
Writing A Waste Reduction Plan

A How-To Book for Tennessee Generators



ABOUT THIS HANDBOOK

This handbook will help you prepare a waste reduction plan for your business or industry. Prepared to provide businesses with practical information on how to approach, plan, and implement a hazardous waste reduction program, the handbook motivates industry to search for administrative, material, or technology changes that result in less waste.

With this book, you'll walk through each step of reviewing operations, identifying and assessing waste reduction options, and implementing and measuring your progress. And within this book you can find answers to questions like:

- What guidance on the elements of a waste reduction plan is the State of Tennessee providing for hazardous waste generators ?
- How do waste reduction practices enhance regulatory compliance?
- Does Tennessee law include EPA's requirements for a waste minimization "program-in-place?"
- How do I conduct a waste reduction assessment?
- What steps are necessary in implementing various waste reduction practices?
- What specific waste reduction practices are businesses successfully using?
- Where can I go with my questions on waste reduction?

Because individual industries' needs vary widely, we encourage you to modify procedures discussed here to meet your own unique requirements. This book serves as a point of reference, rather than a set of rigid requirements.

UT'S Waste Reduction Assistance Program staff developed this handbook for use at statewide facility planning workshops. WRAP offers these workshops to help Tennessee industries comply with new environmental laws. WRAPS ultimate goal is to promote waste reduction through industrial training. The training programs seek to integrate toxic use reduction and waste reduction ethics into the industrial decision-making process.

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Introduction



New Tennessee Legislation and Policy

In response to a growing concern that solid and hazardous waste problems needed more attention than they previously had received, the 1988 Tennessee General Assembly passed legislation establishing a state waste reduction policy that reads:

Wherever feasible, the generation of hazardous waste is reduced or eliminated as expeditiously as possible. Waste that is generated should, in order of priority, be reduced at its source, recovered and reused, recycled, treated, or disposed of so as to minimize the present and future threat to human health and the environment.'

The Tennessee Hazardous Waste Reduction Act of 1990 (TCA 68-46-301 et. eq.) requires businesses that generate both large and small quantities of hazardous waste to develop a facility waste reduction plan. The law encourages in-plant changes which reduce, avoid, or eliminate toxic materials use and hazardous wastes. This new facility planning law is one of the first in the country requiring numeric performance goals based on production units.

The elements of a written facility plan (required by the Tennessee Hazardous Waste Reduction Act of 1990) are based on federal guidelines. Tennessee's program is based on EPA's voluntary "program-in-place." The "program-in-place" meets certification requirements found on the Hazardous Waste Manifest-- a form which companies must use when shipping hazardous wastes off-site.

Companies that produced large quantities of hazardous wastes during the 1989 calendar year must develop a plan by January 1, 1992. Failure to comply could result in fines of up to \$10,000 per day. Small-quantity generators have until January 1, 1994 to develop a waste reduction plan. This planning process is expected to lower industrial costs and liabilities, and benefit public health, safety, and the environment. The new facility planning law requires setting numeric performance goals based on production units.

Although Tennessee's waste reduction policy is based on environmental concerns, waste reduction also has positive incentives for industry. Waste reduction reduces raw materials cost, waste handling and disposal costs, and liability risks. Companies that reduce wastestreams also improve their public image. Waste is an indication of inefficiency and as such, reduction makes sense in today's competitive marketplace.

DEFINITIONS

What is Waste Reduction?

Waste reduction, which is broad in scope, includes source reduction techniques and on-site and off-site recycling methods. Recycling is:

- ✓ The effective use or reuse of a waste as a substitute for a commercial product;
- ✓ Using waste as an ingredient or feedstock in an industrial process;
- ✓ Reclaiming useful constituent fractions within a waste material; and
- ✓ Removing contaminants from a waste to allow its reuse.

Recycling is the use, reuse, or reclamation of a waste, either on-site or off-site, after it is generated by a particular process.

The new federal Pollution Prevention Act of 1990 establishes a new definition for source reduction:

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

Source reduction is any action that reduces the amount of waste exiting a process. Source reduction 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

Key Dates

Defining Waste Minimization and Reduction

For the purposes of the Tennessee planning law, waste reduction does not include reduction in air emissions, wastewater discharges, or solid waste. However, you should consider a wide range of environmental issues while preparing your reduction plan.

Key Dates

Review Appendix A, A Guide to the Act, and write key dates for your company here in the margin. Use these dates when preparing the plan schedule.

Tennessee's Law: Section 305

Section 305 a)



PLAN YOUR PROGRAM

This handbook will help you begin writing your facility waste reduction plan. You're encouraged, however, to turn directly to the law now (found in Appendix B), read it, and interpret it for your own circumstances. Final determinations of economic and technical feasibility, performance goals, and other aspects of the plan are left to you and your facility.

In general, the law says your plan must contain:

- ✓ A written policy of management and corporate support for planning efforts and a commitment to implementation;
- ✓ Written objectives and scope of plan. (You can include a description of hazardous waste reduction accomplished prior to the planning law.);
- ✓ Results of waste reduction assessments. This handbook outlines the steps of a reduction assessment. Completed tasks and findings of an assessment are useful in meeting this requirement. Specifically, reduction assessment details of the plan should include:
 - ... a list of all hazardous wastestreams;
 - ...assessment of whether you need to set performance goals (If goal-setting isn't practical at this point, list actions which will lead to your facility's establishment of performance goals.);
 - ... evaluation of processes, operations, and activities that involve toxic substances and create hazardous waste; and
 - ... evaluation of reduction options for each waste that you targeted in your plan's performance goals.
- ✓ An accounting system, which to the extent technically and economically feasible, should identify. these costs:
 - ...toxic materials;
 - ... hazardous waste disposal;
 - ... hazardous waste storage;
 - ... hazardous waste treatment;
 - ... associated environmental liability of hazardous materials and hazardous wastes; and
 - ... oversight costs for maintaining compliance
- ✓ A feasibility analysis including:
 - ... a list of all reduction options considered and those options selected
 - ...an explanation of reasons options weren't implemented; and
 - ... identification of positive or negative effects of reduction options on the environment, public health and safety, or other reduction efforts.
- ✓ Measurable reduction performance goals (based on a per production unit amount) for all wastestreams.

We suggest you set performance goals for a two-year and a four-year period. Set the goals for these time frames in numeric terms based on production

units. Explain how you arrived at the numeric goal and what barriers may keep you from achieving a more ambitious goal.

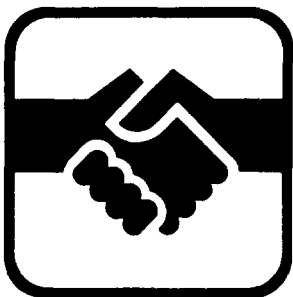
- ✓ A list and explanation of reduction options you selected and a schedule of tasks and implementation deadlines;
- ✓ A description of employee involvement programs for waste reduction efforts; and
- ✓ A description of your efforts to make waste reduction an integral part of daily operations.

