 4—Prioritize projects and set goals
Step 5—Train employees on P2 awareness
Step 6—Document the P2 Plan
Step 7—Report annually

## DUE DATES

If you are new to the WRPA requirements, a summary of due dates for P2 Plans, Executive Summaries, and Annual Progress Reports is laid out in the following sections for your convenience.

### New to WRPA

You have 90 days from the date the first Annual Waste Summary is submitted or TRI Form R is filed with TCEQ—whichever comes first—to have a five-year P2 Plan in place and on site for review by an investigator. Then, submit the Executive Summary of your P2 Plan and signed Certificate of Completeness and Correctness to the TCEQ.

Before the fifth calendar year ends, prepare a new revised five-year P2 Plan, which is due January 1. To meet this deadline, you need to begin planning several months—maybe even a year—before the renewal is due. For example, if you submitted a TRI Form R on July 1, 2000, you should:

- Have a year 2000 five-year P2 Plan in place by September 28, 2000.
- Submit the Executive Summary and signed Certificate to the TCEQ by September 28, 2000.
- Renew the five-year P2 Plan by January 1, 2005.

### WRPA Renewal

Facilities that have completed a five-year reporting cycle must go through the entire planning process again and develop a new five-year P2 Plan. Then, a new Executive Summary of your P2 Plan, along with a signed Certificate, must be submitted to the TCEQ by January 1 of the first year of the new plan. For example, if the fifth year of your plan is 2004, then you must renew your P2 Plan and submit your Executive Summary to the TCEQ by January 1, 2005.

### Annual Reporting Requirements

Facilities that are LQGs or TRI Form R reporters must also report annually on the Annual Progress Report (APR), a required TCEQ report, which is due July 1 of each year. Reports are for your source reduction activities from the previous calendar year. For example, if you submit your APR form in July 1, 2004, you are reporting source reduction activities you have accomplished from January 1, 2003, through December 31, 2003.

**Table 3. WRPA Requirements and Worksheets Guidance**

| WRPA Requirements | Worksheets |
|---|---|
| Designation of responsibility for achieving goals is not required, but is highly recommended to ensure success | Worksheet 1: Assessment Team |
| **P2 Plan** | |
| 1. Prepare an initial survey of facility's activities that generate hazardous waste and/or release of TRI chemicals, §335.474(1)(A) | Worksheet 2: Facility Process Diagram |
| 2. Prepare a prioritized list of pollutants and contaminants to be reduced, §335.474(1)(J)(iv) | Worksheet 3: Prioritized List of Facility Wastes |
| 3. Prioritize source reduction and waste minimization projects, §335.474(1)(B)<br>4. Explain P2 projects to be undertaken, with discussion of technical and economic considerations, and environmental and human health risks in selecting projects, §335.474(1)(C)<br>5. Estimate type and amount of reduction anticipated, §335.474(1)(D)<br>6. Prepare a schedule of implementation for each project, §335.474(1)(E)<br>7. Set measurable pollution prevention goals for entire facility, including incremental goals, §335.474(1)(F)<br>8. Discuss projects that may result in the release of a different pollutant or contaminant, or may shift the release to another medium, §335.474(1)(H)* | Worksheet 4: Project Description and Goals |
| 9. Explain employee awareness and training programs to aid in accomplishing P2 goals, §335.474(1)(G)* | Worksheet 5: Employee Awareness and Training |
| **Documentation** | |
| ***Five-Year P2 Plan***<br>10. Prepare a five year Pollution Prevention Plan, §335.474 | Worksheets 2–5 |
| ***Executive Summary of Five-Year P2 Plan***<br>11. Submit Executive Summary of the plan to TCEQ, §335.474(1)(J)<br>12. Submit certification that the plan is complete and correct by owner or corporate officer who has authority to commit company's resources to implement the plan, §335.474(1)(I) | Worksheet 6: Executive Summary and Certificate of Completeness and Correctness |
| ***Annual Progress Report***<br>13. Submit an P2 Annual Progress Report to assess the facility's progress in implementing the plan and achieving goals, §335.476(1)** | TCEQ Pollution Prevention Annual Progress Report Required Form |

* Not required for facilities that are SQG/non-TRI reporters, but is recommended
** SQGs/Non-TRI Form R reporters: may meet annual reporting requirements by submitting an Annual Waste Summary, §335.476

### Base-Year Date

WRPA requires you to report your base-year waste generation or TRI chemical releases. The base year is the year prior to the first year of your plan. For example, if your P2 Plan goes from 2004 to 2008, your base year is 2003. Your plan should include a list of your generated hazardous wastes and reportable TRI releases and transfers for year 2003. If you do not have this data available, you should use the most recent available data, which would be 2002.

### If You Are Late

**Don't panic** if you have:

- missed a submission deadline,
- lost your existing plan, or
- were required to develop a plan and never did.

Simply contact the TCEQ Office of Pollution Prevention Industry Assistance at 512/239-3100. Our assistance specialists will help you get back on track and achieve WRPA compliance.

For additional assistance with WRPA regulations, visit our Web site: **www.P2Plan.org**.

## EXEMPTION FROM WRPA

Owners and operators of facilities that are required to report under WRPA may request an exemption from the TCEQ executive director. The exemption request must be resubmitted annually, and is not subject to automatic reapproval. To receive an exemption, the facility must be able to demonstrate the following:

- evidence that the facility has reduced the amount of pollutants and contaminants generated or released by 90 percent since the base year (the year prior to the first year of your current plan);

- the potential impact on human health and the environment of any remaining hazardous waste generated, or pollutant or contaminant released; and
- demonstration that additional reductions are not economically and technically feasible.

Before pursuing an exemption, consider which will take less time—obtaining an exemption every year, or preparing a P2 Plan once every five years.

*Note*: Very few exemptions have been granted, and nearly all have been cases in which the facility has closed down and is going through remediation. If you believe you qualify for an exemption, please contact the TCEQ Pollution Prevention Team at 512/239-3100.

Another way to get an exemption from WRPA reporting requirements is to have a TCEQ-approved environmental management system (EMS). Facilities that have an EMS that meets the requirements in TAC Chapter 90 (relating to regulatory flexibility and environmental management systems) and is approved by the executive director, will be granted an exemption from WRPA, provided they report annually on their EMS.

## GRADUATING FROM WRPA

Many facilities have graduated from WRPA's planning and reporting requirements by reducing their hazardous wastes to levels below reporting thresholds. If you no longer report under TRI Form R **and** you have reduced to CESQG status, you are no longer subject to WRPA. This is the ultimate goal of the WRPA program.

The TCEQ would like to recognize facilities that have graduated from WRPA. If you have instituted a pollution prevention program that resulted in significant reductions, please tell us your story by completing a Case Study, Success Story Form (see Worksheet 7), or use the online form located at **www.P2Plan.org**.

**Fast Facts**

- All SQGs, LQGs, and/or TRI Form R reporters are required to prepare a Pollution Prevention Plan.
- All LQGs or TRI Form R reporters are required to report annually on their progress.
- TCEQ worksheets are not required for the P2 Plan, but the TCEQ Annual Progress Report Forms are required for the Annual Progress Report.

CHAPTER 3:

# Identifying Your Processes and Wastes

**Why Should You Read This Chapter?**

- Learn WHO should be on your site assessment team.
- Learn HOW to conduct a site assessment.
- Find out HOW to identify all of your activities that generate waste.

This chapter deals with Step 1 of the P2 Planning process that involves identifying processes and wastes.

WRPA requires that you identify all hazardous wastes, TRI chemicals, and the activities or processes that they result from. The ultimate goal is to generate less waste and fewer toxic pollutants through P2 projects.

## FORMING A SITE ASSESSMENT TEAM

The best way to generate a list of wastes from your processes is to do a site assessment. Use the assessment to plan and allocate resources for P2 projects, develop your P2 Plan, and set the baseline for measuring future progress.

Creating an assessment team is not required under WRPA, but often proves very useful in increasing employee involvement in pollution prevention activities and ensuring that you do not overlook any significant waste or process during the initial investigation. An assessment team is also an effective way to delegate responsibility and to increase the chances for successful implementation of projects. Worksheet 1 provides a starting point for selecting and recording who will be on your assessment team.

Although not required by WRPA, forming a team is the best way to truly identify wastes and the activities that generate them. The team is also helpful in identifying options.

When you've selected your assessment team, familiarize members with WRPA requirements and the importance of developing a quality P2 Plan for your company. Working as a team will make the planning process more efficient and complete. Once everyone is up to speed, you'll be ready to start tracking down your facility wastes, inefficiencies, and environmental concerns.

### Directions for Worksheet 1: Assessment Team

For larger, more complex sites, we recommend involving one representative from each major process at a facility—someone familiar with operational requirements and employees. Smaller facilities may only need 2 to 3 people on their assessment team. Companies should use their own judgment to determine the number of team members that will best suit their needs, and who is selected.

A team leader who is familiar with the facility, the people, and the processes should be chosen. It is also very important for the team leader to want to reduce and eliminate wastes.

### An Example of an Assessment Team Assignment

An example of an assessment team is in Example 1. You may modify or create your own worksheet on the makeup of your assessment team.

**Example 1. Example of a Completed Worksheet 1**

**P2 Plan Assessment Team**

Company: XYZ Corporation Site: Austin Facility Date: 12/5/03

| P2 Function | Team Member | Department/Telephone | Responsibilities |
|---|---|---|---|
| Team Leader | Fred Smith | Environmental/x0056<br>Setting up monthly meetings<br>Project monitoring | Project implementation |
| Team Employee Training | Dale Crow | Fleets/x0045 | Train new employees on P2 issues<br>Retrain old employees (corrective action) |

Current five-year WRPA P2 Plan valid 1/1/2004 through 12/31/2008. Next revision due 1/1/2009.

## WORKSHEET 1: ASSESSMENT TEAM

### P2 Plan Assessment Team

Company: _____ Site: _____ Date: _____

| P2 Function | Team Member | Department/Telephone | Responsibilities |
|---|---|---|---|
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Current five-year WRPA P2 Plan valid _____ through _____. Next revision due _____.

## CONDUCTING THE SITE ASSESSMENT

Conducting an in-depth site assessment is an essential phase of the planning process. All facilities generating hazardous waste or releasing or transferring toxic chemicals can benefit from a thorough look at overall facility operations and processes.

You are required under WRPA to identify the process or activity that generates the toxic chemical or hazardous waste. This requires you to go upstream from the point of discharge and see what you are doing at your facility that results in the generation of the waste. This is the first step toward finding a way to reduce your waste.

The assessment team should work together to visit each facility process and assess efficiency, waste, and potential for improvement. The level of detail and exact approach each facility takes in performing the assessment depends on the size of the company, the number of waste streams, and many other factors. Your assessment should cover all process flows and operations, including:

- Any area where you make a product
- Shipping and receiving areas
- Storage areas for raw material and hazardous waste
- Waste generation points
- Product/by-product areas
- Unit processes
- Modes of transportation
- Administrative areas
- Employee service and recreational areas
- Any area with activity

You may find it helpful to diagram facility processes or create a flow chart of operations, services, and products in order to identify areas for inspection.

If you already know the process that is generating the waste, you can examine that process more closely and look for alternative ways of getting the results. For instance, your TRI Form R may list Methyl Ethyl Ketone. As you walk through your plant, you may find that this chemical is being used as a solvent in one part of your facility and for parts washing in another part of the facility. Once you know the process, you can examine options. For instance, what other solvents could dissolve the chemical you are working with? Could mechanical or sonic parts-washing machines be used instead? There is no "one size fits all" option for every facility to reduce waste, but every facility can benefit from knowing the process that leads to the generation of the waste.

During the process of identifying the sources of your hazardous wastes and toxic releases, keep your eyes open for other areas of environmental concern. Assess potential regulatory, legal, and business risks, as well as health, safety, and environmental risks associated with processes or operations at your facility. In addition, you'll want to consider the full range of operating conditions, potential incidents, and emergency scenarios.

## DIAGRAMING YOUR PROCESSES

Like many companies, your facility probably operates several different processes. Start your P2 assessment by creating a simple facility operations diagram. The facility operations diagram outlined in Figure 2 has four major operations—coatings, metal finishing, vehicle maintenance, and thermoset resins.

**Figure 2. A Facility with Several Processes, Focusing on One Process at a Time**

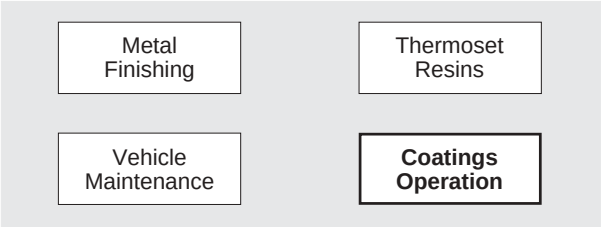
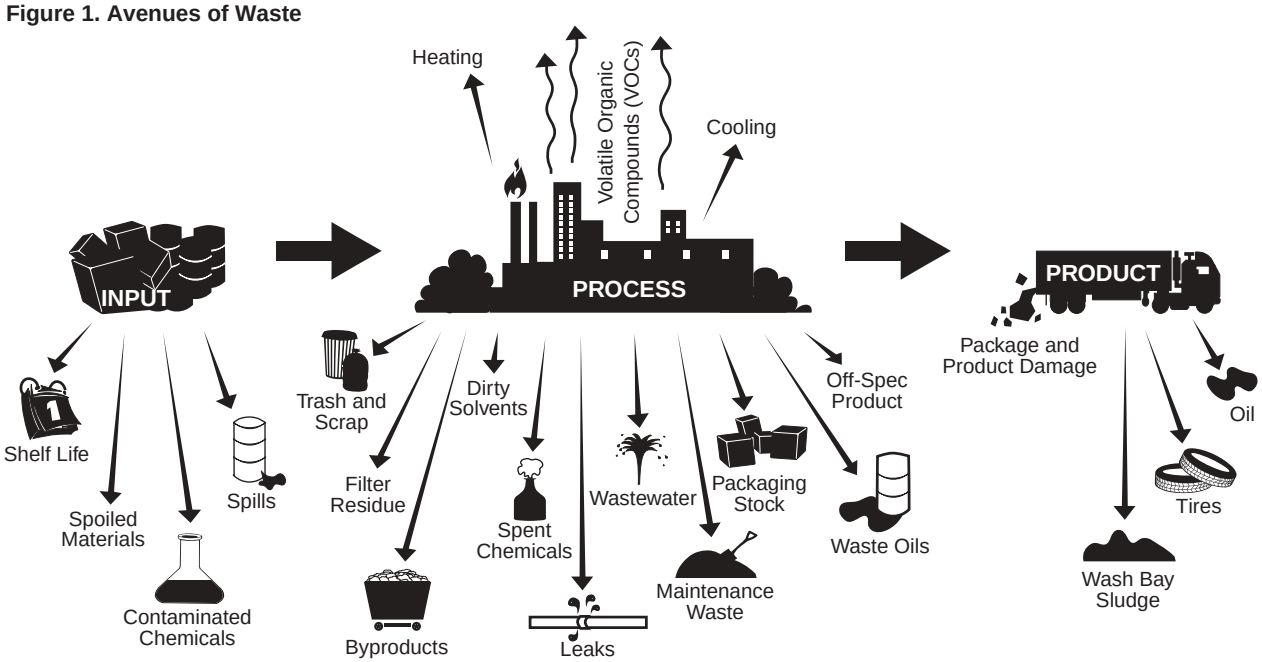



**Figure 1. Avenues of Waste**



After completing a general facility operation diagram, you will need to break each individual process down into a more detailed process flow diagram. The process flow diagram will illustrate the major steps in your process, and pinpoint exactly where and when your waste is created. Example 2 illustrates a process flow diagram for a coatings operation. You may not have a coatings operation at your facility, but the example should help you create diagrams for any process.

### An Example of a Process Flow Diagram

Example 2 shows a process flow diagram for the coatings process previously discussed. The diagram illustrates each type of activity in the process and the waste generated by that activity.

Once you understand how to diagram the flow of your individual facility processes, go to Worksheet 2 (make as many copies as you need) and diagram each separate process and the wastes associated with them at your facility.

### Directions for Worksheet 2: Process Flow Diagram

Process flow diagrams are not required under WRPA, but are useful in locating potential areas for pollution prevention activity and site assessment. You can make your diagrams simple or detailed based on the size and complexity of your operations.

Start by listing the process in the first box. Then list each step resulting in a waste until a final product or service is complete or delivered to the customer. If the diagram isn't large enough to cover all the steps in your process, feel free to add boxes in the empty space at the bottom of the page, or create your own diagrams.

Complete a separate process flow diagram for each major process at your facility, and for smaller processes as necessary.

The Annual Progress Report form is the only required form. You are only required to have the elements listed in Table 3. The worksheets are examples you can use. Facilities can choose their own unique style and format for writing a P2 Plan, follow the worksheets in this guide, or combine their approach with the TCEQ examples.

## IDENTIFYING WASTE FROM ACTIVITIES

As you assess the waste streams for your facility, keep in mind that WRPA requires facilities to describe each activity that either generates hazardous waste or results in the release of a TRI chemical, or both. WRPA also requires that facilities provide a complete list of:

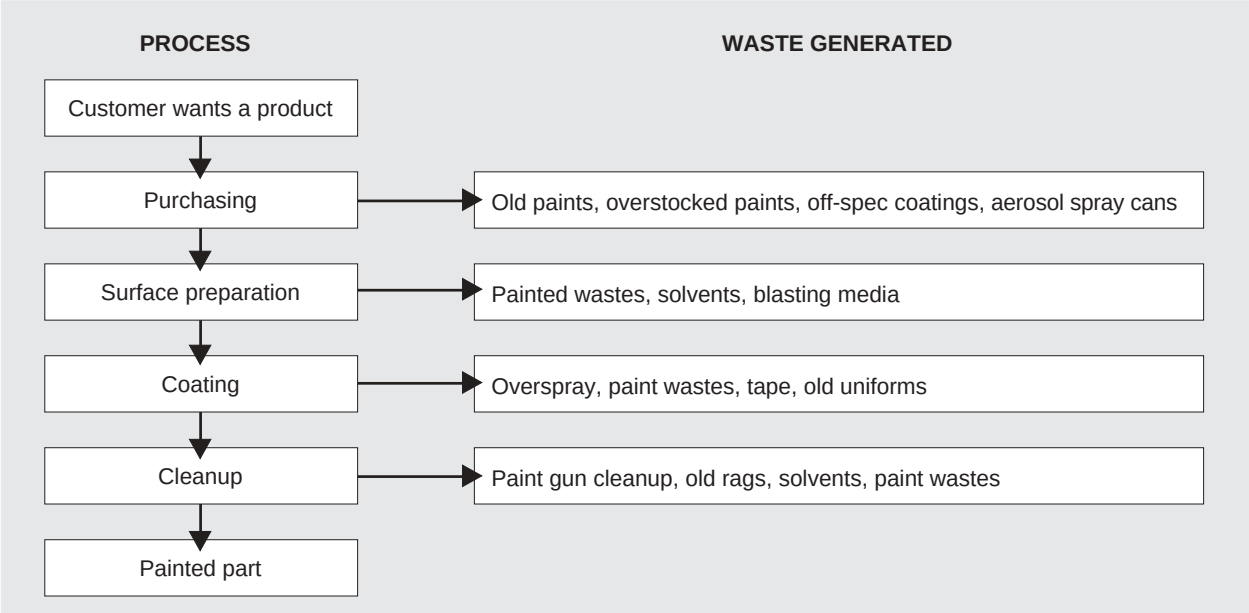
- all hazardous waste generated, and the volume of each (see your Annual Waste Summary), and
- all reportable TRI releases and the volume of each (see your TRI Form R).