Waste reduction is not a program, it's an attitude.

Because businesses and industries grow and product lines change, planning is necessary. Planning for greater waste reduction should complement any planning effort. Waste reduction is an integral part of sound business practices, just as productivity and goal setting are. Unfocused, ill-timed, or poorly managed waste reduction efforts will lead to low performance and high cost. Conversely, a well planned and effectively implemented program leads to reduced costs.

Writing and implementing a waste reduction plan is similar to writing any other business plan. Make sure your plan clearly reflects the reasoning behind the planning, what the plan requires, and who will implement it. A written policy statement should make the plan's goals clear to everyone at the facility

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MANAGEMENT COMMITMENT

A successful waste reduction program requires sincere corporate commitment. The program must become a functioning part of a firm's *corporate policy*, including product development, operational procedures, and training. High-level management commitment will keep the waste reduction program active in all areas of the company, from new product development to the maintenance staff. Management must commit time, personnel, and financing. Lack of this commitment often becomes an obstacle to waste reduction.

While policy statements will vary in detail, they should answer the questions *why, what, and who*:


- Why is the facility implementing waste reduction?
- What is involved in implementing waste reduction?
- Who will implement the reduction program?

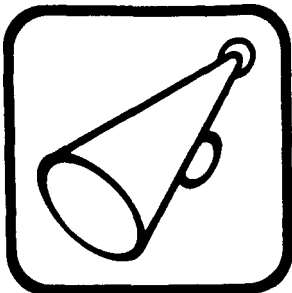
A formal policy statement best conveys waste reduction program objectives to employees. Include these points in your environmental policy statement or operating guidelines:

- **Environmental protection — Make the production line responsible for environmental protection. Measure employee performance against the set goal. In addition, make every employee as responsible for environmental protection as they are for safety;**


-
- Reducing or eliminating waste is a main goal In research, process design, and plant operations and Is as Important to management as safety, yield, and loss prevention; and
 - Consider reusing and recycling materials before classifying and disposing as a hazardous waste.

In the policy statement for your facility, you may also want to list motivations for waste reduction planning, such as regulatory requirements, product quality, cost and liability control, and worker health and safety. Make the exact language appropriate to your facility.

 Develop a ‘draft’ written **policy** statement for your facility in thls space. Can you keep It to 25 words or less?



Once management signs and dates the policy statement, display it prominently and distribute it widely. How you first distribute the written policy to employees indicates company commitment. Posting it unexpectedly at work stations sends a negative message. Calling a special meeting to review Tennessee’s hazardous waste reduction program, explaining and distributing copies of your company’s own policy, and asking for employee ideas sends a positive signal.

 List some ideas here for promoting the policy statement at your own company.

Although a commitment to reducing waste should begin with management, employees can often suggest improvements in day-to-day operations. Employees generate the waste and they can contribute to the overall success of the reduction program. Inform and involve employees at each step in developing and implementing a program.

Section 305 a)(2)



Involvement's the Key

The keys to reducing waste generation - commitment, involvement, and teamwork—are basic to many work place successes. Owners and managers can determine priorities and set the tone of the company's waste management efforts. Management can give direction and support. But it takes everyone to make it happen. Once everyone understands how reduction of toxic substances and hazardous waste fits into company policies and practices, opportunities for participation are unlimited.

Understanding your facility usually means that someone must gather and analyze information. They will start with records and other written material, but soon they must look at actual operations to see how work is performed. Everyone in the facility is involved in some way in changing how it operates.

When planning for waste reduction ask yourself these questions:

- Who can help you understand your facility?
- Who can help you change how your facility operates?
- Who can help you maintain your waste reduction plan as old challenges are met and new opportunities arise?

The team approach is best since it combines a wide range of experience, knowledge, and perception of the issues. An in-house team can include management and plant personnel from engineering, environmental engineering, safety and health, purchasing, materials and inventory control, finance, and product quality control. A technically competent person with sufficient authority to do the job should select and lead the team.

↳ List some potential key players (and their positions) you have already identified for the assessment team:

In order to keep the program alive, you may find an idealistic overall goal useful. In the case of product quality, some companies state a goal of "zero defects." And in the case of worker health and safety, the ultimate goal may be "zero lost work days." For waste reduction, a goal of "zero generation" or "90% reduction by 2000" may be impossible to actually achieve. But such a goal can serve as a slogan and motivation for continued improvement.

Once your commitment is clear and everyone understands your overall goals, it's time to set specific objectives. Whatever your objectives, make sure everyone understands exactly what substances and wastes you're talking about, the amounts, and the target dates for achieving reduction goals.

Better Standard Procedures

Good operational control for waste reduction is an organizational procedure or policy that reduces multi-media wastes. Better standard procedures usually involve production (organizational structure, housekeeping improvements, initiatives, operations planning and control) rather than raw materials and design



factors. Here are selected ways to improve procedures and some specific practices for those processes commonly used by many industries and businesses to reduce unnecessary waste.

Reduce wastes through good operating practices Including:

- Management initiatives and incentives which lead to a reduction in waste;
- Employee training to increase awareness of operating practices that reduce waste generation;
- Preventive maintenance procedures designed to reduce equipment breakdowns, inefficiency, or process fluid leaks;
- Corrective maintenance, such as resetting control valves or adjusting process temperatures, to increase efficiency and prevent raw material loss through wastestreams; and
- Developing procedural guidelines or material information resulting in less waste.

Reduce wastes in materials handling, storage, and transfer including:

- Scheduling improvements to reduce waste and coordinate handling,
- Spill and leak prevention - changing existing procedures to reduce waste resulting from clean up of spills or leaks;
- Material and waste tracking including good inventory control; and
Wastestream segregation to isolate wastestreams according to (1) toxicity, (2) type of contaminant, and or (3) physical form, which reduces the amount of waste or enhances re-use or recyclability.

Reduce wastes in other areas:

- Parts cleaning operations;
- Equipment cleaning operations; and
- Coating operations.

The above improved operating procedures are good housekeeping practices most businesses implement in one form or another. They can result in tighter management of an operation, more efficiency, higher productivity, and waste reduction.

List any waste reduction ideas you have at this point.

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Looking in Your Own Backyard

The likelihood of finding cost-effective options for reducing hazardous wastes is directly related to understanding the relationships between your operations, the toxic substances used, and the wastes generated. Enlarge your understanding of these relationships by reviewing plant operations and conducting a toxics use and hazardous waste reduction assessment.



Consider a reduction assessment in several stages:

- Preview your plant's operations, chemical usage, business practices, and wastes generated;
- Walk through your facility to verify your findings and identify reasons for your wastes; and
- Document your findings.