As the team assesses each process at your facility, check for odors, leaks, spills, and drips, as well as discarded waste materials in trash bins. These are excellent indicators of waste, inefficiency, and money-saving opportunity.

As you search for environmental concerns, look for interaction between employees and machinery, inputs, outputs, energy sources, products, and services employed by, or rendered at your facility. Take notice of anything that can positively or negatively interact with, or impact employees, surrounding communities, your facility, the overall company, and the environment.

To improve the effectiveness of your plan and increase your savings, we recommend that you expand your efforts to include nonhazardous wastes and all other areas of inefficiency. You are not required to look at other environmental impacts, but doing so will help you if you decide to seek regulatory incentives under the EMS program.

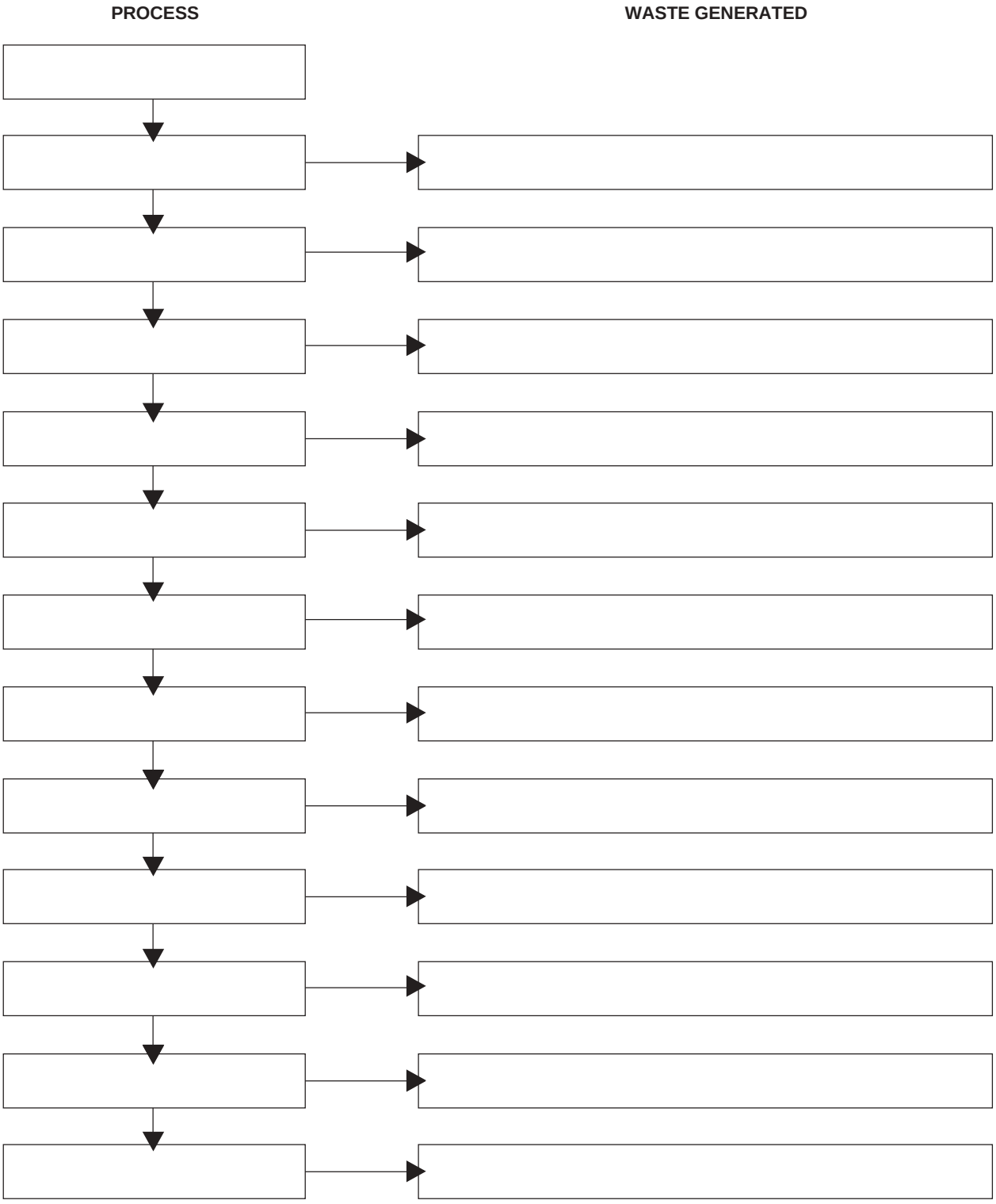
**Example 2. An Example of a Process Flow Diagram**



## WORKSHEET 2: PROCESS FLOW DIAGRAM

Facility: _____ Date: _____

*Make as many copies as you need to cover all the processes at your facility*



Finding ways to reduce all forms of waste while improving operational efficiency also makes good business sense and helps the environment.

You will be able to compile a thorough list of wastes to reduce by questioning the operation, efficiency, potential impact, and liability of each process or activity at your facility.

Once you have completed your site assessment and finished diagraming your process flows, you should have all the information you need to list your hazardous wastes and TRI releases and transfers as required by WRPA. You may want to cross-check the data you collected with your most recent Annual Waste Summary and TRI reports.

By going through these steps you should be able to look at your facility with a fresh perspective, and identify problems that may have previously been overlooked. Now you can proceed with Step 2 in the planning process—prioritizing your wastes for project development.

**Fast Facts**

- Discovering the process that generates a waste can point the way to a money-saving reduction.
- The best way to get results from a Pollution Prevention Plan is to involve many people in the process.

CHAPTER 4:

# Prioritizing Your Waste

**Why Should You Read This Chapter?**
- Learn how to prioritize your waste.
- Discover the **real** cost of your pollutant and how to reduce it.

This chapter explains Step 2 of the P2 planning process. In this step, you will use Worksheet 3 to list and prioritize your facility's wastes, as required by WRPA. Every facility will have different ways of prioritizing their wastes. Your assessment team should be able to decide how many waste streams will be targeted for reduction and why those waste streams take priority over other waste streams.

Things to consider when managing the waste are:
- Cost of disposal
- Amount of waste generated
- Environmental regulations
- Threat to workers, public, and environment
- Residual lifetime

There are a number of ways to prioritize your wastes. One way is to determine which wastes are generated in the highest quantities and which wastes are costing you the most money. In addition to quantity and cost, consider the level of environmental and human health risks associated with the wastes on your list.

Look at waste **quantity, cost, and risk** when identifying which waste deserves priority at your facility.

**Fast Facts**
- WRPA requires that facilities provide a complete list of:
- all hazardous waste generated and the volume of each; and
- all reportable TRI releases and the volume of each.
- Companies typically only account for 20 percent of the cost of managing a waste. Identifying the true cost can point the way to money savings.

By addressing the issue now, you'll save time and money, and avoid planning low-impact projects for waste streams that are of low risk and of less significance. Worksheet 3 will help you prioritize the waste streams, so spend a little time on it and make sure you use accurate information.

## DIRECTIONS FOR WORKSHEET 3: PRIORITIZED LIST OF WASTES

WRPA requires that you list all reportable hazardous waste and TRI chemicals, but you may also list nonhazardous wastes identified during your site assessment, if desired. Once you have completed this worksheet, you will have a better idea where to focus your P2 efforts.

### Filling out Worksheet 3

- List all reportable hazardous wastes and/or TRI releases and transfers.
- List the activity or activities that generate each waste stream.
- Determine the total volume (tons) of each waste stream. This information can be pulled from your Annual Waste Summary, TRI reports, and site assessment report. If the same waste comes from different activities, record the quantity generated from each activity.
- Determine whether the waste is a low, medium, or high risk to human health and the environment (see "Assessing the Risk" in this chapter).
- Determine the total cost, including the hidden cost, of managing each of the wastes (see "Estimating Cost" in this chapter).
- After considering the significance of each waste on the list, indicate which wastes will have priority with a check mark when you begin looking for reduction options.

### Assessing the Risk

When assessing the risk of a waste stream, you should look at the chemical or compound characteristics, health hazards, and environmental hazards associated with the waste stream. Information that will help you includes:
- Material Safety Data Sheets (MSDSs) that accompany all chemicals. Describe compound characteristics and health hazards.
- The National Institute for Occupational Safety and Health (NIOSH) *Pocket Guide to Chemical Hazards*. Helps you recognize and control occupational chemical hazards. Web site: **www.cdc.gov/niosh/npg/npg.html**.

Please note that risk determination is highly variable at different facilities and should be determined by your assessment team, according to your facility standards.

## Estimating Cost

Many facilities only calculate the disposal cost when estimating cost of a waste stream, but there are many hidden costs that you should also address. It is estimated that waste stream costs are underestimated by four to seven times, because many times hidden costs are overlooked. By identifying the hidden costs, you can identify opportunities for savings (see Chapter 6). Hidden costs may include:

- inspection and permit fees,
- preparation costs,
- record keeping and reporting costs,
- liability for accidents and fines,
- sampling and testing fees,
- safety equipment and secondary containment structures,
- storage and containers, and
- employee training.

A simple true cost analysis is shown in the following example:

**Example 3. Example of True Cost Analysis**

| True Cost Analysis | |
|---|---|
| Xylene purchase cost | ($3.00/gal) x (1,500 gal/yr) = $4,500/yr |
| Disposal cost | (4 drums/yr) x ($450/drum) = $1,800/yr |
| Total | $6,300/yr |
| Hidden costs (includes cost of drums, labels, handling, and manifesting the waste) | $1,000/yr |
| TRUE COST TOTAL | $7,300/yr |

## WORKSHEET 3A: PRIORITIZED LIST OF HAZARDOUS WASTES

**P2 Assessment**

Company: _____ Site: _____ Date: _____

| Priority | Waste | Activity | Volume | Risk | Cost |
|---|---|---|---|---|---|
| ✓ | *Example: solvent (xylene)* | *Example: cleanup* | *4 drums/yr* | *Medium* | *$7,300/yr* |
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Current five-year WRPA P2 Plan valid _____ through _____

Next revision due _____

## WORKSHEET 3B: PRIORITIZED LIST OF TRI RELEASES AND TRANSFERS

**P2 Assessment**

Company: _____ Site: _____ Date: _____

| Priority | TRI Chemical | Activity | Volume | Risk | Cost |
|---|---|---|---|---|---|
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Current five-year WRPA P2 Plan valid _____ through _____

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CHAPTER 5:

# Identifying Your P2 Projects

**Why Should You Read This Chapter?**

- Learn the latest methods for identifying great pollution prevention options.
- Learn some of the best pollution prevention Web sites and how they can help your company improve efficiency.
- Find out the most popular pollution prevention practices being implemented by facilities like yours.

This chapter deals with Step 3, the most critical part of the Waste Reduction Policy Act (WRPA). Step 3 involves the identification of projects that can reduce your waste at the source or minimize the environmental impact. Identification of projects and the various options available to you can be challenging because it varies from facility to facility.

A metal finishing operation may benefit from reducing its flow rate, while a fleet maintenance facility may benefit from switching to bypass filters. Even facilities with similar processes can have radically different projects.

WRPA requires you to have a list of prioritized projects for reducing waste, and also to consider the economic and technical feasibility of these projects. WRPA does give you flexibility to decide what kind of projects work best for your facility.

Finding an option that reduces waste, saves money, and works for your facility is very challenging. It requires you to challenge your existing way of thinking about how you do business. It also requires you to be creative and to look at what others have done.

## DEVELOPING YOUR OPTIONS

This guide provides you with a few tools and a P2 checklist of some process-specific options, but they should only be considered starting points in identification of options.

You can develop options that work for your facility by:

- **Brainstorming with your P2 assessment team.** Ask them how they would reduce waste at the facility. The best options often come from line workers who are intimately familiar with the daily operations of the process that generates the waste.
- **Researching the Internet to find other options.** A few good Web sites are listed in the Internet research section of this chapter.
- **Reviewing case studies.** The TCEQ has money-saving case studies from Texas companies in *Pollution Prevention Ideas from Texas Industries* (GI-246), available from the TCEQ's Publications Unit at 512-239-0028, or on the TCEQ Web site, **www.tceq.state.tx.us**. Follow the "Forms and Publications" link. A more extensive list is kept at the Southwest Network for Zero Waste Web site, **www.ZeroWasteNetwork.org**.
- **Using checklists of P2 options provided in this chapter** as a starting point for generating ideas.
- **Contacting P2 experts** from the TCEQ's Engineering Technical Assistance Team and other groups.

## RESEARCHING THE INTERNET

One of the best ways to find an option for your facility is to use the Internet. Following are a few online resources that can help you or your team identify good P2 options.

### P2 Planner Online

This guide was based on the approach taken for an online planning tool called the *P2 Planner*. The *P2 Planner* guides you through the pollution prevention planning process, and provides some of the most common options for reducing pollution. The *P2 Planner* also provides a format similar to this guide for complying with WRPA. The *P2 Planner* is available at **www.P2Plan.org**.

P2Planner
Pollution Prevention Planner

While the *P2 Planner* will help you with the more common processes found in Texas facilities (for example, fleets), it does not have every possible option available. If you need to do further research, the following tools will help you get started.

### Success Stories

One good method for finding an option is to use the University of Texas Zero Waste Network Web site to find a success story. These case studies will show you what people in your industry are doing to reduce waste and save money. The studies were written by people who went through the P2 Planning process and got positive results. In fact, if you get positive results, you can submit your own success story using the worksheet in Chapter 8.

The success stories database is located online at **www.P2Plan.org.**

**Lone Star Success**
As part of their Pollution Prevention Plan, a lubricant testing lab in San Antonio began segregating and recycling. They reduced their hazardous waste generation by 11 tons and saved over $36,000 per year. "It's a win-win situation," according to the lab director.

### Solvents and Coatings

If you want to find a less hazardous substitute for your solvent, you can use the *Solvent Alternative Guide* (SAGE), located at **http://sage.rti.org/es/index.cfm**.

Similarly, alternative coatings guidance can be found at **http://cage.rti.org/es/**.

### Industry-Specific Information

To find out some common pollution prevention strategies for your industry, you can use a series of sector notebooks provided by the EPA. Each notebook describes a specific industrial process and contains a series of pollution prevention options. Another good resource is the topic hubs provided by the national pollution prevention roundtable.

- **www.epa.gov/compliance/resources/publications/assistance/sectors/notebooks/index.html**
- **www.P2Plan.org**

### Pollution Prevention Vendors

Many people find options using tools like the ones previously listed, but they need a vendor to supply the equipment or solvent. These sites listed below maintain lists of vendors with specialized pollution prevention products.

- University of Iowa's vendor database **www.iwrc.org/**
- EPA's vendor database **http://es.epa.gov/vendors/**

The TCEQ does not necessarily endorse the vendors, but is providing you the information as a resource.

### Pollution Prevention Experts on the Web

If there is still no option available for your particular process and pollutant, you can consult with an international group of pollution prevention experts, using a Web site known as P2tech.

- Search the archives to find out if someone has asked a question similar to yours at **www.great-lakes.net/lists/p2tech/**.
- Become a subscriber and post a question on the P2 listserver by sending an e-mail to: **nppr@great-lakes.net**. You may get free expert advice from consultants, industry specialists, or college professors.

### Search Engines

The Internet has a wealth of knowledge. Most people who use the Internet to look for P2 options find the Internet a good starting point. It is a way to locate trade associations throughout the world, to identify potential vendors, or to find a name of an expert who can be contacted in a specific industry. Many people find options for pollution prevention simply by using an Internet search engine like **www.google.com**.

The issue with the Internet is not whether you can find information, but if you can find information that is relevant to your needs. A simple search on "pollution prevention" using a search engine will yield a lot of information, but may not help you find information relevant to your industry.

We recommend that you use search engines as a starting point for identification of options. Once you have identified these options, you should use traditional means of verifying vendor claims and advice from others.

## POLLUTION PREVENTION OPTIONS

Following is a list of some process-specific options for some of the more common processes that report under WRPA. If you have a laboratory, fleet, coatings operation, or metal finishing process, you may want to consider some of these options below. We also provide some general options that can apply to many different facilities. You are not required to use any of the options in the following checklist for your P2 Plan; these are options we have seen work for some facilities that might also work at your facility.

No single guidance document could provide options for every facility that reports under WRPA. The most comprehensive list of common practices is maintained by the Southwest Network for Zero Waste hosted by The University of Texas at Austin at **www.ZeroWasteNetwork.org**. You can use their P2 Planner, topic hubs, or the case study database to get more ideas.

### Getting Answers to Permitting Questions

Keep in mind that some of the options presented may require a permit from the TCEQ. For example, before installing a solvent distillation unit, check whether you need an air permit or an exemption.

If you have permitting questions, or other regulatory issues, call the Small Business Assistance Hotline at 1-800-447-2827.

### Process-Specific Pollution Prevention Options

Consider the following process-specific options:

#### *Fleets*

- **Recycle antifreeze.** Recycling either on site or off site. If more than 1,000 gallons per year of antifreeze is used, the payback period will generally be less than one year.
- **Purchase sprays in bulk.** Purchase solvents, lubricants and other sprays in bulk and apply them with pump sprays or specialized refillable pressurized containers. When you purchase aerosol cans, they are typically only one-fourth full of product; the rest is air. By purchasing in bulk you not only eliminate the disposal of cans, but you can save money on lubricants and solvents.
- **Use trickle chargers.** Extend lead-acid battery life with advanced battery management programs. Trickle charge systems, solar trickle charge systems,

and brass connectors can significantly extend battery life by improving conductivity and reducing sulfation of the lead plates in the battery.

### *Laboratory Options*

- **Transfer reagents between labs.** Transfer unused chemicals between laboratories. If one lab has an excess supply of a solvent, see if another lab can use it. If not, post the chemical on www.renewtx.rog, or see if a local high school can use the chemicals.
- **Track all chemicals.** The majority of laboratories could benefit from a better inventory management system. Most laboratories use a well-managed inventory management system for critical samples or products, but don't apply the process to some other chemicals. The result is a pile of vendor samples, outdated solvents, or some other type of chemical. If chemicals are being disposed of in your lab, look for a pattern of use. Also, you can use the general options for some ideas you can use on inventory management.

### *Metal Finishing Options*

- **Install conductivity meters.** The quality of rinse water should never be judged merely by appearance. Even a $40, hand-held conductivity meter is a worthwhile investment to evaluate the condition of rinse water. More sophisticated conductivity controls systems can be purchased in the $800 to $2000 range (including installation). Conductivity controls are used to keep the rinse tanks operating at a desired conductivity set point and to remove much of the guessing in terms of rinse quality.
- **Install flow restrictors.** If conductivity meters are not used, flow restrictors can be a simple and inexpensive method for reducing water consumption (for example, flow restrictors cost about $8 apiece). Flow restrictors are ideally suited for shops that have constant production rates. They are most effective when coupled with timer controls to ensure that rinse water only flows during rinsing operations.

### *Coating Operations Options*

- **Use HVLP spray guns.** Instead of old-style air atomized spray gun systems for painting, consider using high-volume low-pressure HVLP paint guns. These can be used with most of the current coating systems. HVLP guns operate with air atomizing pressures of 10 pounds per square inch (psi) or less. Low air pressure is replaced with high-volume airflow, which results in reduced emissions and better transfer efficiency.
- **Use automated systems for washing paint guns.** Cleaning paint guns is a labor intensive process that can generate significant volumes of solvent waste. Companies have found that automated systems for washing paint guns can significantly reduce labor costs, solvent usage, gun clogging, and worker exposure to toxic chemicals.

## General Pollution Prevention Options

Consider the following pollution prevention options:

### *Good Operating Practices*

- **Segregate facility waste by type.** When hazardous waste is mixed with nonhazardous waste, the entire mixture becomes hazardous and must be handled accordingly. By separating hazardous and nonhazardous wastes, you can significantly reduce your disposal fees and improve storage time and capacity.
- **Sell your waste as product.** Many "wastes" can actually be exchanged, sold, or transferred free of charge as products to other facilities that want to use them in their processes. The TCEQ's RENEW program provides a forum for resource exchange. It helps match companies looking to reuse a particular waste with other companies that can provide it, resulting in significant savings to both parties. See **www.renewtx.org**.
- **Segregate facility waste for increased recycling.** Recycling and reusing wastes before disposal can save your facility money and generate additional profit.
- **Encourage employee participation in pollution prevention and good housekeeping.** Publicizing source reduction achievements in your newsletter and offering incentives (awards, recognition, prizes) are great ways to get employees involved in the pollution prevention process. The best ideas usually come from employees.
- **Determine costs of managing wastes.** By taking all the costs of managing waste into account, companies typically find they spend five times more on their disposal costs. Regulatory compliance, storage, and increased insurance add to the cost of managing waste. By knowing the cost of managing the waste, you can determine if there is a more profitable way of doing business. Often companies with multiple product lines find that one product is less profitable when they account for waste costs.

### *Inventory Control*

- **Adopt first in, first out (FIFO) policy.** A good way to minimize the incidence of unused materials becoming obsolete hazardous waste is to rotate inventory so that materials received first get used first. Unused materials that must be disposed of due to poor management practices are a bad investment and an unnecessary drain on any business. Label all materials clearly when they are received, and make sure older stocks are used before their shelf life expires.
- **Use a bar-coding system.** A bar-coding system can reduce waste by improving inventory control and eliminating the purchase of excess chemicals and other materials. Bar-coding equipment is inexpensive and would probably pay for itself by

reducing inventory. Bar-code labeling and scanning systems can also be adapted for monitoring the use of aerosols, paints, hazardous materials, TRI chemicals, and the disposal of waste products. These systems can also identify the quantity purchased, the vendor, the quantity disposed of, the disposal method, and specific disposal costs.

- **Use just-in-time purchasing.** Stocking a minimum supply of process materials prevents accumulation of overstock that may never be used. Elimination of hazardous overstock saves you money and space, and encourages efficient use of the materials on hand. Computerizing your inventory will allow you to track the amount of supply used and the quantities remaining before placing your next order.
- **Perform material balances for major on-site processes.** Measuring the raw material inputs, as well as product and waste outputs for critical site processes ensures efficient production and optimization of source reduction efforts.

### *Material Storage and Handling*

- **Store hazardous materials in a covered area.** Storing your hazardous materials in a covered area is a good way to protect them from rainwater contamination, degradation, and character alteration due to sun and heat exposure. You can also reduce the potential for fires, explosions, chemical reactions, and other dangerous situations.
- **Store materials in reusable containers or returnable totes.** Many suppliers now offer reusable containers that can be returned to them when empty, saving you significant storage space and disposal cost.

### *Spill and Leak Prevention*

- **Update your spill response plan.** The law requires facilities to have a prepared spill response plan for hazardous materials. Immediate response to spills, leaks, and improper storage minimizes employee exposure, and at the same time reduces environmental impacts, potential liability, and waste and cleanup costs. Even a small dripping leak can produce several gallons of waste per day, which costs you money.
- **Use dry disconnect links.** Many manufacturers offer hose connection devices with a mechanism to seal off both the hose and the fixed pipe end when the hose is disconnected.
- **Conduct practice drills for major spill response.** A rapid, safe, and organized response is essential during major spills, and reduces waste generation and cleanup costs. Periodic practice drills improve the preparedness and effectiveness of employees during emergency situations.

### *Material Substitution*

- **Research the use of alternative nonhazardous or less hazardous materials.** Switching materials is one of the most common methods for reducing pollution and it often results in significant regulatory reduction. Companies reporting on the TRI Form R are often able to eliminate this requirement by switching one chemical. They are also able to eliminate the need for costly air permits. You can use the SAGE and vendor databases described earlier in this chapter to find alternative materials. Many companies let their vendors do the work for them by demanding materials that are "greener." If your vendor is unable or unwilling to work with you, consider a competitor.
- **Using aqueous cleaners.** This option is the most common form of material substitution. Aqueous cleaners usually emit less toxic fumes, are nonflammable, and tend to be less hazardous to workers, the public, and the environment. You can use the SAGE and vendor databases described earlier in this chapter to find alternative materials.
- **Use low-VOC paints and coatings.** Volatile organic compounds (VOCs) contribute to the problem of photochemical smog. Use of low-VOC paints and coatings can reduce hazardous air pollutants and the need for additional hazardous materials, such as petroleum distillate solvents. Some low-VOC materials may still contain toxic metal pigments, and are considered hazardous, so workers should exercise caution when using them.

### *Cleaning and Degreasing*

- **Switch to a high absorbent "kitty litter."** When purchasing an absorbent material (commonly known as "kitty litter") for cleaning up oil and grease leaks, consider the full cost. A cheap absorbent may seem like a bargain, but if a more expensive version absorbs better, you won't have to use as much, and you can avoid disposal fees.
- **Install an on-site solvent distillation unit.** Solvent distillation units are often the single best option for anyone with a coating operation. If you are coating a product, you are probably using some kind of solvent. Using a column can reduce your waste and cut back on your solvent purchases. Distillation units are available in batch sizes from 2 to 250 gallons. Facilities generating as little as 500 gallons of toxic solvents (for example, toluene, MEK, MIBK) will recover the cost of the distillation unit in less than one year of operation.

### *Process and Equipment Modification*

- **Use Staged Rinsing.** The name sounds formal, but the idea is simple; you may be using it every time you wash your dishes in three sinks instead of one. Extend your solvent life by rotating three containers of solvent. It allows you to use less water or cleaning solution, by emptying the dirtiest containers first, and continuing to use those that are less dirty. (See Figures 3 and 4)

  To set up a counter-current rinsing technique:

  ▼ Align 3 containers as close as possible, to prevent spilling.

  ▼ Fill each container with water or cleaning solution.

▼ Dip soiled part in the first container (A), then in the second container (B), and then in the last container (C), until container C starts to get dirty.

■ **Employ drag-out rinsing techniques.** Process chemicals lost during drag-out are a significant source of waste generation. Drag-out rinsing can reduce this loss and save you money. Installing drip collection devices on drag-out tanks can reduce your waste even more and may reduce cleanup costs.

**Figure 3. Staged Rinsing Process**

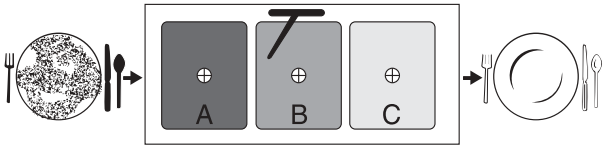


Figure 3 breaks down the staged rinsing area into a simple concept like doing your dishes. Once your final rinse container (container C) becomes a little dirty, you empty your first container (container A). Then follow these steps:

- Discard the soiled contents of container A and refill container A with new cleaning solution.
- Move containers B and C into the first and second positions respectively.
- Place container A in container C's original position.
- Start dipping soiled parts into the three containers until the last container starts to get dirty.

**Figure 4. Continuation of the Staged Rinsing Process**

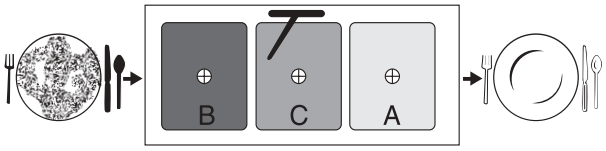


Figure 4 shows a progression of the staged rinsing process. Once you refill container A, move container B and C up the line and put container A in the last spot.

Repeat the procedure again.

***Product Modification***

■ **Modify the specifications or design of your product.** Products that become a hazardous waste when they are no longer usable are costly to manage and detrimental to society and the environment. Hazardous products and wastes may be a long-term liability to you and your customers, and should be phased out, where possible, in favor of safer, less toxic, and more efficient products. Remember, companies can be valuable leaders in the social transition toward environmental awareness and stewardship in our country and the world. If you create a viable "green" product, the market will follow.

## Your Process-Specific Options

Identify a process in your facility. Using the general options and some ideas from the process-specific options, can you think of ideas that would minimize waste in this area? Ask the people who work in that process area. What ideas do they have? Are there options available through your trade association? Are there case studies on the Internet?

## Getting P2 Help

The options above are starting points. The best ideas will come from the people who work at your facility each day. If you are unable to find useful options, contact one of our P2 engineers at 512/239-3100.

**Fast Facts**

▼ Finding an option to reduce your pollution and save money is the most challenging part of the Waste Reduction Policy Act.

▼ No two facilities are the same. You must develop options that fit your operation. The lists and Web sites in this guide are good starting points.

CHAPTER 6:

# Prioritizing Your Projects and Setting Goals

**Why Should You Read This Chapter?**
- Learn to choose the best projects.
- Find hidden cost when managing your waste.
- Set goals and schedules to ensure successful implementation of projects.

Once you have identified a few pollution prevention (P2) options for your wastes, you will need to determine which ones will work best for your facility—Step 4 of the pollution planning process.

WRPA requires that you:
- discuss the technical and economic feasibility of each project;
- list the environmental and human health risks associated with your P2 projects;
- identify cases where implementing your P2 projects will result in the release of a different pollutant or contaminant, or may shift the release to another medium.

The level to which you discuss these three things is up to you. Some options are simple and easy to evaluate, while others require more detailed studies.

## TECHNICAL AND ECONOMIC EVALUATION

During your search for options, you may have discovered more than one way to reduce a particular waste, or too many options to implement all at once. You can approach this difficult decision by looking at six critical decision-making factors to determine which option is best for your facility.

The assessment team should look at:
- The cost of implementation (economic feasibility).
- Technical viability of the proposed project (technical feasibility).
- Compatibility with existing systems.
- Complexity of the project.
- Ability to measure and observe results.
- Ability to test ideas before full implementation (when needed).

The first two factors (economic and technical feasibility) are required steps in the P2 Planning process. Evaluation of the technical and economic feasibility of proposed projects will help you determine which projects to commit company resources to and how to set your reduction goals.

## TECHNICAL FEASIBILITY

To determine the technical feasibility of a project, your assessment team should ask some basic questions:
- Will product quality be maintained?
- Will installations stop production? If so, how long?
- Will training be required for the new system?
- Will new equipment work with the old equipment?
- Will production increase, or decrease?

Your team will probably think of many other pertinent questions to help determine if the option is a practical solution for your facility. If the results for any option are determined to be unacceptable to the facility, you may want to look for another option. If you cannot find a suitable option for your prioritized waste, you may want to select a different waste to work on instead. Also keep watching for new technical innovations that could be incorporated into your plan at a later date.

## ECONOMIC FEASIBILITY

A critical element of a feasibility analysis is the economic feasibility. Economic feasibility has two benefits to your facility.
- Efficiency—you can identify areas to reduce waste and save money.
- Evaluation—you can compare options identified in the technical feasibility section.

By examining the economic feasibility, companies have saved money while reducing waste. This is possible because waste is, by definition, inefficient use of raw materials. Isolating the costs associated with wastes, instead of adding them into overhead expenses, allows a company to make an informed decision when implementing their plan.

The core elements of evaluating the economic feasibility of a pollution prevention option are:
- Waste cost evaluation—What are the costs of generating waste?
- Project cost evaluation—What will the pollution prevention option cost? What are the savings of the option?
- Comparison—Does the option save money, or cost money?

## How Complex Should Your Analysis Be?

WRPA requires an analysis of the economic feasibility of your projects, but does not specify how detailed your analysis must be. The detail of your analysis depends on a variety of factors, such as the number of projects you have, how much capital is needed, and internal company policies.

As with personal finances, the level of analysis for a business depends on individual needs. Some people never reconcile their personal checking accounts. They have a rough idea of how much they spend and keep a small buffer in their account. They may never bounce a check, but they aren't always sure where their money goes.

Other people may use some of the popular software to identify exactly how much money they spend and where they spend it. These people are able to spot waste in their spending habits and to manage their money more efficiently.

Likewise with WRPA, your economic analysis may be minimal, ensuring only that the project doesn't cost too much. This is particularly effective on simple projects. However, a simple cost comparison could overlook some of the hidden costs, such as labor, liability, and regulatory compliance. To get the most benefit from your plan, you may wish to sharpen your pencil and do a full-cost accounting of your projects.

## Simple Economic Analysis

If you have several options, you might want to start your economic feasibility analysis by comparing the costs of the different projects. This simple comparison is a way to identify some of the better projects and to eliminate some of the economically impractical options. A simple analysis is particularly good at identifying the "low hanging fruit," or options that are easy and inexpensive to implement. A review of a hypothetical company, Joe's Paint Shop, offers four quick economic analyses.

Joe's Paint Shop generates hazardous waste as a result of paint booth operations. Ed, the shop manager, worked with the employees to develop the four options in Example 4.

Even a simple look at the options shows three things:

- Option 1 saves money. The only costs are for a worker to take a few minutes to rotate the filter. The shop adopted this option immediately.
- Option 2 costs more initially, but the savings are realized quickly, so the shop adopted this option, as well. Options 1 and 2 together saved the shop $150 initially, and even more money over the long term, due to the reuse potential of the Styrofoam filters.
- Options 3 and 4 looked promising, but Ed decided to do a more detailed analysis before adopting them.

## Identifying Hidden Costs

As stated in Chapter 4, sometimes people are not aware of how much they are spending on managing waste. These costs are usually counted as overhead. It is estimated that waste stream costs are underestimated by four to seven times, because many times hidden costs are overlooked. By identifying the hidden costs, you can identify opportunities for savings. Hidden costs may include:

- inspection and permit fees
- preparation costs
- record-keeping and reporting costs
- liability for accidents and fines
- sampling and testing fees
- safety equipment and secondary containment structures
- storage and containers
- employee training

## Full Cost Accounting

For large industrial facilities with complex projects that span many years, full-cost accounting is the best option for evaluating a pollution prevention project. You will need to involve your accounting staff, as well as technical staff, to find the true cost of doing business and to evaluate the feasibility of switching to another method.

The advantage of going through this process is that environmental decisions are made like any other business decision; they take into account the overall profitability of the project for the company. If you manage an Environmental Health and Safety department at a large facility, you have an opportunity, through accounting, to turn the environmental department into a profit center.

In Example 5, an auto shop office manager, Sally, attributed the environmental costs to the process area. By doing this, she was able to identify inefficiencies and convince some mechanics to switch to nonhazardous solvents.

**Example 4. An Example of a Simple Economic Feasibility Analysis**

| Option | Saves $ by | Savings | Costs |
|---|---|---|---|
| 1. Rotating filters | Filters last twice as long because ones in low-use areas are switched out with ones in high-use areas | $5.00/filter or $100/ year | minimal |
| 2. Substitute filters for baffled Styrofoam elements | Lasts four times longer between replacements and can be washed off for reuse | $5.00/filter or $200/year | $10/filter or $100, 1st year |
| 3. Switching to water-based paints | Water-based paints to meet shop needs are more expensive | ? | 2.00/gal |
| 4. Automated paint gun washing system | Saves on labor and solvent usage. Reduces gun clogging | $900/yr | $800 (one time) |

**Example 5. Comparison of the Cost of Using Hazardous Solvent at an Auto Repair Shop**

| | Bay 1 – Hazardous Solvent | Bay 2 – Nonhazardous Soap Solvent |
|---|---|---|
| Solvent cost | ($3.00/gal) X (1,500 gal/yr) = $4,500/yr | ($5.00/gal) X (300 gal/yr) = $1,500/yr |
| Solvent disposal cost | (4 drums/year) X $450/drum = $1,800/yr | $0.00/yr |
| **Total costs** | $6,300/yr | $1,500/yr |

Two bays at the automobile repair shop use parts washers. Auto Bay 2 has switched to a nonhazardous parts washer, while auto Bay 1 uses a hazardous solvent to clean their parts. The solvent is picked up by a company and recycled off site.

Sally, the office manager, would like to switch Bay 1 to a nonhazardous solvent, but the repair technicians claim that the soap washers slow down work. The owner agreed with the Bay 1 mechanics because he saw that they were repairing vehicles quicker than Bay 2.

Sally looked at some of the true cost of using a hazardous solvent (see example 5).

One thing Sally realized when she looked at the costs was that even though the soap costs more per gallon, the mechanics use less, so it lasts longer. Over a one-year period, they purchase over 1000 gallons less soap than hazardous solvents.

In other words Bay 1 was costing the service station at least $4,800 more than Bay 2 when factoring in volume used and waste disposal. It didn't take long for Bay 1 to switch, once the owner realized the costs of using hazardous solvents. Sally got a raise, and spends a lot less time doing paperwork.

In the previous example, Bay 1 was seen as more profitable, when in fact they were simply shifting the cost of handling the waste out of their area. In other words, both bays were paying for Bay 1's waste expenses.

These are some of the factors to include when going through the process of full environmental cost accounting. If you would like to go through a full environmental cost accounting process, a detailed worksheet is in Appendix E. This worksheet will guide you through six basic steps to save money by reducing waste. There is also an online cost accounting tool that could be helpful in determining your environmental cost.

The Texas Engineering Extension Service (TEEX) designed an online course to help environmental professionals and other nonaccountant industry personnel with total-cost accounting. The course will:

- help you understand the impact of environmental costs on your business;
- provide instruction on comparing the cost of one process to another; and
- give you a tool for communicating costs and benefits of pollution prevention projects to facility management.

TEEX's total-cost accounting Web site can be found at: **http://teexcit.tamu.edu/tca**.

## ENVIRONMENTAL MEDIA SHIFT

WRPA requires that you document if there is a media shift when you implement your new projects. A media shift is the transfer of a pollutant from one environmental media (air, water, soil) to another. Most source reduction projects don't have a media shift because reducing your waste at the source, would not be a media shift. If your projects will result in a media transfer, you must identify this in your plan (see Worksheet 4).

## RISK EVALUATION

It is important to remember that hazard and risk are not the same. A *hazard* is defined as something that can cause harm, such as chemicals and electricity. A *risk* is the chance that the environment or a person will be harmed by a hazard.

When you are evaluating risks, you are looking for the potential that the hazards you identified will cause harm. It is also beneficial to think about who or what will be harmed: Is this a risk to human health or the environment? Once you have identified your risks, determine if your existing safeguards are sufficient, or if more should be done to minimize risks.

One way to evaluate the health and environmental risks of a possible product substitution is to review the material safety data sheet (MSDS) for each possible substitute and to weigh the risks.

## SETTING GOALS AND AN IMPLEMENTATION SCHEDULE

Once you have a good project you will need to set a schedule for implementation. This will ensure that your projects will be moved from the drawing board into your business. WRPA requires you to set goals, evaluate environmental impact, and set milestones. Common goals for WRPA reporters include:

- Percent of hazardous waste to be decreased
- Tons of toxic chemicals reduced
- Reduction in releases of volatile organic compounds
- Gallons of water to be saved

An implementation schedule includes dates by which critical project steps must be complete. For instance, if you plan to reduce your TRI chemical use to zero over the next five years, your milestones might look like this:

- Eliminate methylene chloride in the machine shop by February 5, 2003
- Identify alternative solvents for methyl ethyl ketone by February 5, 2004
- Find low styrene monomer by July 2, 2006
- Have no TRI chemicals on site by 2007

Failure to meet the reduction goals stated in your facility's plan is not a violation of the WRPA, and does not expose you to any penalties.