The size and type of your business will determine how much effort you put into an assessment. The owner of a very small business might conduct an assessment alone in four to six hours. Larger manufacturing or multiple-process firms benefit from a team assessment that may take several weeks. You'll need several people with diverse skills to evaluate complicated wastestreams, analyze multiple kinds of equipment, and contribute to economic analyses.

Ask the following questions about your current operations:

- ✓ What are this facility's current processes/operations?
- ✓ Why do we do each process/operation this way?
- ✓ What are the consequences of doing each process/operation this way?
- ✓ What are the wastestreams generated from each process, and how much?
- ✓ Which wastes are classified as hazardous and which are not? What makes them hazardous?
- ✓ What Input materials do you use that generate wastestreams?
- ✓ How much Input material from a particular process enters each waste stream?
- ✓ How much of a raw material can you account for through fugitive losses?
- ✓ How efficient is the process?

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- ✓ Are unnecessary wastes generated by mixing otherwise recyclable hazardous wastes with other process wastes?
 - ✓ What types of housekeeping practices do you use to limit wastes?
 - ✓ What types of process controls do you use to Improve process efficiency?

Based on the collected information, you can develop a flow diagram and material balance for each process step. The diagram should clearly identify the source, type, quantity, and concentration of each wastestream. Use the background information to identify data gaps, sampling points, problem areas, and data conflicts.

During the assessment preview period, acquaint yourself with the business operations and develop ideas for improvements. Prepare a checklist that will ensure you collect all pertinent information and guide your assessment team through the facility tour.

Before the assessment walk-through, have the team prepare an agenda of points still needing clarification. The list can contain objectives, questions, and further concerns.

Waste reduction assessments identify and profile wastestreams, how they are generated, and the amount of waste generated by each. A waste reduction assessment helps you identify cost-effective approaches to reducing waste volume and toxicity. You can then better decide how to use resources for source reduction and recycling programs. A waste assessment alone will not reduce a business's waste, but it's a good start.

Waste reduction assessments are not one-time projects. Goals are re-evaluated as changes occur. Such changes might exist in available technology, raw material supplies, environmental regulations, and economic climate. Tennessee's waste reduction facility planning law (Section 306) requires an annual review and update of your waste reduction plan and accomplishments.

Section 306

Survey Says

After the assessment team identifies wastestreams and creates a checklist, it's time to survey the plant site. Become as familiar with the site as possible. Although the information you collected is critical to understanding the processes involved, seeing the site in operation is also important. For example, a process unit may operate differently from the method originally described in the operating manual. Employees may have made undocumented changes in flow diagrams or to equipment. The site inspection resolves questions which might arise during your review.

The site inspection also provides information that supplements what you learned earlier. Throughout your tour, team members should use the inspection checklist, ask questions about the above items, and look for specific opportunities to reduce waste. They should verify information gathered during pre-assessment.

Assessors should talk with employees who operate processes and equipment. The employees' experience and opinions concerning waste reduction options can be quite valuable. The assessors should review the data during or just after the survey. This review can help you identify missing or inaccurate information. From it, you can make additions and corrections to the waste flow diagram. Examine each step in the manufacturing process from the delivery of the material to the storage and shipping of the final product.

Have this Information on record for each wastestream:

EPA Waste ID Number(s)

US DOT Description

- **Point of origin;**
- **Subsequent handling/treatment/disposal;**
- **Physical and chemical characteristics;**
- **Quantity;**
- **Rate of generation (i.e., lbs/unit of product);**
- **Variations in generation rate;**
- **Potential for contamination or upset; and**
- **Cost to manage or dispose.**

Once you identify wastes, quantify and cost them as accurately as possible. Reports which you've submitted to regulatory authorities can help you estimate waste quantity and disposal costs. A record of the frequency of waste pulls and tipping fees is often on file at your facility. Develop further details by having team members measure individual wastestreams over a period of time to establish a verified generation rate. The difference between the amount of material purchased and the quantity shipped as product components is your estimated waste.



PICK YOUR TARGET

When the causes of waste are understood, the assessment process enters the creative phase. Your objective at this step is to generate a comprehensive set of waste reduction options. Consider every wastestream as a reduction opportunity until proven otherwise. Most of the time, an opportunity exists if a wastestream exists.

Following the collection of data and site inspections, the members of the team will have begun to identify possible ways to reduce waste in the assessed areas. Identifying potential options relies both on the expertise and creativity of the team members. Much of the information you need can come from their education and on-the-job experience.

Don't forget to utilize available waste reduction information resources such as the CIS Information Clearinghouse, the Waste Reduction Resource Center for the Southeast, or the EPA's telephone hotlines and PIES electronic bulletin board (addresses and phone numbers are at the end of this handbook). These and many other sources contain information on what other companies have done to reduce waste generation.

Evaluating Preliminary Options

In ranking options, source reduction is first, followed by recycling options. Source reduction is the preferred means of reducing waste. Consider treatment options only after identifying acceptable waste reduction techniques.

Rank your options using the following waste management hierarchy:

Source reduction options:

- Improved operating practices;
- Employee training and awareness programs;
- Scheduling to eliminate frequent equipment cleaning;
- Process improvements;
- Input changes;
- Changes in the composition or design of a product; and
- Segregation of wastes.

Recycling options:

Return a waste into the originating process as a substitute for a raw material;

- Use a waste as a raw material in another process;
- Reclaim a waste for sale or use as a fuel; and
- Utilize waste exchange services.

Treatment options:

- Process a waste, hazardous or not, to reduce disposal cost and to minimize environmental damage.

The business and team members should encourage creativity and independent thinking throughout this process. Individual team members will suggest many

potential options on their own. Enhance their participation by using some techniques like brainstorming sessions. These techniques allow the team to identify options that the individual members might not have suggested on their own.

List all the possible opportunities to reduce waste within the facility. The list may include several options for each wastestream or process. At this stage in the assessment process, assessors should not consider in detail the technical or economic usefulness of any particular option. Develop the list based on a broad range of general opportunities identified by asking questions.



As they identify specific opportunities to reduce waste, team members

should ask these questions:

- ✓ Product design - Does product design require use of hazardous materials in later stages of production? Could negotiation with the customer produce desirable changes in product formulation or design?
- ✓ Raw material substitutions — Would different materials result in a less-hazardous or less-toxic product? Do raw materials require use of hazardous materials in later stages of production?
- ✓ Materials handling - Is the form in which raw materials are received constraining design or processing? Are materials delivered in just-enough, just-in-time fashion?
- ✓ Changes in processes, equipment, or operations - Would upgrading machinery result in less use or release of hazardous materials? Do production runs and schedules optimize the use of material?
- ✓ Housekeeping procedures - What housekeeping or operations procedures cause problems later on?
- ✓ Maintenance procedures - Is maintenance adequate, regularly scheduled, and implemented?
- ✓ Training procedures - Are operators trained in (and using) the most efficient production processes?
- ✓ In-process recycling/reuse - Are there ways to recycle materials within the production process for later reuse?
- ✓ Reclaiming, recycling, and reusing of wastestreams and scrap materials - Are there ways to recycle materials outside the process, at the facility, in a way that minimizes the risk of worker exposure or release to the environment?

DISCUSS THE RESULTS

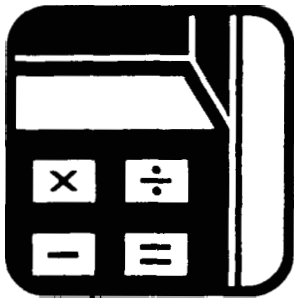
Now you're ready to discuss your results with plant personnel and company management. The screening activity should promote the best options for technical and economic feasibility analyses. You need a detailed analysis from both the technical and economic viewpoints in order to choose the best waste reduction options.

Technical evaluation

A determination of whether a proposed option will work, and whether there are by facility constraints or product requirements which make it technically unwise to install and operate. The completed technical evaluation is reviewed by ALL affected groups. If a project appears impractical, or is found unacceptable through unsatisfactory answers to any of the questions below, drop it until more promising options have been investigated.

During the screening procedure, assessors should consider the following questions:

- What is the main benefit gained by implementing this option (e.g., economics, compliance, liability, workplace safety, etc.)?
- Does the necessary technology exist to develop it?
- How much does it cost? Is it cost effective?
- Can you implement it within a reasonable amount of time without disrupting production?
- Does it have a good track record? If not, is there convincing evidence that the option will work as required?
- Does the option have a good chance of success? (A successful start for a waste reduction program will gain wider acceptance as the program progresses.)
- What other benefits will occur?



Economic evaluation

- Capital Costs: If capital expenditures are necessary, generate as accurate an estimate possible of the total cost of implementation. Companies with sizeable engineering departments probably have preset methods of estimating capital projects. If you are a smaller company, be sure that the capital cost estimate includes ALL costs incurred in getting the new process or equipment to the site, installed and ready to operate.
- Operating Costs: In addition to reducing waste disposal and raw material costs, there are a number of other factors (either positive or negative in net effect) such as liability, compliance, and oversight which you must consider in operating cost estimates.

Just Say "Charge It"

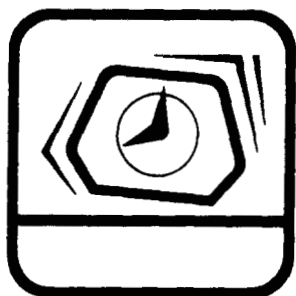
Charge departments full costs for the waste they generate. Factor in liability, compliance, and oversight costs to the most comprehensive extent possible in your waste accounting system.

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True costs of waste management include:

- Calculating costs of wastestream materials, based on the purchase price of those materials;
- Calculating the cost of managing wastes, including costs for personnel, recordkeeping, monitoring, training, inspections, manifesting, and labeling. Also include costs for transportation, laboratory fees, penalties and fines, liability insurance, pollution control equipment, treatment and disposal and others;
- Estimating the cost of waste reduction (include initial costs, amortization, depreciation, tax rebates, pay back potential); and
- Estimating liability costs, especially long-term. Use the capital and operating cost estimates as the basis for arriving at a final recommendation by whatever method the company normally uses for profitability analysis (i.e. return on investment, payback period, net present value).

These technical and economic calculations should lead to the final ranking of the most reasonable options. The waste assessment tracks all wastes produced at a business to find out where it was generated. When the tasks outlined above are completed, you can write into the plan a description of options and schedule for implementation. You will find some options (such as procedural changes) are inexpensive and quick to implement. The screening procedure should account for ease of implementation. If an option is clearly desirable and inexpensive, promote it. Don't let any grass grow under your feet before implementation is under way!



Implement Now

Implement operational, procedural, or materials changes (without changing equipment) as soon as you determine potential cost savings. In plans that call for equipment changes, it's essentially no different from any other capital improvement project. The phases of the project include planning, design, procurement, and construction.

Once the reduction techniques are identified, develop an implementation plan for each wastestream. This plan should include the implementation schedule, equipment needs, conceptual design, implementation requirements, management requirements, and cost estimates.

The Implementation schedule and goals for the plan should Include:

Selecting alternatives for implementation (prioritize and list conditions for adoption);

Identifying measurable, performance goals for each hazardous waste-stream;

- Establishing outcome objectives and ranges of acceptability;
- Identifying steps or phases and timing for implementation;
- Identifying tasks and personnel assignments;
- Training and involving all personnel in the business; and
- Setting target dates for completion of goals.

Several attitudes can prevent successful implementation of waste-reduction options, which is frustrating to the assessment team. The important factor at this point is that the waste reduction task force **MUST NOT** consider the job complete until the recommended measures are implemented, or at least until the project is funded and scheduled.

Some barriers you can expect Include:

- Other corporate priorities for use of capital resources;
- Skepticism - "it won't work;"
- The Status Quo - "if it ain't broke, don't fix it"

This waste reduction program is designed and organized to overcome such attitudinal barriers early by:

- Obtaining high-level commitment;
- Representing all groups in the plant on the task force; and
- Carefully analyzing and evaluating all options.

BUT, the assessment team must keep selling the package until it's a success.

Section 305 a)(5)

Make a Circle

Although a commitment should begin with management, production operators and line employees can often suggest improvements in the operations. They possess first-hand knowledge and experience with production and operation processes. They can assist especially in assessing operational or procedural changes, or in equipment modifications affecting the way they work

Many businesses have quality circles to increase efficiency. These circles consist of workers and supervisors who meet together to determine and evaluate improvements. Quality circles, which foster participation and commitment to improvement, closely rely on production people. Several companies have used quality circles to gain valuable waste reduction ideas.

To reduce waste successfully, management must recognize the value of assessment and employee involvement. If management initiates the assessment and encourages employees to develop and implement a program, waste reduction changes will occur.

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A LONG-TERM COMMITMENT

To insure continued reductions, a business must monitor and evaluate techniques once they are in place. Your plan should address updating procedures as well as combining the program into the management structure. In addition, the program should allow for production changes and development of new reduction techniques.

Waste planning (and assessing) offers ways to improve management of a waste reduction program and introduce new technologies and practices.

Much of the planning for a waste reduction program requires:

-
- **Increased awareness and attention to toxic chemicals**
 - **Increased awareness and training to change old work patterns;**
 - **Knowledge of options for change;**
 - **Willingness to experiment and to change;**
 - **Management's willingness to provide resources for change; and**
 - **Willingness to follow-through, evaluate, and learn from changes.**

Management's commitment to change makes the difference between simply preparing a plan, and preparing and implementing a plan. Implementation is the key. The law requires annual reports summarizing progress toward both the general and quantitative objectives in your plan.