## Directions for Worksheet 4: Project Description and Goals

Use this worksheet (see example in this chapter) to describe all the required elements of your prioritized projects and facility goals, including:

- name of waste to be reduced and amount of reduction you expect to achieve by the end of the five-year plan;
- type of project (source reduction or waste minimization);
- statement of facility goals;
- project description;
- implementation schedule (major steps in project development and implementation);
- technical, economical, human health, and environmental considerations; and
- potential for release of a new waste, pollutant, or contaminant, or media shift.

Remember, *source reduction* is reduction of waste at its source. *Waste minimization* is any activity that reduces hazards associated with a waste (reuse, recycling, neutralization).

To set your facility goal, estimate the amount of reduction you **hope** to achieve by the end of the fifth year (base-year waste generation amount minus the reduction anticipated).

For each project, prepare an implementation schedule which outlines a schedule of major tasks to be accomplished.

*Note*: Small Quantity Generators that do not report on TRI Form R are not required to fill in the areas that are marked with an asterisk.

**Fast Facts**

To choose a P2 project, consider:

- ▼ Cost benefits
- ▼ Risks of the pollutant
- ▼ How practical your project is

## WORKSHEET 4: PROJECT DESCRIPTION AND GOALS

(Use a separate worksheet for each prioritized project.)

Facility name: _____ 5-year planning cycle: From year _____ to _____

Target waste or TRI chemical: _____ This project is: ❑ Source reduction activity?
❑ Waste minimization activity?

a. Amount waste generated at base year: _____

b. Amount of reduction anticipated: _____

c. Amount of waste generated at 5th year (a minus b): _____

Facility goals (5th year goals): _____

_____

_____

_____

_____

Project description: _____

_____

_____

_____

Implementation schedule and goal of project: _____

_____

_____

_____

_____

_____

_____

_____

_____

Describe human health and environmental considerations: _____

_____

_____

_____

*Small quantity generators that are also non-TRI Form R reporters are not required to complete the following portion.*

Will this project result in a new pollutant, contaminant or waste? ❑ YES ❑ NO

Will this project result in a shift to another medium? ❑ YES ❑ NO

If you answered YES to either question, EXPLAIN: _____

_____

Describe technical and economic considerations: _____

_____

_____

CHAPTER 7:

# Training Employees on P2 Awareness

**Why Should You Read This Chapter?**

- Learn the importance of employee awareness and training.
- Learn how to meet WRPA's requirement for employee awareness and training.

In this chapter, you will learn about Step 5 concerning employee awareness and training.

A successful company is only as strong and successful as its employees. For this reason, managers know how critical employee training and awareness can be to efficient operations.

As one of your company's most valuable resources, employees can influence the quality of operations, as well as P2 success. By actively encouraging all employees to get involved in P2 action and awareness, you drastically improve your company's ability to save money and achieve P2 success.

## QUESTIONS YOUR ASSESSMENT TEAM CAN ADDRESS

Gather your assessment team and evaluate your current awareness and training program by asking questions such as the following:

- How do we ensure that our employees properly perform their manufacturing job or other functions that are critical to our company?
- How are people trained in areas that are important to our company?
- What are the largest environmental risks to our company?
- How do we ensure that each employee knows about the risks they are responsible for managing?
- Do employees have a way of bringing environmental issues to our management?
- Do employees know the consequences of failure to follow their environmental training?

WRPA requires facilities that are LQGs or that report on TRI Form R to have written documentation of an employee awareness and training program that aids in accomplishing pollution prevention goals. SQGs that do not report on TRI Form R are not required to have written documentation of the employee awareness and training program, but it is recommended to have one in place to accomplish your pollution prevention goals.

## EVALUATING YOUR TRAINING PROGRAM

One method of evaluating your program is to look at employee function by process and waste generation. Refer to your facility process flow diagrams (Worksheet 2) and list employees that work within each major job function throughout the process. Then decide what training would most benefit that employee or operation, and determine how that training is currently achieved.

If something is missing, you'll probably see it and be able to correct it. Remind your assessment team that talking with facility employees at every level of operations can stimulate innovative solutions to even the greatest of problems.

Each facility will approach employee awareness and training according to its specific needs and varied levels of P2 involvement. Facilities with the strongest commitment to reducing environmental impacts usually have very active programs and high employee involvement.

How you choose to encourage employee involvement and organize effective training is up to you. Worksheet 5 will help you describe how your program can contribute to the achievement of your goals. As always, worksheets are provided for your benefit, but are not required if you elect to use your own format.

### Directions for Worksheet 5: Employee Awareness and Training

This worksheet can be used by LQGs and TRI reporters to fulfill WRPA P2 Plan requirements concerning employee awareness and training. Copy this sheet for each facility process in Worksheet 2 (process flow diagrams), or combine related activities to cut down on paperwork.

List which process you are describing, the major steps or activities in the process, and waste generated. Next, list each employee who performs the given activity and determine how their job impacts waste generation and reduction.

Based on the employee's activity, decide what type of training would be most relevant and useful to assist the employee in contributing to the facility's pollution

prevention goals. This will often require training in more than one subject or method, so list each method on a separate line, followed by the date when the training is completed. An example is on the next page.

Finally, describe how you ensure employee awareness of their environmental impact, and how the training method selected will contribute to the achievement of your P2 projects and goals.

**Fast Facts**

- Employee awareness is ensuring all employees are aware of their environmental responsibilities.
- Training is only one part of an employee awareness program.
- By making employees aware of their role in the facilities Pollution Prevention Plan, you can achieve maximum benefits.

## WORKSHEET 5: EMPLOYEE AWARENESS AND TRAINING

Facility: _____ Plan Date: _____

Updated: _____

| Process/Activity | Waste(s) Generated | Employee(s) Performing Activity | Training Needed | Date Completed |
|---|---|---|---|---|
| *Loading* | *HW spills & leaks* | *Joe Helpful* | *Spill prevention and cleanup* | *1/2/03* |
| | | | *Equipment safety and operation* | *2/1/03* |
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How do you ensure employees are aware of their impact on the environment, waste generation, and reduction for this process?

How does each training or awareness method listed above contribute to facility goal achievement?

CHAPTER 8:

# Documenting the P2 Plan

**Why Should You Read This Chapter?**
- Find out which documents are required for your facility under WRPA.
- Learn how to assess your progress toward facility goals.

This chapter involves Step 6, documentation of the P2 Plan.

Following the guidance in the previous chapters will help you meet the documentation requirement of the Waste Reduction Policy Act. This chapter will guide you through documentation of:

- Pollution Prevention (P2) Plan
- Executive Summary
- Signed Certificate of Completeness and Correctness
- Annual Progress Report forms (LQGs and/or TRI Form R reporters only)

**Notice: You are required to keep a copy of your plan on site and available for an inspector.**
Many companies make the mistake of sending in their Executive Summary, even though they have no plan on site. This results in a **Notice of Violation** when they are inspected.

You are required to prepare a P2 Plan and have the P2 Plan available for an investigator. Although you do not send it to TCEQ, the plan is the most important requirement in WRPA. It is also the single most common violation under WRPA.

You are required to submit the Executive Summary and, for some reporters, submit an Annual Progress Report to the TCEQ. As long as you meet the documentation requirements of the rule (see Appendix A), you are not required to fill out any of the worksheets in the chapters. However, you are required to fill out the Annual Progress Report (APR) forms and submit them to the TCEQ. APRs are only required for facilities who are LQGs and/or those who report on the EPA's TRI Form R.

## DOCUMENTATION OF THE POLLUTION PREVENTION PLAN AND EXECUTIVE SUMMARY

You can document the plan by gathering the following materials you have already completed:

- worksheets;
- notes from the site assessment;
- P2 options you are considering;
- other information that might be useful in supporting your P2 Plan, projects, goals and decisions;
- items like material safety data sheets (MSDS); and
- invoices, job descriptions, training documents, Annual Waste Summaries, TRI reports, and other important records for use as references.

Make sure that several people are aware of the plan and have a copy. If you followed the team approach recommended in earlier chapters, you should have many people who are aware of the plan, following the schedules, and able to produce it if an inspector checks for it.

The Executive Summary should be included in the plan kept on site, and a copy of the Executive Summary and a Certificate of Completeness and Correctness should be sent to the TCEQ. Although there are no required forms for the Executive Summary, we recommend Worksheet 6. This Worksheet will ensure TCEQ has the necessary information to track your compliance.

### Documentation Requirements for LQGs or TRI Reporters

On the following page is a table showing the minimum documentation requirements for Pollution Prevention Plans of large quantity generators or reporters on TRI Form R.

### Documentation Requirements for SQGs Who Are Not TRI Reporters

On the following page is a table showing the minimum documentation requirements for pollution prevention plans for small quantity generators that do no report on TRI Form R.

## P2 PLAN FORMAT AND WHEN TO REVISE

Your P2 Plan and Executive Summary can be in any format, as long as it has the elements listed in Tables 4 and 5. P2 Plans must be updated every five years. Many companies revise their plans throughout the five-year period, but you are not required to send additional documentation to the TCEQ unless the facility experiences significant changes in operation and scope of work.

The most common reason companies send revisions to the TCEQ is if they change their solid waste registration or TRI identification numbers. You are required to

prepare a new plan once every five years and send an updated Executive Summary to TCEQ. *You should begin planning three to six months before the updated plan is due*.

Worksheet 6 provides you with an easy-to-use format for submitting the Executive Summary and Certificate of Completeness and Correctness. This is the part of the plan you are required to send to the TCEQ.

**Table 4. Minimum Documentation Requirements for Large Quantity Generators or TRI Form R Reporters**

| P2 Plan | Executive Summary |
|---|---|
| ■ Facility description<br>■ List of all hazardous waste generating activities<br>■ List of all TRI release activities<br>■ Prioritized list of technically and economically feasible P2 projects<br>■ Explanation of P2 projects to be undertaken with discussion of:<br>▼ technical and economic considerations<br>▼ environmental and human health risks<br>■ Estimate of type and amount of reduction anticipated<br>■ Implementation schedule for each P2 project<br>■ Description of measurable P2 goals<br>■ Explanation of employee awareness and training programs<br>■ Discussion of projects that may result in the release of a different pollutant or contaminant, or that may shift the release to another medium<br>■ Signed certification by owner or corporate officer of commitment and ability to authorize company resources for implementation<br>■ Executive Summary of the P2 Plan | ■ Facility description, including:<br>▼ facility name<br>▼ mailing and physical addresses<br>▼ contact, phone numbers, and e-mail<br>▼ general description of facility<br>▼ ID numbers—TCEQ solid waste, EPA, and TRI numbers<br>▼ SIC code or NAICS (if available)<br>▼ time period the five-year plan is in effect<br>■ List of all hazardous wastes generated and the volume of each<br>■ List of all reportable TRI releases and the volume of each<br>■ Prioritized list of pollutants and contaminants to be reduced<br>■ Statement of measurable reduction goals<br>■ Explanation of environmental and human health risks considered in determining reduction goals<br>■ List of projects with an associated schedule of implementation<br>■ Implementation schedule for future reduction goals<br>■ Discussion of projects that may result in the release of a different pollutant or contaminant, or that may shift the release to another medium<br><br>**Annual Progress Report**<br>Every July 1 an Annual Progress Report must be submitted using TCEQ forms. Forms are available online or in this guide. |

**Table 5. Minimum Document Requirements for Small Quantity Generators That Do Not Report on TRI Form R**

| P2 Plan | Executive Summary |
|---|---|
| ■ Facility description<br>■ List of hazardous wastes generated and volume of each<br>■ Prioritized list of pollutants and contaminants to be reduced<br>■ Statement of measurable reduction goals<br>■ Discussion of environmental and human health risks considered in determining reduction goals<br>■ List of P2 projects with implementation schedule<br>■ Implementation schedule for future reduction goals<br>■ Signed certification by owner, or officer, of commitment and ability to authorize company resources for implementation<br>■ Executive Summary of the P2 Plan | ■ Facility description, including:<br>▼ facility name<br>▼ mailing and physical addresses<br>▼ contact, phone numbers, and e-mail<br>▼ general description of facility<br>▼ ID numbers for TCEQ solid waste and EPA<br>▼ SIC code or NAICS (if available)<br>▼ Time period the five-year plan is in effect<br>■ Projection of the annual amount of hazardous waste that the facility expects to generate by the end of the 5-year plan<br>■ Prioritized list of pollutants and contaminants to be reduced<br>■ List of source-reduction activities associated with reduction of prioritized wastes identified in the plan |

# WORKSHEET 6: EXECUTIVE SUMMARY AND CERTIFICATE OF COMPLETENESS AND CORRECTNESS

Planning Cycle:_____(1 st year) to _____(5th year, 1st year plus 4)

## EXECUTIVE SUMMARY, PART 1: FACILITY INFORMATION

| | |
|---|---|
| Company name: | Facility name: |
| Mailing address: | Physical address:<br>*(if same as mailing, write "same")* |
| City, State, Zip: | City, State, Zip: |
| County: | County: |
| WRPA contact: | Fax: |
| Phone: | E-mail: |
| TCEQ SW ID: | Customer reference number:<br>*(Always begins with CN)* |
| EPA ID: | Regulated entity number:<br>*(Always begins with RN)* |
| TRI ID: | |
| Primary SIC Code: | Secondary SIC Codes: |
| NAICS code:<br>*(to convert SIC to NAICS, go to: www.census.gov/epcd/www/naics.html)* | |

General description of facility: _____

_____

_____

_____

_____

_____

## EXECUTIVE SUMMARY, PART 2: FACILITY'S GENERATION AMOUNT

List amount of all hazardous wastes generated for 20_____
*The data should be taken from your most recent Annual Waste Summary form (base-year data*).*

| Description of waste and TX waste code number: | Amount generated in tons: |
|---|---|
| _____ | _____ |
| _____ | _____ |
| _____ | _____ |
| _____ | _____ |
| _____ | _____ |
| _____ | _____ |
| _____ | _____ |

List below all reportable TRI chemicals, CAS numbers, and the amount released or transferred for 20_____
*The data should be taken from your most recent TRI form R (base-year data*)***

| TRI chemicals and CAS number: | Amount released or transferred in tons: |
|---|---|
| _____ | _____ |
| _____ | _____ |
| _____ | _____ |
| _____ | _____ |
| _____ | _____ |
| _____ | _____ |
| _____ | _____ |

Provide a prioritized list of pollutants and contaminants to be reduced during five-year period: _____

_____

_____

_____

_____

_____

## EXECUTIVE SUMMARY, PART 3: P2 PROJECTS AND GOALS

Statement of facility's measurable reduction goals: _____

_____

_____

_____

_____

_____

Explain the environmental and human health risks considered in determining reduction goals**: _____

_____

_____

_____

_____

_____

List of pollution prevention projects with an implementation schedule of each project: _____

_____

_____

_____

_____

_____

Implementation schedule for future reduction goals: _____

_____

_____

_____

_____

_____

Identify cases in which the implementation of source reduction or waste minimization activity may result in the release of a different pollutant or contaminant, or may shift the release to another medium.**_____

_____

_____

_____

_____

_____

* Base year is the year prior to the 1st year of your plan
** Not required for SQG that are non-TRI Form R reporters

## CERTIFICATE OF COMPLETENESS AND CORRECTNESS

### Certificate of Completeness and Correctness

The person who signs the Certification of Completion should have the authority to commit the corporation's resources to implement the plan. This is usually the plant manager, owner of the facility, or whoever runs the facility.

This document certifies that the Pollution Prevention Plan has been completed and meets the specified requirements of the Waste Reduction Policy Act of 1991, the Solid Waste Disposal Act and 30 TAC §§335.471-335.480, and that the information provided herein is true, correct, and complete.

This certificate should not be signed by the environmental health and safety manager. Signatures from consultants or other third parties are not compliant.

This document also certifies that the person whose signature appears below has the authority to commit the corporate resources necessary to implement this plan.

Name _____ Title _____
(please print clearly)

Position (check one): ❑ Facility Owner ❑ Corporate Officer

Signature _____ Date: _____

CHAPTER 9:

# Reporting Annually

**Why Should You Read This Chapter?**
- Find out the requirements for annual reporting.
- Learn the steps for completing the Annual Progress Report (APR).
- Learn how you can share your success story.

This chapter deals with Step 7 of the P2 Planning process—reporting annually. Large quantity generators (LQGs) of hazardous waste and/or facilities reporting on TRI Form R are required to report annually on their progress toward pollution prevention goals laid out in their P2 Plan. The pollution prevention Annual Progress Report (APR) measures this progress, and provides an opportunity to review and update your plan and look for new ways to save money by reducing waste. LQGs and TRI reporters must meet the annual reporting requirement by submitting the required APR form (TCEQ-00784) by July 1 of each year. The APR form is available in this guide, as well as online **www.P2Plan.org**.

The most important information collected in the Annual Progress Report is the amount of pollution reduced at the source (Part 3). This is the one piece of information the TCEQ could collect from no other source. It documents the amount of pollution that would have been generated if you did not have a pollution prevention project.

If you read the rule, you may notice a requirement for Annual Progress Reports for SQG reporters. Small quantity generators (SQGs) of hazardous waste that do not report on TRI Form R, are not required to submit the required APR forms. Those facilities meet their Annual Progress Reporting requirements by submitting their Annual Waste Summary.

## PURPOSE OF THE ANNUAL PROGRESS REPORT

The purpose of the APR is to assist facilities in monitoring and improving progress toward their pollution prevention goals and to measure statewide progress towards successful pollution prevention. The TCEQ analyzes APR data in order to:

- report the statewide status of pollution prevention to the Texas Legislature;
- communicate industrial pollution prevention progress to the press and public; and
- identify facilities for potential success stories.

Through accurate reporting of your P2 progress, you may contribute to the direction of future environmental programs in Texas.

The biggest benefit to the APR is for the facility. Regular reporting of the APR encourages facilities to continuously monitor and reassess their pollution prevention efforts. Many companies improve the effectiveness of their pollution prevention programs because completion of the APR reveals additional opportunities to reduce waste and increase profits.

**Need Assistance?**
If you need ideas on how to improve the effectiveness of your pollution prevention activities, refer to the P2 options in Chapter 5. If you are unclear about the difference between source reduction and waste minimization, see the definitions provided in the introduction. To get the best results out of your P2 Plan, visit the technical assistance resources available at **www.P2Plan.org**.

## ONLINE APR

The Annual Progress Report is also available online, for your convenience. Avoid messy paperwork, last-minute mailing, and lost reports by completing the APR form online. It's fast and easy, and you'll receive a confirmation by e-mail to let you know we received it, within minutes of your submission. You can also print out a copy for your own records.

Submitting the APR online has the added benefit of reducing typographic errors when data is entered. You insert the information and send it on its way. When we receive it, it gets downloaded to our system as is, which eliminates data entry mistakes on our end. Plus, the online APR is accessible 24 hours a day, every day.

Another advantage of online filing is that you can get your report done early to avoid the last minute rush, and avoid having to call and request a new form when you've misplaced yours. By submitting your APR online, you can rest easy knowing it will arrive on time to meet the July 1 deadline.

**Where to Report Online**

You can complete your Annual Progress Report online using **www.P2Plan.org**.

Most companies find this the quickest and easiest way to complete the Annual Progress Report. The TCEQ prefers online submissions to paper.

## INSTRUCTIONS FOR COMPLETING THE APR FORM

Six copies of the required APR form have been provided in this guide (Appendix F). Use one copy for each year of your five-year plan. We recommend that you calculate your answers on a separate sheet of paper before completing the final, colored forms for submission. This ensures that your submission is clean and legible, with minimal mistakes and corrections. If you want to submit your Annual Progress Report using paper, the following directions will guide you through the form.

### Part 1—Facility Description

Part 1 of the APR asks for facility and contact information. Check your answers in this section to ensure that you receive credit for your APR submission. Without correct facility information, we may not be able to locate your records.

Report year—Enter the calendar year being reported on the APR. Remember that although your report is due each July, the reporting period covers January to December of the previous year.

Report date—Enter the date that the report is sent to the TCEQ. All reports should be postmarked no later than July 1 of the year following the report year.

Company name—Enter the name of the company or corporation that appears on the notice of registration (NOR) for the facility. If you are a large company with several facilities, you should also enter a site name (for example, ABC, Inc., West Texas Plant).

Mailing address, city, state, and zip code—Enter the mailing address of the pollution prevention contact person. The address can be either a street address or a post office box. Use the five-digit zip code and the four-digit extension (xxxxx-xxxx), when it is known.

Name of pollution prevention contact—Enter the name of the person who can answer questions about the facility's pollution prevention program from the public, the TCEQ, or other parties. This person does not have to be the same as the person who completed or oversaw completion of the APR, but the individual should be able to answer questions about the facility's P2 Plan.

Telephone, fax, e-mail—Enter area code, telephone number, and fax for the pollution prevention contact person. Include the e-mail address if you would like to receive correspondence from TCEQ through the Internet.

Is your company independently owned or operated?—If your company is part of a larger company, a subsidiary of another company, or is operated by another company, then the answer is "no."

Facility Identification Numbers—It is essential to provide the correct Solid Waste, EPA and TRI identification numbers. If you do not provide accurate ID numbers, your facility may not receive credit for the submitted report.

Enter the 5-digit solid waste number from your TCEQ Notice of Registration (NOR).

Enter the 12-character EPA ID number.

Enter the 15-character TRI ID number from your TRI report, if applicable.

Number of employees—Enter the estimated total number of full-time employees at all company sites. For this form, a full-time employee means 2,000 work hours per year. You may wish to estimate the number of employees based on employee hours in a work week (see Example 6). If your facility is owned by an extremely large company, you may answer "over 1,000."

Enter the date the P2 Plan was last updated—This would be the year your current five-year plan began. If applicable, attach a brief explanation of why the plan and Executive Summary were revised.

Check the box if you are currently a member of the Clean Texas, Cleaner World program. Enter "X" if your facility is a Clean Texas, Cleaner World member for the report year. If you would like information on this program, or want to become a member, please contact your Clean Texas, Cleaner World coordinator at 512/239-3100, or by e-mail at: **ppc@tceq.state.tx.us**.

### Part 2—Projected Amounts for Goal Year

In this section, report how much waste you expect to reduce by the end of the fifth year of your plan. It is an estimation, and the numbers reported each year will remain the same, unless your facility goals are updated during the year to reflect better results or reduced expectations. Your goals can be found in your P2 Plan.

Goal year—This is the fifth year of your plan. If your plan begins in 2003, your goal year is 2007.

Row 1—Enter the estimated amount of hazardous waste (Column A) to be generated and the total estimated amount of TRI (Column B) chemicals to be released and transferred for your goal year.

Row 2—Add the total amount of hazardous waste (Column A) and/or TRI (Column B) chemicals that will be source-reduced over the five-year period (See Example 7).

Row 3—At the end of your five year plan, you will have a certain amount of hazardous waste and/or TRI chemicals remaining (Row 1). What percentage of Row 1 do you plan to recycle, reuse, or implement other waste minimization practices? (See Example 8)

### Part 3—Reduction Achievement for the Report Year

This section is the most important part of the Annual Progress Report. Use this section to report actual reduction amounts achieved for the report year. The report should reflect the previous calender year's pollution prevention activities.

If you have a difficult time matching your projects to our categories, look at the "Checklist of Pollution Prevention Options" in Chapter 5 or the "Source Reduction Activities by Category" in Appendix D. You may not find an exact match, but most projects can be related to one of the categories provided. If you are still unable to list reductions achieved at your facility, describe the reduction and quantity in the box provided.

The amount of source reduction reported in Part 3 is an estimate of the amount of pollution that would have been generated if you had not undertaken a P2 project in the report year.

**Example 6. Estimating the Number of Employees**

Ed's Repair Shop has three full time mechanics (40 hours/week), a part-time custodian who works 10 hours per week, and a part-time secretary who works 30 hours per week. The secretary and the custodian work the equivalent of one full-time employee (total 40 hours/week). Therefore, the number of employees is four.

**Example 7. Calculating Five-Year Source Reduction**

A company reports 20 tons of xylene on the TRI Form R in their prior year. The xylene is an ingredient in the solvent they use to prepare their product. During the first year of their plan they plan to educate their employees on better handling of the solvent: putting lids on containers, minimizing spills, and checking for leaks in the process area. By implementing these inventory control procedures, they hope to use 5 tons/year less xylene.

In the second year they plan to have a solvent reuse/recirculation device in place that will route unused solvent back into the process. This change will result in a source reduction of 10 tons per year. By their third year they hope to find an alternate material that does not contain hazardous or TRI-listed chemicals. This change will source-reduce their remaining 5 tons.

| Plan Year | Amount Source-Reduced | Amount Generated |
|---|---|---|
| Year 1 | 5 | 20 - 5 =15 tons |
| Year 2 | 10 | 15 - 10 = 5 tons |
| Year 3 | 5 | 5 - 5 = 0 tons |
| Year 4 | 0 | 0 |
| Year 5 | 0 | 0 |

Add the amounts to be source-reduced (in the shaded column) in each year of the plan to get the Total Source Reduction. This company would then report 20 tons in Part 2, Row 2, Column B.

**Example 8. Calculating Percent Waste Minimization for the Goal Year**

A company generates 100 tons of hazardous sludge per year. In the first year they treat 10 tons. After treatment the waste will no longer be hazardous. The second year they expect to treat 15 tons. The third year they expect to treat 20 tons. By the fifth year they expect to treat 30 tons.

Row 3 is only for reporting fifth-year projections (based on the Source Reduction Waste Minimization Plan). Therefore, this company would report:

$$1- \left[ \frac{\text{(100 tons Total) - (30 tons Waste Minimized in the Fifth Year)}}{\text{(100 tons Total)}} \right] = 0.3 \text{ or } 30\%$$

Part 2, Row 3, Column A would read 30%

Rows 1 through 8—Estimate the amount of hazardous waste and TRI reduction achieved as a result of your P2 projects. Try to use one of the eight categories listed. Some projects may fit more than one category, you can use your best judgment in assigning a category.

Report HW reductions (tons) in Rows 1 through 8, Column A. Report reductions of TRI chemicals (tons) in Column B. The quantities source-reduced for a reporting year can be determined by measurement, or estimated using activity or production indexing. Example 9 shows a simple source reduction estimation.

Many companies have changes in pollution due to production changes, while simultaneously decreasing the amount of pollution through source reduction. If your production has changed, see Example 10. Some materials are classified as both HW and TRI. Due to different reporting standards, the amount of HW reported for a dual classified material may be different from the amount of TRI reported for the same waste. When one of these dual classified materials is source-reduced, the separate amount (tons) should be reported in Column A (for HW) and B (TRI) with different quantities. Example 11 illustrates this concept.

Row 9 — Enter the sum of Rows 1 through 8 in tons.

Describe your primary P2 method—This area is where you describe how you achieved your reductions.

## SHARE YOUR P2 SUCCESS

Have you found a great way to reduce waste and save money at your facility? Do you think it might work for other facilities like yours? The TCEQ is looking for success stories like yours to help companies find innovative new approaches to waste management in Texas. The *Case Study, Success Story* form provided as

Worksheet 7 in this chapter is an optional form for all WRPA reporting facilities.

The case study provides an excellent opportunity for facilities like yours to showcase your own success. You can share valuable information about successful pollution prevention techniques and technologies with other facilities that may be trying to reduce similar wastes. If you have found a way–innovative and new, or tried and true–to reduce your waste at the source, we encourage you to tell us about it!

## How the TCEQ Uses Case Studies

The TCEQ uses case studies to inform the Legislature of P2 progress in Texas, to share useful P2 knowledge with other facilities, and to recognize P2 champions in TCEQ publications, on the Internet, and in public media.

When a case study is submitted to the TCEQ, a team of P2 professionals reviews the information, verifies that reported activities qualify as source reduction or waste minimization, and edits the information, if necessary. All TCEQ-approved case studies are then returned to the facility for final approval before being posted to the Internet, used in publications, or released to the media.

The TCEQ has partnered with the Southwest Network for Zero Waste at University of Texas at Austin to post case studies on the World Wide Web. To view case studies submitted by other Texas facilities, or to post your success story to the Internet on your own, visit the Web site, **www.ZeroWasteNetwork.org.**

## Directions for Optional Worksheet 7: Case Study, Success Story

Case studies are ways to share your success with others. The TCEQ may spotlight your case study in workshops, in our online database (**www.P2Plan.org**), and even as a candidate for awards and recognition of innovative projects.

The best case studies describe the amount of pollution prevented (tons of toxic chemicals avoided, gallons of water saved), the dollars saved, and how the reduction was achieved.

Information submitted on this form (like other documents submitted under WRPA) is considered available to the public. One of our staff may contact you as a courtesy if we are considering using it in a publication.

If you have found a successful way to reduce waste at your facility, then you are a P2 success! Share your story with us by faxing this completed form to the Pollution Prevention Team at 512/239-3165.

**Example 9. Basic Source Reduction Estimation**

A facility uses a solvent bath to clean filament wire in a batch process. Facility records document that in 1991, the 500-gallon tank contents were changed 10 times, generating 1 ton of HW each cleaning. In 1992, raw material changes resulted in the tank contents being changed 10 times, generating 0.9 tons of HW with each cleaning. How much source reduction took place in 1992? What source reduction activity should it be reported under?

Step 1. Determine quantity of waste generated in 1991 and 1992 from the batch process.

HW gen. 1991 = (10 cleanings) X ( 1 ton HW/cleaning ) = 10 tons
HW gen. 1992 = (10 cleanings) X ( 0.9 ton HW/cleaning ) = 9 tons

Step 2. Determine the difference in quantities of waste generated between 1991 and 1992, which is the amount source reduced (the total length of wire cleaned was the same each year).

HW Source-Reduced = 10 - 9 = 1 ton SR in 1992

Reported on Part 3, Row 5, Column A

**Example 10. Total Amount Source-Reduced Calculation (Estimate) Based on Activity/Productivity Index**

A facility manufactures widgets and generates a hazardous waste stream, waste stream 1 (ws1). The amount of HW generation associated with ws1 is directly proportional to how many widgets are produced. In 1991, 5 tons of HW was generated for 2,000 widgets. In 1992, the facility manufactured 3,000 widgets with process modification and generated 7 tons of HW. How much source reduction took place for the 1992 reporting year? What source reduction activity should it be reported under?

Step 1. Calculate Activity/Production Index
A/P Index = 3,000 / 2,000 = 1.5

Step 2. Multiply waste quantity generated in 1991 by the A/P Index.
(5 tons) X (1.5) = 7.5 tons

Step 3. Subtract the 1992 waste quantity from the quantity that would have been generated without process modification (source reduction activity).
Amount Source-Reduced = 7.5 - 7.0 = 0.5 tons in 1992

Answer: Amount SR in 1992 is ton.

Reported on Part 3, Row 6, Column A

**Example 11. Materials Reported under Both TRI and Hazardous Waste Regulations**

ABC Manufacturing reports benzene on its Annual Waste Summary and the TRI Form R. The benzene releases result from leaks in their pipes and connections. In order to prevent the leaks from contaminating groundwater, the floor is washed every night, and the water-benzene mixture is sent to an off-site wastewater treatment plant.

Different Reported Amounts for the Annual Waste Summary and TRI—On the TRI Form R, the total releases and transfers of benzene are reported as 4,000 pounds (2 tons.) On the Annual Waste Summary, the benzene shipped off site is reported as 50 tons. This difference results because the benzene was disposed of in a water-benzene mixture. Under the hazardous waste regulations, when a nonhazardous substance is mixed with a hazardous substance, the entire mixture becomes hazardous. In contrast, the TRI reporting requirements only require facilities to report the amount of toxic chemical released or transferred. Because the reporting requirements are different, the amount of hazardous waste material source reduced, as reported in Column A of Part 3, will differ from the amount of TRI material source reduced, as reported in Column B of Part 3.

Source Reduction Project — ABC manufacturing installed dry disconnect couplings on most of their flanges, reducing the accidental leaks and spills, and thus reducing the amount of wastewater needed to handle the benzene. Since installing these dry disconnect couplings, the amount of benzene contaminated wastewater reported on the Annual Waste Summary was reduced from 50 tons to only 1 ton. The benzene releases and transfers reported on the TRI Form R dropped from 2 tons per year to 0.2 tons per year.

Reporting on Section 3

Hazardous Waste Source Reduction = 50 tons - 1 ton = 49 tons
TRI Source Reduction = 2 tons - 0.2 tons = 1.8 tons

Looking on the TRI Form R, Section 8, the company noted that their activity has the Source Reduction Activity Code of W39, other spill and leak prevention, and therefore the activity will be listed on Row 4 of Section 3 for both hazardous waste and TRI columns.

---

*Note*: You may find that your TRI reductions and your hazardous waste reductions are not proportional. In this example, the facility achieved a 98 percent reduction in hazardous waste, but only an 80 percent reduction of TRI.

## WORKSHEET 7: CASE STUDY, SUCCESS STORY

1. **GENERAL INFORMATION.**

Company Name: _____ Location: _____

Contact Name: _____ Phone Number: _____

E-mail: _____

Waste Reduced: _____ Independently Owned: ❑ Yes ❑ No

Industry Type: _____ Number of Employees: _____

Process/activity where waste is generated: _____

Was this project part of your WRPA five-year Pollution Prevention Plan: ❑ Yes ❑ No

Can we publish this case study? ❑ Yes ❑ No

**2. DESCRIPTION OF THE PROJECT—**Describe the environmental problem, waste stream, or emission of concern and explain the source reduction or waste minimization process used. In general terms, describe the techniques, equipment (including vendor if applicable), processes, procedures, or management programs developed or utilized in your pollution prevention project.

_____

_____

_____

**3. INNOVATIVE APPLICATION OF TECHNOLOGY—**Describe any novel or innovative advances in technology or management. Feel free to identify sources of equipment or services used.

_____

_____

_____

**4. ENVIRONMENTAL BENEFITS—**Describe the environmental or safety benefits resulting from implementation of your project. Include quantitative information about the total reductions (weight or volume) of waste, raw materials, energy or emissions. In addition, indicate any regulatory requirements that have been reduced or eliminated by implementation of this P2 project.

_____

_____

_____

**5. COST SAVINGS (OPTIONAL)—**Quantify the following: (1) payback period of the project, (2) cost savings due to avoided disposal cost, (3) savings from reduced material or energy usage, and (4) savings from reduced regulatory requirements, reduced environmental liability, or other hidden costs. Cost savings information is essential in promoting pollution prevention. Use the environmental accounting guidance in Chapter 4 to simplify your calculations.

_____

_____

_____



*FAX this form to the Industrial Pollution Prevention Team at 512/239-3165.*

CHAPTER 10:

# Submitting Documents

**Why Should You Read This Chapter?**
- Discover when and where to mail your documentation to the TCEQ.
- Discover where to find additional assistance.

## SUBMITTING THE EXECUTIVE SUMMARY OR APR

Your first Annual Progress Report is due July 1 after the first full year of your P2 Plan. Subsequent APRs are due on July 1 for each year of your P2 Plan. For example, a facility that completes the initial P2 Plan in the year 2000 is required to submit an APR by 7/01/2001. Each APR submitted should report information about reduction achievements in the previous year.

When submitting your Executive Summary, make sure the Certificate of Completeness and Correctness has an original signature and provides the printed name, title, and date. Do not send a copy of your entire plan, and do not fax your P2 Plans, Executive Summaries, or Annual Progress Reports unless requested by TCEQ staff.

Submit the original P2 Annual Progress Report with report year, current contact, and source reduction quantities for the previous year. All envelopes should be clearly marked as Executive Summary or Annual Progress Report and mailed to:

Executive Summary (or Annual Progress Report)
Industrial Pollution Prevention Team, MC 112
Texas Commission on Environmental Quality
PO Box 13087
Austin, TX 78711-3087

**Fast Facts**
- The most important requirement in WRPA is to prepare a plan and keep it on site.
- WRPA reporters are required to send an Executive Summary of their plan to TCEQ.
- Annual Progress Reports are due for some reporters on July 1, and can be done online or by using paper forms.

## GETTING ADDITIONAL ASSISTANCE

If you need to order additional forms, guides, or other TCEQ publications, call Publications at (512) 239-0028. For additional assistance sending your submission, completing forms, or getting help with specific inquires about WRPA requirements, contact the Industrial Pollution Prevention Team at:

**Phone:** 512/239-3100
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**Visit one of our Web sites:**
**Home page: www.tceq.state.tx.us**
**P2 page: www.P2Plan.org**
or
Refer to Appendix C for more assistance

APPENDIX A

# TCEQ Pollution Prevention Rules

## SUBCHAPTER Q:
## POLLUTION PREVENTION:
## SOURCE REDUCTION AND WASTE MINIMIZATION

§§335.471 - 335.480

# SUBCHAPTER Q: POLLUTION PREVENTION: SOURCE REDUCTION AND WASTE MINIMIZATION

§§335.471 - 335.480

## STATUTORY AUTHORITY

The amendments are adopted under Texas Water Code (TWC), §5.103 and §5.105, which provide the commission with authority to adopt any rules necessary to carry out its powers and duties under this code and other laws of this state and §26.011, which requires the commission to control the quality of water by rule. The amendments are also adopted under Solid Waste Disposal Act (the Act), THSC, §361.017 and §361.024, which authorize the commission to regulate industrial solid waste and municipal hazardous waste and to adopt rules consistent with the general intent and purpose of the Act. Also, under THSC, §361.505(c), the commission is required to adopt rules for the development of simplified, as appropriate, pollution prevention plans and reports for persons identified under THSC, §361.504(a)(2), SQGs.

### *§335.471. Definitions.*

The words and terms used in this subchapter have the meanings given in the Waste Reduction Policy Act of 1991, or the regulations promulgated thereunder. The following words and terms, when used in this subchapter, shall have the following meanings, unless the context clearly indicates otherwise. Further, the following words and terms, as defined herein, shall only have application to this subchapter.

(1) **Acute hazardous waste –** Hazardous waste listed by the administrator of the EPA under the federal Solid Waste Disposal Act, as amended by RCRA, because the waste meets the criteria for listing hazardous waste identified in 40 Code of Federal Regulations §261.11(a)(2).

(2) **Base year –** The year preceding the first year of the plan.

(3) **Conditionally exempt small quantity generator –** A generator that does not accumulate more than 1,000 kilograms of hazardous waste at any one time at his facility and who generates less than 100 kilograms of hazardous waste in any given month.

(4) **Environment –** Water, air, and land and the interrelationship that exists among and between water, air, land, and all living things.

(5) **Environmental management system –** As defined in §90.30(3) of this title (relating to Definitions). A documented management system to address applicable environmental regulatory requirements that includes organizational structure, planning activities, responsibilities, practices, procedures, processes, and resources for developing, implementing, achieving, reviewing, and maintaining an environmental policy directed toward continuous improvement.

(6) **Facility –** All buildings, equipment, structures, and other stationary items located on a single site or on contiguous or adjacent sites that are owned or operated by a person who is subject to this subchapter or by a person who controls, is controlled by, or is under common control with a person subject to this subchapter.