Since changes seldom occur as planned, and facilities change over time, you need to monitor your waste reduction plan to ensure its usefulness. This means long-term management support and, in many cases, a champion within the organization whose job includes staying abreast of the waste reduction program and making needed updates.

Who could be a “cause champion” at your facility?

In the 08, businesses will thrive on decentralized management, quality circles, and delegated responsibility. The advantages of group processes have been repeatedly documented. In some businesses, however, a single individual maybe assigned to carry the entire responsibility for a hazardous waste reduction program. Instead of shouldering the burden alone, consider yourself a team leader. If possible, try to select a minimum of two other employees for your team.

 **Performance Goals Worksheet**

**US EPA
WASTE ID No.(s)**

**US DOT
Description**

INSTRUCTIONS: Copy this form and use one copy for each process. Summarize each process selected for detailed review along with its associated toxic substances and wastes.

Assessment Worksheet for

(Company Name)

(Date)

Process, Operation, or Activity:

List Wastestream Generated:

- Point of origin;
- Subsequent handling/treatment/disposal;
- Physical and chemical characteristics;
- Quantity;
- Rate of generation (i.e., lbs/unit of product);
- Variations in generation rate;
- Potential for contamination or upset; and
- Cost to manage or dispose.

List all toxic substances used in this process:

List reduction options for this process:

Which option is economically most feasible? Explain:

Which option is technically most feasible? Explain:

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How much reduction is achieved? Develop a performance standard for this wastestream based on this information.

List the positive or negative cross-media impacts on the environment or employee health and safety.

Toxic substances affected:

Other wastestreams affected:

Products affected:

Option proposed on (date)

Option approved for implementation:
YES NO Date:

Reason for acceptance or rejection:

Section 305 c)

MEASURING RESULTS

The specific performance goals established under subsection (b) of this section shall be quantitative goals, expressed in numeric terms. Whenever possible, the units of measurement should be in pounds (or tons) of waste generated per standard unit of production, as defined by the generator. If the establishment of numeric performance goals is not practical, the performance goals shall include a clearly stated list of actions designed to lead to the establishment of numeric goals as soon as possible.

Demonstrating that your plan's objectives have been achieved is essential. The following are some useful measurements:

- Ratio of waste generated to production unit or rate, before and after implementation;
- Savings in raw materials and waste disposal cost;
- Quantities of waste generated before and after implementation; and
- Ratio of raw materials consumed to production rate, before and after implementation (an indirect measure of waste reduction).



Measuring waste reduction by comparing quantity of waste or input materials to production rate is generally more useful if applied to a single production unit rather than to an entire plant. This is especially true of plants where dissimilar processes and operations are included in one facility. Consider wastes generated on a periodic basis, such as waste from maintenance or construction, separately from production wastes, unless the evaluation includes at least one repetition of the periodic cycle.

One measure of effectiveness for a waste reduction project is the project's effect on the organization's cash flow. The project should pay for itself through reduced waste management costs and reduced raw materials costs. However, measuring the actual reduction of waste is also important. The easiest way to measure waste reduction is by recording the quantities of waste generated before and after a waste reduction project was implemented. The difference, divided by the original rate of waste generation, represents the percentage of waste reduced. However, this simple measurement ignores other factors also affecting the quantity of waste generated.

In general, waste generation directly depends on the production rate. Therefore, the ratio of waste generation rate to production rate is a convenient way to measure waste reduction. Expressing waste reduction in terms of the ratio of waste to production rates is not free of problems, however. One of these problems is the danger of using the ratio of infrequent large quantities to the production rate. In general, a distinction is made between production-related wastes, maintenance-related wastes, and clean-up wastes.

Also, a few wastestreams may be inversely proportional to production rate. For example, waste from old materials will increase if the production rate decreases.

his is because the old materials in inventory are more likely to expire when its production use decreases.

In measuring waste reduction, businesses should measure the total quantity of an individual wastestreams as well as the individual waste components. Often, good housekeeping and concentrating a dilute aqueous waste cause much of the reduction. Although concentration, as such, does not fall within the definition of waste reduction, practical benefits result from concentrating water wastestreams, including decreased disposal costs. Concentrating a wastestream makes it easier to recycle. Concentration may also help reduce the load on a facility's wastewater treatment system .

Obtaining good quality data for wastestream quantities, flows, and composition can be costly and time consuming. For this reason, in some instances, expressing waste reduction indirectly in terms of the ratio of input materials consumption to production rate may be practical. These data are easier to obtain although the measure is not direct.

Measuring waste reduction with a ratio of waste quantity to material throughput or product output is generally more meaningful for specific operations rather than for an entire facility. Therefore, preserving the focus of the project when measuring and reporting progress is important. For those operations without chemical reactions, measuring progress with the ratio of input material quantity to material throughput or production rate may be helpful.

Section 305 d)

JUSTIFY PERFORMANCE GOALS

Each generator has to be prepared to explain the rationale for each performance goal in the facility plan. The law requires that you implement waste reduction options that are technically and economically feasible and that you explain how you arrived at your decision. The rationale for a reduction goal should address any impediments to hazardous waste reduction, including but not limited to the following:

- The availability of technically practical hazardous waste reduction methods, including any anticipated changes in the future;
- Previously implemented reductions of hazardous waste (can also be in Preface to Plan);
- The economic practicability of available hazardous waste reduction methods, including any anticipated changes in the future.

Examples of situations where hazardous waste reduction may not be economically practical include, but are not limited to, these examples:

... For valid reasons of prioritization, a particular company has chosen first to address other more serious hazardous waste reduction concerns;

... Necessary steps to reduce hazardous waste are likely to have significant diverse impacts on product quality; or

... Legal or contractual obligations interfere with the necessary step that would lead to hazardous waste reduction.

POTENTIAL EXCLUSIONS

The board, by rule, may provide for modifications and exclusions for small quantity generators related to the kind of information that is included in the plan. The board may provide for exception by rule for generators whose hazardous wastestreams fluctuate widely due to contract work or manufacturing orders.

Section 305 f)

PREFACE TO THE PLAN

A generator may include as a preface to its initial plan:

- An explanation and documentation regarding hazardous waste reduction efforts completed or in progress before the first reporting date; and
- An explanation and documentation regarding impediments to hazardous waste reduction specific to the individual facility.



Now you should begin writing your facility's waste reduction plan!