(7) **Generator and generator of hazardous waste –** Has the meaning assigned by Texas Health and Safety Code, §361.131. A person whose act or process produces industrial solid waste or hazardous waste or whose act first causes an industrial solid waste or a hazardous waste to be regulated by the commission.

(8) **Large quantity generator –** A generator that generates, through ongoing processes and operations at a facility:

(A) more than 1,000 kilograms of hazardous waste in a month; or

(B) more than one kilogram of acute hazardous waste in a month.

(9) **Media and medium –** Air, water, and land into which waste is emitted, released, discharged, or disposed.

(10) **Pollutant or contaminant –** Includes any element, substance, compound, disease-causing agent, or mixture that after release into the environment and on exposure, ingestion, inhalation, or assimilation into any organism, either directly from the environment or indirectly by ingestion through food chains, will or may reasonably be anticipated to cause death, disease, behavioral abnormalities, cancer, genetic mutation, physiological malfunctions, including malfunctions in reproduction, or physical deformations in the organism or its offspring. The term does not include petroleum, crude oil, or any fraction of crude oil that is not otherwise specifically listed or designated as a hazardous substance under §101(14)(A) - (F) of the environmental response law, nor does it include natural gas, natural gas liquids, liquefied natural gas, synthetic gas of pipeline quality, or mixtures of natural gas and synthetic gas.

(11) **Release –** Any spilling, leaking, pumping, pouring, emitting, emptying, discharging, injecting, escaping, leaching, dumping, or disposing into the environment. The term does not include:

(A) a release that results in an exposure to a person solely within a workplace, concerning a claim that the person may assert against the person's employer;

(B) an emission from the engine exhaust of a motor vehicle, rolling stock, aircraft, vessel, or pipeline pumping station engine;

(C) a release of source, by-product, or special nuclear material from a nuclear incident, as those terms are defined by the Atomic Energy Act of 1954, as amended (42 United States Code, §2011 *et seq.*), if the release is subject to requirements concerning financial protection established by the United States Nuclear Regulatory Commission under that Act, §170;

(D) for the purposes of the federal CERCLA (Superfund), §104, or other response action, a release of source, by-product, or special nuclear material from a processing site designated under the Uranium Mill Tailings Radiation Control Act of 1978 ((42 United States Code, §7912 and §7942), §102(a)(1), or §302(a)); and

(E) the normal application of fertilizer.

(12) **Small quantity generator –** A generator that generates through ongoing processes and operation at a facility:

(A) equal to or less than 1,000 kilograms but more than or equal to 100 kilograms of hazardous waste in a month; or

(B) equal to or less than one kilogram of acute hazardous waste in a month.

(13) **Source reduction –** Has the meaning assigned by the federal Pollution Prevention Act of 1990, Publication Law 101 - 508, §6603, 104 Stat. 1388. The term ''source reduction'' means any practice which:

(A) 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

(B) reduces the hazards to public health and the environment associated with the release of such substances, pollutants, or contaminants. The term includes equipment or technology modifications, process or procedure modifications, reformulation or redesign of products, substitution of raw materials, and improvements in housekeeping, maintenance, training, or inventory control.

(14) **Tons –** 2,000 pounds, also referred to as short tons.

(15) **Toxic release inventory –** A program which includes those chemicals on the list in Committee Print Number 99 - 169 of the United States Senate Committee on Environment and Public Works, titled "Toxic Chemicals Subject to the Emergency Planning and Community Right-To-Know Act of 1986 (EPCRA, 42 United States Code, §11023), 313" including any revised version of the list as may be made by the administrator of the EPA.

(16) **Waste minimization –** A practice that reduces the environmental or health hazards associated with hazardous wastes, pollutants, or contaminants. Examples may include reuse, recycling, neutralization, and detoxification.

### *§335.472. Pollutants and Contaminants.*

The following pollutants and contaminants are subject to pollution prevention planning:

(1) all hazardous wastes generated that are reportable in accordance with §335.9 of this title (relating to Recordkeeping and Annual Reporting Procedures Applicable to Generators); and

(2) all chemicals that exceed the Form R threshold reporting requirements in accordance with Emergency Planning and Community Right-To-Know Act of 1986, §313.

### *§335.473. Applicability.*

This subchapter applies to facilities that are required to develop a pollution prevention plan in accordance with the Waste Reduction Policy Act of 1991, or the regulations promulgated thereunder, including:

(1) all large quantity generators of hazardous waste;

(2) all small quantity generators of hazardous waste; and

(3) all persons subject to §313, Title III, Superfund Amendments and Reauthorization Act of 1986 (Emergency Planning and Community Right-to-Know Act (EPCRA), 42 United States Code, §11023). These toxic release inventory (TRI) covered facilities would be required to develop pollution prevention plans for only the TRI listed chemicals that exceed Form R reportable threshold quantities established under EPCRA.

### *§335.474. Pollution Prevention Plans.*

All persons identified under §335.473 of this title (relating to Applicability) shall prepare a five-year pollution prevention plan that shall be updated as necessary. Plans shall be maintained on-site and available to commission personnel for inspection. Prior to expiration of the initial plan and each succeeding five-year plan, a new five-year plan shall be prepared. Plans prepared under paragraphs (1) - (3) of this section shall contain a separate component addressing source reduction activities and a separate component addressing waste minimization activities.

(1) Large quantity generators or toxic release inventory (TRI) Form R reporters. For facilities that are large quantity generators as defined in §335.471(8) of this title (relating to Definitions) or TRI Form R reporters defined in §335.471(15) of this title, the plan shall include, at a minimum:

(A) an initial survey that identifies:

(i) for facilities described in §335.473(1) of this title, all activities that generate hazardous waste; and

(ii) for facilities described in §335.473(3), all activities that result in a release of TRI reportable chemicals;

(B) based on the initial survey, a prioritized list of economically and technologically feasible source reduction and waste minimization projects;

(C) an explanation of source reduction or waste minimization projects to be undertaken, with a discussion of technical and economic considerations, and environmental and human health risks considered in selecting each project to be undertaken;

(D) an estimate of the type and amount of reduction anticipated;

(E) a schedule for the implementation of each source reduction and waste minimization project;

(F) measurable source reduction and waste minimization goals for the entire facility, including incremental goals to aid in evaluating progress;

(G) an explanation of employee awareness and training programs to aid in accomplishing source reduction and waste minimization goals;

(H) identification of cases where the implementation of a source reduction or waste minimization activity designed to reduce risk to human health or the environment may result in the release of a different pollutant or contaminant or may shift the release to another medium;

(I) certification that the plan is complete and correct by the owner of the facility, or, if the facility is owned by a corporation, by an officer of the corporation that owns the facility who has the authority to commit the corporation's resources to implement the plan. A copy of the certification is to be submitted to the commission; and

(J) an executive summary of the plan submitted to the commission that shall include at a minimum:

(i) a description of the facility that shall include:

(I) name of facility;

(II) mailing and physical address;

(III) point-of-contact, including phone number and electronic mail (e-mail) address, if available;

(IV) a general description of the facility;

(V) applicable identification numbers, including: Texas Commission on Environmental Quality (TCEQ) solid waste registration number, EPA identification number, and TRI identification number;

(VI) primary standard industrial classification (SIC) code and, if applicable, North American Industry Classification System (NAICS); and

(VII) the specific time period the five-year plan is in effect;

(ii) a list of all hazardous wastes generated and the volume of each;

(iii) a list of all reportable TRI releases and transfers and the volume of each;

(iv) a prioritized list of pollutants and contaminants to be reduced;

(v) a statement of measurable reduction goals;

(vi) an explanation of environmental and human health risks considered in determining reduction goals;

(vii) a list of source reduction and waste minimization projects with an associated schedule toward implementation;

(viii) an implementation schedule for future reduction goals; and

(ix) identification and description of cases where the implementation of source reduction or waste minimization activity designed to reduce risk to human health or the environment may result in the release of a different pollutant or contaminant or may shift the release to another medium. Included in this description shall be a discussion of the change in characteristic of the normal waste stream or release and how it will be managed in the affected medium.

(K) The executive summary of the plan may include:

(i) a discussion of the person's previous efforts at the facility to reduce risk to human health and the environment or to reduce the generation of hazardous waste or the release of pollutants or contaminants;

(ii) a discussion of the effect changes in environmental regulations have had on the achievement of the source reduction and waste minimization goals;

(iii) the effect that events the person could not control have had on the achievement of the source reduction and waste minimization goals;

(iv) a description of projects that have reduced the generation of hazardous waste or the release of pollutants or contaminants; and

(v) a discussion of the operational decisions made at the facility that have affected the achievement of the source reduction or waste minimization goals or other risk reduction efforts.

(2) Small quantity generators/non-TRI Form R reporters. For facilities that are small quantity generators as defined in §335.471(12) of this title and are not TRI Form R reporters as defined in §335.471(15) of this title, the plan shall include, at a minimum:

(A) a description of the facility which shall include:

(i) name of the facility;

(ii) mailing and physical address;

(iii) point-of-contact, including phone numbers and electronic mail (e-mail) address, if available;

(iv) general description of the facility; and

(v) applicable identification numbers, including: TCEQ solid waste registration number and EPA identification number;

(B) a list of all hazardous wastes generated and the volume of each;

(C) a prioritized list of pollutants and contaminants to be reduced;

(D) a statement of measurable reduction goals;

(E) information on environmental and human health risks, such as material safety data sheets or other available documentation, considered in determining reduction goals;

(F) A list of source reduction and waste minimization projects with an associated schedule of implementation;

(G) an implementation schedule for future reduction goals;

(H) certification that the plan is complete and correct by the owner of the facility or if the facility is owned by a corporation, by an officer of the corporation that owns the facility who has the authority to commit the corporation's resources to implement the plan. A copy of the certification must be submitted to the commission; and

(I) an executive summary of the plan submitted to the commission that shall include at a minimum:

(i) a description of the facility that shall include:

(I) name of facility;

(II) mailing and physical address;

(III) point-of-contact, including a phone number and email, if available;

(IV) EPA identification number and TCEQ solid waste registration number;

(V) primary SIC code; and if applicable, NAICS;

(VI) the specific time period the five-year plan is in effect;

(ii) a projection of the amount of hazardous waste that the facility will generate (based on what is reported as hazardous waste under §335.9 of this title (relating to Record Keeping and Annual Reporting Procedures Applicable to Generators)) at the end of the five-year period that the plan is in place;

(iii) prioritized list of pollutants and contaminants to be reduced;

(iv) a list of source reduction activities associated with reductions of pollutants and contaminants identified under subparagraph (C) of this paragraph.

(J) The executive summary of the plan may include:

(i) a discussion of the person's previous effort at the facility to reduce hazardous waste or the release of pollutants or contaminants through the pollution prevention plan;

(ii) a discussion of the effect that changes in environmental regulations have had on the achievement of the source reduction and waste minimization goals;

(iii) the effects that events the person could not control have had on the achievement of the source reduction and waste minimization goals;

(iv) a discussion of the operational decisions the person has made that have affected the achievement of the source reduction and waste minimization goals; and

(v) identification and description of cases where the implementation of source reduction and waste minimization activities designed to reduce risk to human health or the environment may result in the release of a different pollutant or contaminant or may shift the release to another medium. Included in this description shall be a discussion of the change in characteristic of the normal waste stream or release and how it will be managed in the affected medium.

### *§335.475. Implementation.*

All facilities subject to this subchapter shall develop a pollution prevention plan. A facility, once subject to this subchapter, shall remain subject until it no longer meets the requirements of §335.473 of this title (relating to Applicability) or is exempted under §335.477 of this title (relating to Exemptions). The executive summary and certificate of completeness shall be submitted to the executive director on the date the plan is required to be in place. Any facility that becomes subject to the requirement to have a pollution prevention plan, shall have 90 days from the date it is required to submit its initial annual waste summary or TRI forms to the commission to have the pollution prevention plan in place and available for review. Facilities subject to this subchapter are required to renew their plan every five years.

### *§335.476. Reports and Recordkeeping.*

All persons required to develop a pollution prevention plan for a facility under this subchapter shall submit to the commission an initial executive summary of the plan following the requirements of §335.474(1)(J) of this title (relating to Pollution Prevention Plans) for large quantity generators/toxic release inventory Form R reporters or §335.474(2)(I) of this title for small quantity generators/non-toxic release inventory Form R and a copy of the certification of completeness and correctness as required by §335.474(1)(I) of this title. Within 30 days of any revision of such plan, a revised executive summary, including a copy of a new certificate of completeness and correctness shall be submitted. All owners and operators required to develop a plan under §335.473(1) or (3) of this title (relating to Applicability) shall also submit an annual progress report as defined in paragraphs (1) - (3) of this section according to the schedule outlined in paragraph (4) of this section. Persons required to develop a pollution prevention plan for a facility under §335.473(2) of this title may meet the annual progress reporting requirements by submitting their annual waste summary required under §335.9 of this title (relating to Recordkeeping and Annual Reporting Procedures Applicable to Generators) and by submitting their hazardous waste reduction goals as required under §335.474(2)(I) of this title.

(1) The annual progress report shall detail the facility's progress in implementing the pollution prevention plan and include:

(A) an assessment of the progress toward the achievement of the facility source reduction goals and the facility waste minimization goals;

(B) a statement to include, for facilities described in §335.473(1) of this title, the amount of hazardous waste generated and, for facilities described in §335.473(3) of this title, the amount of any releases and transfers of reportable pollutants or contaminants designated under Texas Health and Safety Code, §361.503(a)(3) in the year preceding the annual progress reporting year, and a comparison of those amounts with the amounts generated or released using the base year; and

(C) any modification to the plan.

(2) The annual progress report may include:

(A) a discussion of the person's previous effort at the facility to reduce hazardous waste or the release of pollutants or contaminants through the pollution prevention plan;

(B) a discussion of the effect changes in environmental regulations have had on the achievement of the source reduction and waste minimization goals;

(C) the effects that events the person could not control have had on the achievement of the source reduction and waste minimization goals; and

(D) a discussion of the operational decisions the person has made that have affected the achievement of the source reduction and waste minimization goals.

(3) The annual progress report shall contain a separate component addressing source reduction activities and a separate component addressing waste minimization activities.

(4) The first annual progress report shall be submitted on July 1st of the calendar year following the year of first plan due date. Thereafter, the annual progress report shall be submitted annually, due July 1st to report progress from the previous calendar year.

(5) Base year data shall be used in developing both the annual progress report and the executive summary of the plan.

(6) The annual progress report shall be submitted on forms furnished or approved by the executive director and shall contain at a minimum the information specified in paragraph (1) of this section. Upon written request by the facility, the executive director may authorize a modification in the reporting period.

### *§335.477. Exemptions.*

This subchapter does not apply to:

(1) facilities regulated by the Railroad Commission of Texas under the Natural Resources Code, §91.101 or §141.012;

(2) owners and operators of facilities listed in §335.473 of this title (relating to Applicability) who may apply on a case-by-case basis to the executive director for an exemption from this subchapter. The executive director may grant an exemption if the applicant

demonstrates that sufficient reductions have been achieved. If an exemption is granted, it is valid only for the following year, but can be renewed, on an annual basis, by filing a new application. The executive director's decision will be based upon the following standards and criteria for determining practical economic and technical completion of the plan:

(A) the facility has reduced the amount of pollutants and contaminants being generated or released by 90% since the base year;

(B) potential impact on human health and the environment of any remaining hazardous waste generated, or pollutant or contaminant released; and

(C) a demonstration that additional reductions are not economically and technically feasible.

(3) facilities that have an environmental management system (EMS) that meets the requirements and is approved by the executive director, as described in §90.36 of this title (relating to Evaluation of an Environmental Management System by the Executive Director) and report annually under the EMS program.

***§335.478. Administrative Completeness.***

The executive director may review a pollution prevention plan or annual progress report to determine whether the plan or report complies with this subchapter.

***§335.479. Enforcement.***

Failure to have a pollution prevention plan in accordance with this subchapter or failure to submit a pollution prevention annual progress report in accordance with this subchapter is a violation.

***§335.480. Confidentiality.***

(a) A pollution prevention plan shall be maintained at each facility owned or operated by a person and/or generator who is subject to this subchapter and shall be available to agency personnel for inspection. The pollution prevention plan is not a public record for the purposes of Chapter 424, Acts of the 63rd Legislature, 1973 (Texas Civil Statues, Article 6252-17a).

(b) The executive summary of the plan and the annual progress report are public records. On request, the person and/or generator shall make available to the public a copy of the executive summary of the plan or annual progress report.

(c) If an owner or operator of a facility for which a pollution prevention plan has been prepared shows to the satisfaction of the executive director that an executive summary of the plan, annual progress report, or portion of a summary or report prepared under this subchapter would divulge a trade secret if made public, the executive director shall classify as confidential the summary, report, or portion of the summary or report.

(d) To the extent that a plan, executive summary, annual progress report, or portion of a plan, summary, or annual progress report would otherwise qualify as a trade secret, an action by the agency does not affect its status as a trade secret.

(e) Information classified by the executive director as confidential under this section is not a public record for purposes of Chapter 424, Acts of the 63rd Legislature, 1973 (Texas Civil Statutes, Article 6252-17a), and may not be used in a public hearing or disclosed to a person outside the agency unless a court decides that the information is necessary for the determination of an issue being decided at the public hearing.

APPENDIX B:

# Example of a Pollution Prevention Plan and Executive Summary

# POLLUTION PREVENTION PLAN PLAN YEAR 2003 TO 2007

## Source Reduction and Waste Minimization Plan For Occidental Chemical Corporation Ingleside Plant

**A) Activities that generate hazardous waste and TRI releases**

1. Chlorinated heavy ends from the production of EDC and VCM.
2. Chlorinated light ends from production of EDC and VCM.
3. Waste HCl from incineration of hazardous wastes and process vents.
4. Limestone sludge from the neutralization of incinerator acid with limestone.
5. Waste paint solids from paint solvent distillation.
6. Waste Naphtha from parts cleaning.
7. Hazardous waste oil from removal of lube oil from process equipment.
8. Spray can residue from puncturing of used spray cans.
9. Spent copper chloride catalyst from OHC process reactors.
10. Sand filter sand from filtering of wastewater.
11. Reboiler scale from cleaning of process heat exchangers.
12. Contaminated dirt from process area trenches.
13. Air releases of trichloroethylene from parts degreasing.
14. Leaks from refrigeration equipment that release R-22 or 134a refrigerants.

**B) Prioritized list of source reduction and waste minimization projects**

1. A source reduction project to make process changes which would reduce reboiler fouling and reduce generation of heavy ends waste.
2. A source reduction project to change C-2210 operation to reduce or eliminate light ends production and reduce amount of EDC in vents.
3. Changing pray can degreasers to a brand that contains no TRI chemicals.
4. A waste minimization project to reduce the amount of contaminated dirt from cleaning of process area trenches by installing a flush system to keep trenches clean.
5. Reduce emissions of CFC by replacing older process unit refrigeration equipment and installing new air conditioning units that have lower reservoir volumes and use new refrigerants.
6. A waste minimization project to use incinerator blowdown as soda ash for C/A to reduce limestone sludge formation and biosludge formation.
7. Delisting of derived from listed wastewater so that sand filter media can be disposed of as non-hazardous.

**C) Discussion of projects**

1. Rag formation in the wash train and corrosion products contribute to fouling of Reboiler in the EDC process area. To minimize this fouling, the EDC concentration of the Heavy Ends is maintained at elevated levels. Use of a static mixer in the wash system and changing from ammonia to caustic for pH control in the C-210 and C-2210 columns have the potential to reduce this fouling. If the fouling potential is reduced, the concentration of EDC in the Heavy Ends can be reduced which will reduce the amount of Heavy ends generated. These changes would also reduce the cleaning frequency of the Reboiler, which would reduce the amount of reboiler scale generated. The heavy ends and reboiler scale are both hazardous wastes, which must be incinerated and disposed. This project has been determined to be economically and technically feasible.
2. The C-2210 column can be changed from a dehydration column to a light ends column to eliminated the generation of Light Ends waste and reduce the amount of EDC in the column vents from 55% to 15%. The reduction in the amount of EDC incinerated from the vents reduces the air emissions from the incinerator. This project has been determined to be economically and technically feasible.
3. "CRC Heavy Duty Degreaser" is used to remove oil and grease from mechanical parts. This degreaser contains trichloroethylene, which is a TRI chemical. An alternative degreaser can be used that does not contain any TRI chemicals.
4. Dirt and solids accumulate in the concrete lined trenches in the VCM and EDC process areas and periodically this must be cleaned out and disposed of. This generates a hazardous waste, which must be incinerated and disposed. Also periodic cleaning of the trenches can release contaminants to the air and contribute to personnel exposure. The accumulation of dirt can be reduced or eliminated by installing a trench flush system that reuses cooling tower blowdown water to flush the trenches once per week. This project has been determined to be economically and technically feasible.
5. Leaks from refrigeration equipment in the chlorine area and 130 tanks have caused releases of refrigerant. Also, a number of the older air conditioning units for office buildings have become unreliable. These older units typically have large reservoirs of refrigerant, which can be released, if the unit develops a leak. These refrigerants are ozone-depleting substances. The 130-tank refrigeration equipment has been idled and part of the chlorine area refrigeration equipment has been replaced. The 134a condenser in the chlorine area is scheduled for replacement in 2004. Also, when the older air conditioning units are replaced, units with lower volume reservoirs are chosen to reduce the amount of refrigerant that could be release in the event of a leak. Where possible refrigerant 134a is used which has a lower potential for ozone depletion.

6. Scrubber water from the incinerators contains sodium carbonate, which can be used as a reactant in the treatment of brine for the Chlor/Alkali process. Currently when this scrubber water is discharge to the wastewater treatment system, it reacts with calcium from other wastewater streams and forms calcium carbonate. This formation of calcium carbonate increases the generation of limestone sludge and biosludge. The scrubber water can be recycled in the Chlor/Alkali process to replace soda ash, which is normally purchased or produced on site while reducing the generation of limestone sludge and biosludge. The technical and economic feasibility of this project has not yet been determined.
7. One of the wastewater streams is a listed hazardous waste because it is derived from a listed hazardous waste. Since this wastewater stream contacts the outfall sand filters, the sand also becomes a listed hazardous waste when it is removed. By delisting the wastewater, the waste sand will no longer be a hazardous waste.

**D) Reduction anticipated**

1. Process improvements could reduce the generation of reboiler scale by 5 to 10 tons per year and heavy ends generation by approximately 1200 tons per year.
2. Converting the C-2210 column to a light ends column reduces the light ends waste generation by 3,100 tons per year.
3. Reducing dirt build up in the trenches could reduce the generation of VCM trench material by up to 25 tons per year.
4. Changing to an alternative degreaser will reduce trichloroethylene emissions by about 2.7 tons per year.
5. Converting air conditioning units to lower volume units could reduce releases of R-22 by 500 pounds per year.
6. Recycling the incinerator scrubber water could reduce biosludge generation by 450 tons per year and limestone sludge generation by 200 tons per year.
7. Delisting of the wastewater could reduce the generation of hazardous waste sand by 120 tons per year.

**E) Implementation schedule**

1. The C-2210 column was converted to caustic in 2002 and the C-210 is scheduled for conversion to caustic in 2003. The static mixer was installed in 2002.
2. The C-2210 column was converted to a light ends column in 2002. The results of this change should be realized fully in 2003.
3. The change over to a new degreaser will be implemented in the first quarter of 2003.
4. An AFE has been written for the first phase of the trench washing system. Installation should be completed during the first quarter of 2003. If the system is effective, the remainder of the trenches would be converted over the following five years.
5. Some units have been converted or replaced, all large units should be replaced within the next five years.
6. This project is still under study. An installation schedule has not been established.
7. Work on the delisting is scheduled to begin in the first quarter of 2003. This should be completed and approved by the EPA by the first quarter of 2004.

**F) Facility goals**

The goal of the facility is to continually reduce hazardous waste generation and TRI emissions through process improvement and recycling. It is anticipated that hazardous waste generation can be reduced to less than 120,000 tons per year and that TRI releases can be reduced to less than 50,000 pounds by 2005.

**G) Employee awareness training**

All employees receive environmental training when first employed and annually thereafter. This training includes discussions of the OxyMin program, which is OxyChem's formalized pollution prevention program. Employees are en couraged to submit pollution prevention ideas and the progress of the pollution prevention plan are presented during the annual training.

**H) Media transfers from pollution prevention projects**

1. There would be no media transfers associated with the process changes to reduce fouling and heavy ends generation.
2. Converting the C-2210 column to a light ends column would transfer the light ends hazardous waste to a vent gas which is not considered to be a hazardous waste. The reduction of EDC in the vents would not be a reduction in the amount of vents burned in the incinerators as the EDC would be converted into usable product.
3. Changing degreasers will change the composition of the chemicals released during degreasing to a non-TRI chemical.
4. The trench washing system will move the dirt and solids from the trenches into the wastewater treatment system. Some of the solids will be treated through steam stripping and biological treatment, which would remove the hazardous constituents from the solids. A portion of the solids will settle out in the storm water tanks, which must be removed periodically as hazardous waste.
5. Some of the conversions of air conditioning units change the refrigerant to a refrigerant with a lower ozone depletion potential.
6. Recycling of the incinerator scrubber water would transfer this stream from wastewater to a usable product. The reduction in limestone sludge and biosludge generation would not transfer this waste to another media.
7. Delisting of the wastewater would transfer the hazardous waste sand to non-hazardous waste sand due to a change in the regulatory status.

# POLLUTION PREVENTION PLAN EXECUTIVE SUMMARY
# PLAN YEAR 2003 TO 2007

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(361) 776-2222
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**Description:** The facility is located off Texas Highway 361, approximately 1 mile west of Ingleside on the northern shore of Corpus Christi Bay in San Patricio County. The general area is a mix of agriculture and industry with Du Pont, Sherwin Alumina and OxyChem being the largest industries in the area. The OxyChem operations encompass approximately 890 acres. The northern side contains the Choler/Alkali, EDC and VCM production facilities. The southern side contains bulk storage, railcar, barge and ship loading facilities. A Cogen unit (450 MW) is in operation at the western side of Edwards Road. The plant produces chlorine, sodium hydroxide, hydrogen, EDC and VCM, using brine ethylene and electricity.

| | |
|---|---|
| **TNRCC Solid Waste Registration:** | 38280 |
| **EPA Identification:** | TXD982286932 |
| **TRI ID:** | 78359CCDNTHWY36 |
| **SIC Codes:** | 2869, 2812 |

## HAZARDOUS WASTE GENERATED 1997 TO 2001:

| Waste Description | Texas Waste Code | 1997 (tons) | 1998 (tons) | 1999 (tons) | 2000 (tons) | 2001 (tons) |
|---|---|---|---|---|---|---|
| Waste Paint Solids | 0133409H | 8.2 | 5.6 | 4.2 | 3.5 | 3.3 |
| Waste Naphtha (Safety Kleen) | 0134203H | 1.7 | 1.3 | 1.4 | - | - |
| HW Oil | 0136206H | 25.8 | 22.7 | 20.2 | 18.0 | 26.0 |
| Reboiler Scale | 0229407H | 47.2 | 55.1 | 42.7 | 77.1 | 48.5 |
| EDC Contaminated Material | 0238319H | 2.5 | 3.1 | 7.3 | 6.5 | 25.2 |
| Incinerator Ash | 0242303H | 4.3 | 4.8 | 4.5 | 8.4 | 7.9 |
| VCM Furnace Coke | 0244407H | 12.0 | 18.7 | 17.0 | 9.4 | 11.0 |
| VCM Contaminated Filters | 0249310H | 0.5 | 0.5 | 0.2 | 0.4 | 0.2 |
| Haz. Limestone Sludge | 0253306H | 821.0 | 1412.3 | 910.4 | 228.0 | 16.2 |
| EDC By-product (EDC Heavy Ends) | 0339219H | 1286.2 | 889.3 | 1140.2 | 1322.5 | 270.8 |
| CCl4 Contamin. Waste | 0424310H | 8.4 | 0.5 | 0.6 | 0.5 | 0.4 |
| HW Oil w/ PCBs One-Time | F4KR206 | 0.0 | 0.0 | 0.0 | 0.1 | 0.0 |
| PCB Capacitors & HW debris One-Time | F4Y2497H | 0.0 | 0.0 | 0.0 | 0.0 | 0.1 |
| Waste Inhibitor One-Time | F523211H | 0.0 | 0.0 | 0.0 | 0.4 | 0.5 |
| Labpack, Haz | 0075001H | 0.3 | - | - | - | - |
| Rockbox Residue | 0255319H | 490.7 | 1497.4 | 293.7 | - | - |
| VCM Light Ends | 0251219H | 2882.3 | 2504.9 | 4017.5 | 3567.6 | 2815.6 |
| VCM Heavy Ends | 0248219H | 16789.6 | 18850.6 | 20977.7 | 18250.8 | 20746.0 |
| Sludge, Ind. Process / VCM Trench Material | 0247319H | 25.8 | 54.2 | 37.4 | 25.8 | - |
| Demister Elements | 0405403H | - | 7.0 | - | - | - |
| Mother Liquor | 0258219H | | - | 134.8 | 39.5 | |
| Incinerator Acid | 0293105H | 142012.6 | 183988.6 | 201935.2 | 133555.0 | 100780.0 |
| By-Product Contaminated Solids | 0301301H | 2.9 | | 5.6 | 0.2 | 0.0 |
| PCB & HW oil cont. debris / PCB capacitors | F4YZ497H | - | - | - | 0.04 | - |
| Oil Contaminated Solids - Haz. | 0106489H | - | 11.2 | 8.5 | - | 10.0 |
| Solvent Contaminated Solids | 0108407H | - | - | 0.1 | - | 0.2 |
| Spray Can Residue | 0192204H | - | - | 0.2 | - | 0.5 |
| Contaminated Sludge | 0247319H | - | - | - | - | 24.8 |
| Sand Filter Sand | 0294319H | - | - | - | - | 121.1 |
| Mineral Oil Contaminated with PCBs | 9153206H | - | - | - | - | 0.1 |
| Solids Contaminated with PCBs | 9154319H | - | - | - | - | 0.02 |
| Waste Oil Contaminated with PCBs | F4KR206H | - | - | - | - | 0.2 |
| Unused Resin | 0138219H | - | 0.2 | - | - | - |
| Unused Resin | 0138319H | - | - | 0.3 | - | - |
| Unused Sealant | 0139219H | - | 0.3 | - | - | - |
| Fuel Oil Contaminated Water | 0177205H | - | 0.5 | 0.1 | - | - |
| Incinerator Brick | 0243319H | - | 5.5 | 6.0 | - | - |
| VCM Contaminated Spent Carbon | 0250404H | - | - | 1.3 | - | - |
| Freon 113 (one-time waste) | 9444202H | - | - | 0.3 | - | - |
| Unused Varnish | 0140209H | - | 0.1 | - | - | - |
| Waste Resin | 0196409H | - | 0.6 | - | - | - |
| Contaminated Cooling Tower Wood | 0197488H | - | 3.1 | - | - | - |
| EDC Contaminated Spent Carbon | 0199404H | - | 18.1 | - | - | - |
| Spent Copper Chloride Catalysts - Haz. | 0246393H | 3.9 | 38.6 | - | - | - |
| Incinerator Flue Gas Scale | 0289303H | 2.2 | 0.2 | - | - | - |
| Chlorine Butter | 0406609H | - | 0.9 | - | - | - |
| Suction Chiller Reboiler | 0481407H | - | 5.7 | - | - | - |
| Contaminated Carbon Tetrachloride | 0483202H | - | 0.7 | - | - | - |
| Acid Contaminated Scale | 0499319H | - | 0.4 | - | - | - |
| **Total** | | **164,428** | **209,402** | **229,567** | **157,113** | **124,909** |

## TRI RELEASES 1997 TO 2001:

| CHEMICAL NAME | RELEASES 1997 TOTAL (LB/YR) | RELEASES 1998 TOTAL (LB/YR) | RELEASES 1999 TOTAL (LB/YR) | RELEASES 2000 TOTAL (LB/YR) | RELEASES 2001 TOTAL (LB/YR) |
|---|---|---|---|---|---|
| AMMONIA | 1,370 | 2,040 | 2,099 | 1,769 | 1,461 |
| ASBESTOS | 0 | 0 | 0 | 0 | 0 |
| BENZENE | 5 | 5 | 5 | 6 | 0 |
| BIS (2-CHLOROETHYL) ETHER | 12 | 4 | 7,727 | 35 | 20 |
| CARBON TETRACHLORIDE | 9,596 | 9,460 | 8,149 | 8,422 | 128 |
| CHLORINE | 5,785 | 6,727 | 6,281 | 6,646 | 5,867 |
| CHLOROETHANE | 75 | 61 | 159 | 222 | 146 |
| CHLOROFORM | 260 | 246 | 216 | 471 | 267 |
| CHLOROPRENE | 5 | 0 | 5 | 5 | 0 |
| 1,2 DICHLOROETHYLENE | 71 | 93 | 69 | 78 | 62 |
| ETHYLENE | 6,222 | 7,799 | 9,535 | 7,912 | 1,661 |
| 1,2 DICHLOROETHANE | 16,585 | 29,915 | 173,041 | 62,052 | 9,225 |
| HYDROCHLORIC ACID | 4,291 | 3,207 | 3,212 | 464 | 5,908 |
| PROPYLENE | 1,830 | 1,905 | 1,931 | 1,866 | 618 |
| 1,1,2,2-TETRACHLOROETHANE | 14 | 11 | 10 | 432 | 11 |
| TETRACHLOROETHYLENE | 57 | 34 | 31 | 34 | 14 |
| 1,1,2-TRICHLOROETHANE | 225 | 104 | 10,885 | 594 | 169 |
| TRICHLOROETHYLENE | 14 | 7 | 256 | 404 | 5,583 |
| VINYL CHLORIDE | 1,620 | 3,854 | 2,274 | 2,005 | 2,075 |
| VINYLIDENE CHLORIDE | 1 | 0 | 1 | 2 | 2 |
| 1,3-DICHLOROBENZENE | -- | -- | 0 | 1 | 0 |
| HEXACHLOROBENZENE | -- | -- | 0 | 22 | 0 |
| CHLOROBENZENE | 5 | 0 | 0 | 8 | 9 |
| CHLOROMETHANE | 0 | 0 | 0 | 5 | 0 |
| HCFC 22 | 14,000 | 15,500 | 0 | 17,041 | 28,755 |
| PCB’s | -- | -- | 0 | 21 | 0 |
| DIOXINS | -- | -- | 0 | 1 | 1 |
| MERCURY | -- | -- | 0 | 0 | 0 |
| LEAD COMPOUNDS | -- | -- | -- | -- | 48 |
| NAPHTHALENE | -- | -- | -- | -- | 0 |
| 1,1,1 TRICHLOROETHANE | 0 | 0 | 0 | -- | 0 |
| HEXACHLOROETHANE | 1 | 1 | 9 | -- | 0 |
| HEXACHLORO-1,3-BUTADIENE | 1 | 1 | 1 | -- | 0 |
| PHOSPHORIC ACID | 0 | 0 | 0 | -- | 0 |
| METHANOL | 3 | 0 | 0 | -- | 0 |
| HYDROQUINONE | -- | -- | -- | -- | 0 |
| FORMALDEHYDE | -- | -- | -- | -- | 0 |
| SULFURIC ACID | 0 | 0 | 0 | -- | 0 |
| **TOTAL (LB/YR)** | **62,048** | **80,974** | **225,896** | **110,518** | **62,030** |

### Pollutant reduction list:

1. Over 20 chlorinated chemicals found in the heavy ends and light ends waste streams.
2. Trichloroethlyene from spray can degreaser.
3. EDC and other chlorinated organic chemicals in process trench waste.
4. R-22 and 134a refrigerants which are ozone depleting substances.
5. Biosludge and limestone sludge wastes.

### Reduction goals:

The goal of the facility is to continually reduce hazardous waste generation and TRI emissions through process improvement and recycling. It is anticipated that hazardous waste generation can be reduced to less than 100,000 tons per year and that TRI releases can be reduced to less than 50,000 pounds by 2005.

### Environmental and human health risks considered:

The hazardous wastes generated at the Occidental Chemical Corporation Ingleside Plant may be detrimental to the environment and human health. Therefore reduction in the amount of waste generated will reduce human health and adverse environmental impact.

### Project implementation schedule:

Third Quarter 2003 - Convert C-210 column to caustic.
First Quarter 2003 - Begin use of alternate degreaser.
First Quarter 2003 - Installation of trench washing system in EDC area.
Fourth Quarter 2003 - Replace 134a condenser in chlorine area.
Second Quarter 2004 - Complete economic and technical evaluation of recycling incinerator scrubber water.
First Quarter 2003 - Complete first round of sampling for delisting.

### Media transfers from pollution prevention projects:

1. There would be no media transfers associated with the process changes to reduce fouling and heavy ends generation.
2. Converting the C-2210 column to a light ends column would transfer the light ends hazardous waste to a vent gas which is not considered to be a hazardous waste. By reduction of amount of EDC in the vents, the total amount of vents burned in the incinerators will be reduced.
3. Changing degreasers will change the composition of the chemicals released during degreasing to a non-TRI chemical.
4. The trench washing system will move the dirt and solids from the trenches into the wastewater treatment system. Some of the solids will be treated through steam stripping and biological treatment, which would remove the hazardous constituents from the solids. A portion of the solids will settle out in the storm water tanks, which must be removed periodically as hazardous waste.
5. Some of the conversions of air conditioning units change the refrigerant to a refrigerant with lower ozone depletion potential.
6. Recycling of the incinerator scrubber water would transfer this stream from wastewater to a usable product. The reduction in limestone sludge and biosludge generation would not transfer this waste to another media.
7. Delisting of the wastewater would transfer the hazardous waste sand to non-hazardous waste sand due to a change in the regulatory status.

APPENDIX C:

# Resources Available for Your Pollution Prevention Plan

## SITE ASSISTANCE VISITS

The TCEQ offers a series of nonregulatory site assistance visits (SAVs) to help companies identify money saving options for reducing waste. Engineers from the TCEQ will walk through your facility and help you find options for reducing your waste at it's source.

Companies that have participated in a SAV have saved nearly $178 million per year since the program began. To maximize the benefits of P2 Planning, companies must look beyond the up-front costs of pollution prevention, and examine all costs associated with managing wastes—including time, disposal fees, potential liability, and regulatory costs.

If you would like more detailed information on SAVs, or any of the options below, call the TCEQ Pollution Prevention and Industry Assistance Section at 512/239-3100.