Waste Reduction Planning Opportunities for (Company Name)

PREFACE

(Company Name) already has an extensive program of waste reduction underway. The waste reduction program leader, (Employee Name), and assessment team are actively addressing many waste reduction issues and have developed action plans in some of the more critical areas. In fact, (Company Name) has implemented or is in the process of:

(List and describe previous efforts which have resulted in the reduction of volume and/or toxicity of a hazardous wastestream. If possible, explain the reduction in terms of pounds or tons per production unit, savings in costs, or benefits for employees or the environment. Explain why these previously implemented reductions may be an impediment to further reductions of these specific hazardous wastestreams.)

In view of the above, the assessment team is now concentrating on other wastestreams at the facility and, in order to comply with the new Tennessee Hazardous Waste Reduction Act of 1990, are developing a facility plan with the following suggestions for improvement in the current waste reduction program.

Section 305 a(1)

ISSUE A WASTE REDUCTION POLICY STATEMENT

All employees should be aware of the need for waste reduction and the contribution that they can make. This is best accomplished by issuing a policy

Section 305 a)(1)

statement on waste reduction. Date the policy and have senior management issue it and discuss it with all employees to communicate commitment. Some of the major points that you should cover in the policy statement are:

- (Company Name's)'s policy is to reduce all hazardous and non-hazardous waste to the minimum levels economically and technically practical and to be in full compliance with all Federal and State waste regulations;
- As both a responsible citizen and (Company Name) employee, each individual is responsible for reducing waste during working hours, for complying fully with all waste reduction program goals established by the company, and for not violating any Federal or State waste regulations.
- Employees are urged to come forth with suggestions for further reducing waste in their own work area and in any other areas about which they may have ideas.

Section 305 a)(6)

ASSIGN WASTE REDUCTION RESPONSIBILITY

In order to obtain full cooperation at all levels of the company in implementing the waste reduction policy, it's our policy to designate one individual as having overall responsibility for that effort. Mr./Ms. _____, (Position), has overall company responsibility for establishing the training programs and operating procedures required to implement (Company Name's)'s written policy statement.

Section 305 a)(5)

SECURE EMPLOYEE COMMITMENT

No waste reduction program is successful without the full cooperation of all employees. Other companies have achieved cooperation by training the staff, especially the supervisors, in the importance of waste reduction and the procedures employed. Another important aspect to achieving commitment is to set waste reduction performance goals for the smallest practical operating entity (an individual worker) and to provide incentives to the employees for achieving or surpassing those goals. The workers should participate in the setting of the goals and agree to them before they are brought to management for endorsement.

Secure employee commitment to waste reduction by training them in waste reduction procedures, encouraging them to come forth with ideas, asking them to participate in the setting of waste reduction goals and procedures, and by providing them with incentives to achieve those goals.

Section 305 a)(2)

DEVELOP PROJECT SCOPE, OBJECTIVES, AND GOALS

The objectives of the (Company name) hazardous waste reduction plan are to:

- Review historical and current technologies and procedures, and
- Outline possible future technologies and procedures.

Both efforts will aid (Company name) in meeting its waste reduction goal. In addition, we will analyze existing training levels and future training needs as necessary to enable Tennessee to meet its 25 percent hazardous waste reduction goal.

SAMPLE WASTE REDUCTION SLOGAN: "If you're not marching to the waste reduction beat, you might want to check your current job sheet."

General project goals and objectives developed by management and the assessment team were:

- To achieve a significant reduction in the generation of hazardous wastes;
- To work towards developing reliable means of measuring reductions;
- To improve the health and safety aspects of the workplace;
- To increase research and development activities with a focus on finding substitutes for hazardous raw materials used in production;
- To maintain product quality;
- To sustain the facility's 10 percent per year growth for a five-year period; and
- To meet the corporation's economic requirements.

Section 305 a)

DEVELOP ANNUAL WASTE REDUCTION PLAN

An annual plan is an excellent means of organizing work, setting priorities and obtaining management endorsement of the next year's objectives. Furthermore, annual waste reduction plans are now required by the state. A good plan has measurable, prioritized objectives, detailed action steps and target completion dates. The individual responsible for each action step is clearly indicated.

Periodic reviews (at least annually) are essential for tracking progress, compliance, and adjusting the plan for changing business conditions. A waste reduction assessment was made of (Company Name) on (Date) by an in-plant team. The purpose of this assessment was twofold:

- To identify opportunities for reducing wastes of all types (solid, liquid, gaseous, hazardous, non-hazardous) at (Company Name), and
- To provide information on alternative methods of capturing those opportunities for use by (Company Name's) management in deciding which, if any, options they may wish to implement.

The in-plant assessment team consisted of:

- (Name, Position), (Name, Position), and (Name, Position), etc.

Those listed are well aware of the benefits of waste reduction and are ready to develop a plan for reducing all hazardous wastes.

Section 305 a)(4)

TRACK WASTESTREAMS

An accounting system is in place that routinely tracks the quantity, disposal method, and disposal cost for every wastestream produced at (Company Name). This information is very useful in identifying waste reduction opportunities, prioritizing efforts, and tracking the overall success of the program. The disposal cost should consist of the fee paid to the removal contractor, any manifesting costs involved, and the lost raw material value of the waste material. We have also factored in liability, compliance, and oversight into our waste management costs. The value of the waste material is the cost paid for it by the company less any scrap credits currently obtained.

The waste assessment tracks all wastes produced at a business to find out where it was generated. Break it down into these elements:

Section 305 a)(2)

• Alternative procedure and process decisions for the following:

- Identify housekeeping and operating procedures which will reduce wastes and include a description of these new operating procedures in the plan,
- Survey production equipment and facility technologies to ensure no excessive waste is generated, and
- Review employee training programs to include waste reduction goals and to encourage employee participation in the program.

Section 305 a)(3)

• Inventory of raw material supplies and waste sources to include:

- Material and waste balances,
- Sources of chemical use and waste generation,
- Points of waste discharge,
- Chemical profile of wastes (why they are hazardous), and
- Waste disposal costs.

• Priority framework to include:

- Review chemical hazards,
- Assess risk,
- Estimate cost of waste reduction (include initial costs, amortization, depreciation, tax rebates, pay back potential),
- Estimate liability costs, especially long-term,
- Identify management criteria for importance, and
- Prioritize wastes for the reduction program.

✎ List technologies, procedures, and training activities which will reduce unnecessary waste generation.

When the tasks outlined above are completed, you can write into the plan a description of hazardous waste options scheduled for implementation and a schedule.

The implementation schedule and goals for (Company Name)'s plan include the following:

- **Selecting alternatives for implementation (prioritize and list conditions for adoption);**
- **Identifying measurable, performance goals for each hazardous waste-stream;**
- **Establishing outcome objectives and ranges of acceptability;**
- **Identifying steps or phases and timing for implementation;**
- **Identifying tasks and personnel assignments;**
- **Training and involving all personnel in the business; and**
- **Setting target dates for completion of goals.**

Section 305 b)&c)

Section 305 d)

Each company shall explain the rationale for each performance goal. The law requires that you implement waste reduction options that are technically and economically feasible and that you explain how you arrived at your decision. The rationale for a particular performance goal shall address any impediments to hazardous waste reduction.

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United States Environmental Protection Agency
Waste Minimization: Environmental Quality with Economic Benefits. EPA/530-SW-87-026. Washington, DC: US EPA Office of Solid Waste and Emergency Response, 1987. 800-369-5888.

WASTE REDUCTION INFORMATION

The University of Tennessee
Center for Industrial Services
Waste Reduction Assistance Program
226 Capitol Boulevard Building, Suite 401
Nashville, Tennessee 37219-1804, phone 615-242-4816

The Waste Reduction Assistance Program provides information on techniques designed to reduce hazardous waste. This is accomplished through confidential, on-site assessments, an information center, and training activities.

WRAP staff

George Smelcer, program director
Tom Dolan, waste reduction engineer, middle Tennessee
Cam Metcalf, training manager
Pam Peters, secretary
Debbie Phillips, technical writer
Keith Ridley, information specialist
Bill Singleton, waste reduction engineer, west Tennessee
Chuck Steinmetz, waste reduction engineer east Tennessee
Bill Wiley, technical trainer
and retired waste reduction engineers throughout Tennessee.

Regional Offices

East Tennessee
Suite 105 Student Services Building
Knoxville, Tennessee 37996-021
615-974-1528

West Tennessee
Suite 850-M
899 Madison Avenue
Memphis, Tennessee 38103-3439
901-577-8127

Waste Reduction Resource Center for the Southeast
P.O. Box 27687
3824 Barrett Drive 27619
Raleigh, NC 27611-7687
800-476-8686

The Center is staffed by three engineers who provide confidential waste reduction technical assistance on a variety of industry specific techniques. The Center houses an extensive collection of information concerned with waste reduction options.

Bob Carter - Senior Engineer

US EPA
Pollution Prevention Office
401 M Street, SW
Washington, DC 20460
202-245-3557

Provides information on reducing industrial pollutants.

US EPA
Pollution Prevention Information Clearinghouse Technical Support
Science Applications International Corporation
8400 Westpark Drive
McLean, VA 22102
703-506-1025

Technology transfer of methods to reduce industrial pollution including information packets and the PIES on-line data base.

US EPA - Office of Research and Development
Pollution Prevention Research Branch
26 West Martin Luther King Drive
Cincinnati, OH 45268
513-569-7215

Publishes information for industry based on Pollution Prevention research.

US EPA - Region IV
Pollution Prevention Office
345 Courtland Street, NE
Atlanta, GA 30365
404-347-7109

Regional office that provides Pollution Prevention information.

US EPA Asbestos and Small business Ombudsman
401 M Street, SW A-149 C
Washington, DC 20460
800-368-5888

Distributes information to businesses on a variety of health and environment issues.

Pollution Prevention Information Clearinghouse (PPIC)
Office of Environmental Engineering and Technology Demonstration
Myles E. Morse
202-475-7161; FTS 475-7161
OR
Pollution Prevention Office
Priscilla Flattery
202-245-3557; FTS 245-3557

Appendix A

A Guide to the Act

The Tennessee Hazardous Waste Reduction Act of 1990 (TCA 68-46-301 et seq)

WHAT DOES IT DECLARE? (Section 302)

☛ Prevention and reduction of hazardous waste is state policy. The Tennessee Capacity Assurance Plan filed with US EPA under SARA reflects the state's commitment to waste reduction and prevention through:

- Education
- Planning
- Technical Assistance

☛ It's essential that each hazardous waste generator develop a comprehensive waste reduction plan.

☛ The state's goal is a 25 percent reduction in hazardous waste generation before June 30, 1995.

☛ Wastewater streams which, after treatment, are discharged to surface waters under NPDES permits are specifically excluded.

WHAT TERMS DOES IT DEFINE? (Section 303)

Board - Solid Waste Control Board (SWCB).

Commissioner - Commissioner of Environment and Conservation (CEC) or his authorized representative.

Department - Tennessee Department of Environment and Conservation (TDEC).

Large Quantity Generator (LQG) - A generator who generates 2.2 pounds of acute hazardous waste, or 2200 pounds or more of hazardous waste *in any one month*.

Small Quantity Generator (SQG) - A generator who generates between 220 and 2200 pounds of hazardous waste *in any one month*.

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Waste, Hazardous Waste (HW), or Acute Hazardous Waste (AHW) - These terms are defined by reference to existing law (TCA, Title 68, Ch. 46, Part 1 and the regulations promulgated pursuant thereto). For the purposes of this Act only, wastes which result from clean-up of contaminated sites or hazardous materials spills are excluded.

Source Reduction or Waste Reduction- Reduction or elimination of waste at the source, usually within a process, including process modifications, feedstock substitutions, improvements in inventory control and feedstock purity, housekeeping and management practices, increase machinery efficiency, on-site, closed-loop recycling, any action that reduces the amount and toxicity of waste exiting the process.

WHAT MUST A GENERATOR DO AND WHEN?

(Sections 304,306 and 308)

- ☛ Complete a Hazardous Waste Reduction Plan by the correct deadline.

- ☛ Deadlines are different for LQGs and SQGs. The amount of waste generated in calendar of 1989 determines the category for the purposes of complying with this Act.

- ☛ **Deadline for LQGs is on or before January 1, 1992.**

- ☛ **Deadline for SQGs is on or before January 1, 1994.**

- ☛ **Maintain a current copy of the plan at the generating facility.**

- ☛ **Find new deadlines for plan in Appendix B (under 68-46-304(a)), if you generate a new hazardous wastestream or became a hazardous waste generator after December 31, 1989.**

- ☛ **Permit CEC or his designee to inspect the plan.**

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- ☛ Permit any officer, employee or representative of TDEC to have access to the plan at all reasonable times.
- ☛ Furnish a copy, upon request, to CEC.
- ☛ Make annual reports of progress under the plan.
- ☛ Summarize progress in the annual generator's report to TDEC.

WHAT MUST THE PLAN INCLUDE?

(Section 305)

- ☛ A dated and signed policy of management support for the plan.
- ☛ A statement of scope and objectives, including:
 - Evaluation of technologies, procedures and training programs to ensure that (1) unnecessary waste is not generated and (2) to encourage hazardous waste reduction.
 - Specific goals for hazardous waste reduction, as described below.
- ☛ A description of technically and economically practical hazardous waste reduction options
 - This paragraph states that the basis of this list should be an internal analysis conducted to review individual operations and processes and to identify opportunities for waste reduction. **In short, this paragraph requires that you conduct a waste reduction assessment.**
- ☛ A description of the mechanism set up to identify waste management costs, including liability, compliance and oversight costs to the extent feasible.
- ☛ A description of employee awareness and training programs with respect to waste reduction.