## ONLINE SOURCES FOR POLLUTION PREVENTION

**Pollution Prevention Technical Assistance and Voluntary Programs**
www.tnrcc.state.us/exec/sbea/p2tech.html

**Case Studies, Pollution Prevention Ideas—**Find ways to save money and cut pollution; search the database by industry, waste, or process, hosted by the Southwest Network for Zero Waste at the University of Texas at Austin.
www.ZeroWasteNetwork.org

**Pollution Prevention Fact Sheets—**Informational bulletins for specific industries.
http://www.tnrcc.state.tx.us/exec/oppr/p2_info/p2_info_index.html

**Texas Environmental Excellence Awards—**Honors the state's most outstanding projects in various categories.
www.tnrcc.state.tx.us/exec/oppr/txawd/txawd.html

**Recycle Texas Online—**Information on companies that handle recycled materials.
www.tnrcc.state.tx.us/exec/sbea/rtol/index.html

**Resource Exchange Network for Elimination Waste (RENEW)—**Promotes the reuse and recycling of industrial waste.
www.tnrcc.state.tx.us/exec/oppr/renew/renew.html

**Waste Reduction Policy Act—**Requires industry and business that generates hazardous waste or releases specific toxic chemicals to develop prevention plans and report annually.
www.tnrcc.state.tx.us/exec/oppr/ppplng/wrpa.html

**Pollution Prevention for Wastewaters: Don't Let P2 Options Go Down the Drain—**Offers tips and resources for preventing the pollution that occurs when certain pollutants are discharged to wastewater treatment facilities and information on how communities can encourage P2.
www.twua.org/p2

**Texas Engineering Extension Service (TEEX)—**Designed an online course to help environmental professionals and other nonaccountant industry personnel with total cost accounting.
http://teexcit.tamu.edu/tca

APPENDIX D:

# Source Reduction Activities by Category

The following categories will help you classify your source reduction project for the Annual Progress Report.

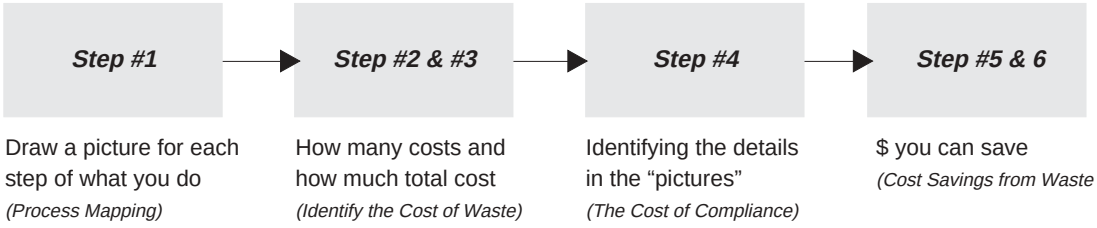
| Source Reduction Activities by Category | |
|---|---|
| Row 1<br>Good Operating Practices | Segregate hazardous waste from non-hazardous waste<br>Segregate waste to increase recycling<br>Improve maintenance scheduling, record keeping, or procedures<br>Change production schedule to minimize equipment and feedstock changeovers |
| Row 2<br>Inventory Control | Institute procedures to eliminate expired materials<br>Test outdated material–continue to use if still effective<br>Institute better labeling procedures<br>Inspect and label raw materials when they arrive<br>Purchase materials only when needed<br>Eliminate shelf-life requirements for stable materials<br>Institute clearinghouse to exchange waste materials |
| Row 3<br>Spill and Leak Prevention | Improve storage and stacking procedures<br>Improve procedures for loading, unloading, and transfer operations<br>Install overflow alarms or automatic shut-off valves<br>Install vapor recovery systems<br>Implement inspection or monitoring program of potential spill and leak sources<br>Update your spill response plan |
| Row 4<br>Raw Material<br>Modification/Substitution | Use aqueous cleaners instead of petroleum based solvents<br>Increase purity of materials<br>Substitute non-hazardous materials for hazardous materials<br>Use low VOC paints and coatings |
| Row 5<br>Process and Equipment<br>Modification | Institute recirculation within a process<br>Modify equipment, layout or piping<br>Use a different process catalyst<br>Institute better controls on operating bulk containers to minimize discarding of empty containers<br>Institute closed-loop recycling<br>Change from small volume containers to bulk containers<br>Replace out-dated equipment with more efficient models |
| Row 6<br>Cleaning and Degreasing | Modify stripping/cleaning equipment<br>Change to mechanical stripping/cleaning devices (from solvents or other materials)<br>Change to aqueous cleaners (from solvents or other materials)<br>Modify containment procedures for cleaning units<br>Improve draining procedures<br>Redesign parts racks to reduce drag out<br>Modify or install rinse systems<br>Improve rinse equipment design<br>Improve rinse equipment operation<br>Reduce number of solvents used, to make waste more amenable to recycling |
| Row 7<br>Surface Preparation<br>and Finishing | Modify spray systems or equipment<br>Substitute coating materials used<br>Improved application techniques<br>Change from spray to other system |
| Row 8<br>Product Modifications | Change product specifications<br>Modify design or composition of product<br>Modify packaging |

APPENDIX E:

# Full Cost Accounting Worksheet

**Worksheet 8 will guide you through six basic steps to save money by reducing waste.**

1. First, draw an input/output 'picture' of *each step or process* in your business.
2. Next, figure *how much* the raw materials cost for *each process*.
3. Calculate your costs to *dispose* of the waste for *each process*.
4. Determine *how much* you spend to comply with laws for waste you generate.
5. Add up all of the costs of managing waste.
6. Look for ways to reuse or recycle materials, lower costs, and save money.




**After you have completed these steps, you will:**

- notice costs that were *hidden* in your overhead,
- see things you do in your business *that cause* waste,
- locate areas of your business where you can *reduce* your waste,
- be able to determine if your business is operating *efficiently* and measure what it may be costing you to dispose of reusable or recyclable things, and
- find places where you can improve your business, *lower* your costs, save money and be a cleaner business.

The following steps will help you understand how to use Worksheet 8 to figure out costs. The front of the worksheet lists steps 1-5. The back of the worksheet covers step 6, "Comparing Costs Using a Waste Reduction Option Versus Doing Business as Usual." Table 6 shows a calculation of cost savings using a waste reduction option. After reading the example, you should be able to use the worksheet to identify areas in YOUR business where you are spending most of your money.

***Step #1 – Drawing a "Picture" of What You Do***

You will want to track the inputs (supplies) used and outputs (wastes) created during each step or process in your business. For example, imagine that *one process* in your business involves cleaning the presses with petroleum-based solvent. You may have many processes in your operation, but for the example, we will look only at one process. On the next page, there is an example of how the worksheet is used to track the inputs and outputs for the press cleaning step. Once the inputs and outputs are identified in STEP #1, how the outputs are disposed of is recorded in the far right corner of STEP #1.

***Step #2 – Traditional Input (Supply) Costs per Process per Year***

Next, you will want to determine your ANNUAL costs for each of the inputs in this process. This includes the cost of labor and materials. In STEP #2 of the example, notice that there is a total cost for doing this one process throughout the year **(A)** Your calculations will vary depending on the process.

***Note:*** *You will have to calculate the costs for each process in your operation separately. You will need a separate worksheet for each process.* ***Make copies of the blank worksheet to enter costs for other processes.***

***Step #3 –Traditional Output (Disposal) Costs per Process per Year***

You also want to determine your ANNUAL costs for each output (disposal) connected with this process. The example in STEP #3 demonstrates the amount spent *on each type of disposal method* for this process and then adds them all up for a total cost to dispose of all wastes from this process **(B)**.

***Step #4 – Hidden Costs per Year***

This step involves identifying some of the costs for this process that may be hidden in your overhead or other accounts such as permit fees and training costs and not seen as part of the PROCESS in your business. Some hidden costs are the result of the compliance requirements that your business has "triggered." These additional costs must be paid by you, but usually do not add value to your final product.

Finding the *exact* dollar amount is not as important as identifying the various compliance costs linked to the process. Just estimate how much you spend, as closely as possible. Or, estimate your total hidden cost and divide by the number of processes. Then distribute the amount equally to each item that affects each process. Accuracy is not as important as identifying these costs, seeing where they come from, and looking at their relationship to your annual revenues and expenses. In the worksheet, the costs were estimated and totaled for the year **(C)**.

***Step #5 – Total Costs per Year***

Add up the cost of materials going into the process **(A)**, the cost of disposal of excess materials and controlling materials **(B)**, and any hidden costs **(C)**. In the example worksheet, we calculated the total cost for cleaning

the presses. By knowing what EACH PROCESS (press cleaning, for example) costs your business, you can start to manage your costs more effectively and save money.

Now that you have done the example for STEPS #1 - 5, you can use this information to find ways to save money. We'll continue using the press cleaning example. Step 6 is to compare the cost of doing business *as it is now* with alternatives *designed to reduce your waste* at the source and save you money. After reading the example, use the back of the worksheet to identify areas in YOUR business where you can save money.

### *Step #6 – Comparing Costs Using a Waste Reduction Option*

After going through step 5, you now want to see if you can reduce, reuse or recycle any of those left over materials. You will need to:

- Determine the cost of materials that are being lost through disposal, rather than reusing or recycling them.
- Choose a waste reduction option from the options you have identified in your technical feasibility study.
- Compare your current costs to the cost of using an alternative method that reduces waste.
- Determine the payback period of any new equipment purchased.

Based on their technical feasibility study, the company decided to a solvent recycling unit. It reduces raw materials and labor needed to do clean up (Table 6). Other processes may need different waste reduction options.

Table 6 makes several assumptions about solvent distillation units based on information gathered from vendors. Your unit may perform differently than the estimates here. *It is important to figure out how much solvent your unit recovers, because other numbers are based on it (see below)*. Even with a solvent recovery unit, some new solvent must be purchased. Usually machines recover between 50-70% of the original solvent, so additional solvent that will need to be purchased will range from 30-50% of the initial amount.

The information from the front of the worksheet (STEPS #1-5) was used. It appears in the "Before" column of the second worksheet. Next, the new information from the waste reduction option table (Table 6) was written in the "After" column. Finally, the current operating costs are compared to the costs of using the new waste reduction option (see second page of the worksheet).

At the bottom of second page of the worksheet, there is a comparison calculation which will tell you how long it will take until you break even on any equipment you had to purchase in the waste reduction option. This is called the "Payback Period" and it shows you two things:

- how long it takes to break even on the equipment purchased, and
- how quickly you can start to save money.

**Table 6: Waste Reduction Option – Installing a Two-gallon Solvent Distillation Unit**

| | |
|---|---|
| A. Amount of solvent you use in a year for this process (# of times you do process x amount used each time) | 117 gals. |
| B. Annual costs to use this much solvent for this process ($0.53/half pt = $8.48/gal.) (117 gal. x $8.48/gal.) | $ 992.16 |
| C. Annual disposal costs to dispose of this much solvent as hazardous waste (Step #3, from the front of Form 1) | $ 231.25 |
| D. Minimum average amount (%) of solvent recovered with a two-gallon solvent distillation unit | 0.65 |
| E. Amount of solvent recovered per year for this process ( A. x .65 ) – with 65% recovery rate | 76.05 gals. |
| F. Additional solvent purchases required for this process, above the amount of solvent recovered with a solvent distillation unit ( A - E ) | 40.95 gals. |
| G. Average amount (gals.) of still bottom sludge disposed of per year with a two-gallon solvent distillation unit | 110 gals. |
| **New cost to purchase solvent for this process ( B x .35 ) – 65% recovery rate means only need to buy 35% as much new solvent** | **$ 347.26** |
| **Cost to dispose of 110 gals. of still bottom sludge per year for this process (contact your local hazardous waste hauler)** | **$ 185.00** |

# WORKSHEET 8. FULL COST ACCOUNTING WORKSHEET

## STEP #1 PROCESS INPUT/OUTPUT MAP

| Inputs (materials, supplies) | Process Name | Outputs (what's left other than the finished product) |
|---|---|---|
| 1. _____ | _____ | 1. _____ |
| 2. _____ | _____ | 2. _____ |
| 3. _____ | _____ | 3. _____ |
| 4. _____ | _____ | 4. _____ |
| 5. _____ | _____ | 5. _____ |

**Disposal Method**

| | OUTPUT # 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|---|
| Dumpster | | | | | |
| Sewer | | | | | |
| Waste hauler | | | | | |
| Recycle | | | | | |

## STEP #2 ANNUAL INPUT COSTS FOR THIS PROCESS

| Input costs for doing this process ONCE | | Estimated number of times this process is done in a year | | Annual input cost for THIS process |
|---|---|---|---|---|
| 1. $ _____ | x | _____ times/year | = | 1. $ _____ |
| 2. $ _____ | x | _____ times/year | = | 2. $ _____ |
| 3. $ _____ | x | _____ times/year | = | 3. $ _____ |
| 4. $ _____ | x | _____ times/year | = | 4. $ _____ |
| 5. $ _____ | x | _____ times/year | = | 5. $ _____ |

Example: Estimated number of times this process is done in a year
for 1 duplicator press & 1 two-color press
(3 washes @ 2 times a day x 6 days a week x 52 weeks =1,872 times/year)

**Total INPUT COSTS per year for this process** **A** $ _____

## STEP #3 ANNUAL OUTPUT COSTS FOR THIS PROCESS

| Annual disposal AMOUNTS for each disposal method | | | Estimated % of annual disposal amounts from THIS process | | Annual input cost for THIS process | | Annual disposal from THIS process |
|---|---|---|---|---|---|---|---|
| Dumpster | _____ | loads | _____ % | X | $_____ | = | $ _____ |
| Sewer | _____ | gals. | _____ % | X | $_____ | = | $ _____ |
| Waste hauler | _____ | drums | _____ % | X | $_____ | = | $ _____ |
| Recycle | _____ | lbs. | _____ % | X | $_____ | = | $ _____ |

**Total OUTPUT COSTS per year for this process** **B** $ _____

## STEP #4 HIDDEN COSTS

Estimate your annual overhead costs that come from this process.

| | |
|---|---|
| Inspections & monitoring | $ _____ |
| Permit fees & preparation | $ _____ |
| Record keeping & reporting | $ _____ |
| Sampling & testing | $ _____ |
| Safety equipment | $ _____ |
| Training | $ _____ |
| Labels & labeling | $ _____ |
| Secondary containment | $ _____ |
| Storage & containers | $ _____ |
| Pollution control equipment – maintenance | $ _____ |
| Pollution control equipment – utilities | $ _____ |
| Waste collection equipment – maintenance | $ _____ |
| Waste collection equipment – utilities | $ _____ |
| Waste pre-treatment | $ _____ |

**Total HIDDEN COSTS for this process** **C** $ _____

## STEP #5 TOTAL COSTS FOR THIS PROCESS

Cost of INPUTS per year for this process **A** $ _____

**+**

Cost of OUTPUTS per year for this process **B** $ _____

**=**

Total Traditional Costs per year for this process $ _____

**+**

Cost of HIDDEN COSTS per year for this process **C** $ _____

**=**

Total cost of THIS PROCESS per year for this process **$** _____

## STEP #6 COMPARING COSTS USING A WASTE REDUCTION OPTION VERSUS DOING BUSINESS AS USUAL.

| BEFORE WASTE REDUCTION | | AFTER WASTE REDUCTION | |
|---|---|---|---|
| **Process Name:** Press Cleaning | | **P2 Option Name:** Solvent Distillation Unit | |
| | | Which INPUT(s) at the left will be affected by selecting a waste reduction option? | **Solvent** |
| **Inputs (materials, supplies)**<br>Annual input costs for each of the inputs for THIS process.<br>*from the front of your worksheet (Step 2)* | | **New Input Costs**<br>**(including any changes from this P2 Option)** | |
| 1. Solvent | 1. $ 992.16 | 1. **Solvent** | 1. $ 347.26 |
| 2. Labor | 2. $ 7,020.00 | 2. Labor | 2. $ 7,020.00 |
| 3. Rags | 3. $ 299.52 | 3. Rags | 3. $ 299.52 |
| 4. | 4. $ | 4. | 4. $ |
| 5. | 5. $ | 5. | 5. $ |
| What is the OLD annual input total cost from this process | $ 8,311.68 | What is the NEW annual input total cost from this process | $ 7,666.78 |
| | | Which DISPOSAL method(s) at the left will be affected by selecting a waste reduction option? | **Waste hauler** |
| **Outputs (what's left)**<br>Annual disposal costs from THIS process.<br>*from the front of your worksheet (Step 3)* | | **New Output Costs**<br>**(including any changes from this P2 Option)** | |
| Dumpster | $ | Dumpster | $ |
| Sewer | $ | Sewer | $ |
| Waste Hauler | $ 231.25 | **Waste Hauler** | $ **185.00** |
| Recycle | $ | Recycle | $ |
| The OLD annual disposal total cost from this process | $ 231.25 | The NEW annual output total cost from this process | $ 185.00 |
| **Annual HIDDEN Costs**<br>*from the front of your worksheet (Step 4)*<br>The OLD annual hidden costs from this process? | $ 170.00 | **New Annual HIDDEN Costs**<br>The NEW annual hidden costs (including any possible changes) | $ 170.00 |
| **COST COMPARISON**<br>Your OLD Total cost per year for your INPUTS, OUTPUTS, and HIDDEN Costs | $ 8,712.93 | | |
| **MINUS**<br>NEW Total cost per year for your INPUTS, OUTPUTS, and HIDDEN Costs | $ 8,021.78 | | |
| **EQUALS**<br>Difference in OLD vs. NEW TOTAL COSTS per year | $ 691.15 | | |
| **NEXT**<br>Now subtract the cost of any NEW EQUIPMENT purchased and installed (if applicable) | $ 2,100.00 | | |
| The difference is: | **$ -1,408.05** | | |

If you divide the new up-front cost by how much you save per year, you will determine your PAYBACK PERIOD, or how long it will take to pay for the new equipment.

**$ 2,100.00 / $ 691.15 = 3.03 yrs.**

APPENDIX F:

# P2 Annual Progress Report Form

Texas Commission on Environmental Quality

# P2 Annual Progress Report

Required APR Form

## PART 1. FACILITY DESCRIPTION

| | |
|---|---|
| Report Year: | Report Date: |
| Company Name: | |
| Facility Name: | |
| Mailing Address: | Physical Address: |
| Mailing City, State, Zip: | Physical City, State, Zip: |
| Name of Pollution Prevention Contact: | TCEQ SW Reg. # |
| Telephone: | TRI ID # |
| Fax: | EPA ID # |
| E-mail (optional): | NAICS: |
| Primary SIC Code: | Number of Employees: |
| Secondary SIC Code: | Independently owned? ❑ Yes ❑ No |
| First year of your current plan: | |
| Does this report revise a previously submitted APR? ❑ Yes ❑ No | |

## PART 2. PROJECTED AMOUNTS FOR GOAL YEAR (FROM YOUR PLAN)

Goal Year (the fifth year of your plan): _____

| | Estimate Quantity | |
|---|---|---|
| | HW (A) | TRI (B) |
| 1. Projected amount of HW generation or TRI releases/transfers by Goal Year | Tons | Tons |
| 2. Source reduction anticipated over five-year period | Tons | Tons |
| 3. % Waste Minimization by the Goal Year | % | % |

## Part 3. Reduction Achievement for the Report Year

***Source Reduction Activities***

Estimate the amount of reduction for hazardous waste generation and TRI release/transfer that your facility experienced in each category below.

| | Estimate Quantity | |
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| | HW (A) [Tons] | TRI (B) [Tons] |
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| 2. Inventory Control | | |
| 3. Spill and Leak Prevention | | |
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| 5. Process Modifications | | |
| 6. Cleaning and Degreasing | | |
| 7. Surface Preparation and Finishing | | |
| 8. Product Modification | | |
| 9. **Total Source Reduction (Sum 1-8) in Tons** | | |

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Texas Commission on Environmental Quality

# P2 Annual Progress Report

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