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☛ A description of how the plan is or will be incorporated into ongoing management practice.

☛ Specific performance goals for source reduction or recycling of each hazardous wastestream.

- Quantitative goals, expressed in numeric terms.
- Preferred unit of measurement is **pounds (or tons)** of waste generated **per unit of production**. *The generator defines unit of production.*
- If establishing numeric goals is not practical, the plan must include a clearly stated list of actions leading to establishment of numeric goals as soon as practicable.

☛ Explanation of the rationale for each performance goal.

Impediments to hazardous waste reduction will be addressed, including:

- Present and anticipated availability of technically practical hazardous waste reduction methods.
- Previously implemented reductions of hazardous waste
- Present and anticipated future availability of economically practicable hazardous waste reduction methods. Economic practicality can address subjects such as prioritizing of reduction efforts, adverse impact on product quality, legal or contractual barriers to implementation, etc.

☛ A preface may be included to explain and document barriers to hazardous waste reduction specific to the individual facility, and waste reduction efforts completed or in progress before the first reporting date.

☛ Other information may be required by regulation, but **will not require disclosure of proprietary information.**

This section also includes a provision which will enable SWCB to provide modifications and exclusions, by rule, of the requirements for

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SQGs, should such be deemed advisable. Also, the SWCB may provide for exception by rule for generators whose hazardous wastestreams fluctuate widely due to contract work or manufacturing orders.

WHAT ARE THE ANNUAL REVIEW AND SUMMARY REQUIREMENTS?

(Section 306 & 308)

- ☛ An annual progress report must be produced.
 - The report must quantitatively describe progress toward each goal.
 - If changes are needed, they must be listed and explained.
 - Report is retained at the generator's facility, available for examination, but it does not become part of public record.

- ☛ Deadline for first reports:
 - March 1, 1993 for LQGs.
 - March 1, 1995 for SQGs.

- ☛ The generator's annual report must contain a waste reduction progress summary. The summary shall include:
 - A statement of reduction goals and progress made toward those goals.
 - An explanatory narrative on any necessary changes.
 - A description of any impediments encountered.

WHAT HAPPENS IF I FAIL TO COMPLY?

(Sections 307 & 309)

- ☛ TDEC, after examining plan or report, notifies generator of specific deficiency (ies). Generator is allowed at least 90 days to correct deficiencies.

- ☛ If correction is not satisfactory to CEC, he issues an order of correction to the responsible person, to be complied with within a specified time limit.

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☞ Failure to file, refusal to comply, or giving false information is subject to a civil penalty of up to \$10,000. Each day the violation continues is a separate offense.

WHAT'S ELSE IS IN THE THE ACT?

(Sections 301, 310-314 and 316)

☞ Legislative mechanics, such as amending TCA, Title 68, Ch. 46 by adding the provisions of this bill.

☞ Gives the Act its name, i.e. the Tennessee Hazardous Waste Reduction Act of 1990.

☞ Enables TDEC to contract for technical assistance for generators and TDEC.

☞ Provides that reports required under the Act *shall not be considered public records*.

☞ Provides that proprietary information provided under this Act can not be revealed to others without the owners' consent.

☞ Provides that summary information received under the Act can be used by agencies of the state or by the US EPA to comply with federal law.

☞ Authorizes SWCB to promulgate rules and regulations to implement the Act, and to hear appeals from orders or assessments issued by CEC under the Act.

☞ Establishes the effective date of July 1, 1990.

Appendix B

Tennessee Hazardous Waste Reduction Act of 1990

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TCA 68-46-301 et. seq.

AN ACT relative to hazardous waste reduction plans, and to amend Tennessee Code Annotated, Title 68, Chapter 46.

BE IT ENACTED BY THE GENERAL ASSEMBLY OF THE STATE OF TENNESSEE;

SECTION 1. Tennessee Code Annotated, Title 68, Chapter 46, is amended by adding Sections 2 through 12, inclusive, and Section 15 of this act as a new part to be appropriately designated as sections 301-312.

Section 68-46-301. This act may be cited as the Tennessee Hazardous Waste Reduction Act of 1990.

Section 68-46-302. (a) The General Assembly declares it to be the policy of the state that, wherever economically and technically feasible, the generation of hazardous waste is to be prevented or reduced as expeditiously as possible. Hazardous waste that is nevertheless generated should be stored, treated and disposed of so as to protect human health and the environment.

(b) It is the intent of the General Assembly that the Capacity Assurance Plan (CAP) required by the Superfund Amendments and Reauthorization Act of 1986 (SARA) (P.L. 99-499, 100 Stat. 1613, as amended) should reflect the state's primary commitment to waste prevention and reduction through education, planning and technical assistance.

(c) The General Assembly further finds that the timely development of a comprehensive waste reduction plan by each large and small hazardous waste generator operating in the state is essential in order to identify opportunities for reducing waste generation which may be implemented by that generator.

(d) The General Assembly finds that the state should aid generators of hazardous waste to meet the requirements of this act, by providing a program of planning and technical assistance.

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(e) It is the purpose of this act to prevent and reduce the generation of hazardous waste in the state. The state's goal is to reduce the aggregate level-of hazardous waste, adjusted for economic growth, that is generated within Tennessee by twenty-five percent (25%) before June 30,1995; provided, however, that such waste shall not include wastewater streams containing hazardous wastes that are collected and treated in on-site wastewater treatment systems, the discharge of which is the subject of a NPDES permit.

SECTION 68-46-303. As used in this act:

- (1) "Board" means the solid waste disposal control board as established by Tennessee Code Annotated, Section 68-31-111.
- (2) "Commissioner" means the Commissioner of Health and Environment or his authorized representative.
- (3) "Department" means the Department of Health and Environment.
- (4) "Large quantity generator" means a generator who generates 2.2 pounds of acute hazardous waste, or two thousand two hundred (2,200) pounds or more of hazardous waste in any one (1) month.
- (5) "Small quantity generator" means any generator who generates between two hundred twenty (220) and two thousand two hundred (2,200) pounds of hazardous waste in any one (1) month.
- (6) "Source reduction" or "waste reduction" means the reduction or elimination of waste at the source, usually within a process, including process modifications, feedstock substitutions, improvements in feedstock purity, housekeeping and management practices, increases in the efficiency of machinery and on-site, closed-loop recycling, or any action that reduces the amount and toxicity of the waste exiting the production process.
- (7) "Waste," or "hazardous waste," or "acute hazardous waste," means any hazardous waste as defined in Tennessee Code

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Annotated, Title 68, Chapter 46, Part 1, and the regulations promulgated pursuant thereto, and for which the generator is required to notify the department pursuant to such regulations. However, for the purpose of this act only, these terms shall not include such wastes which result from the clean-up of contaminated sites or spills of hazardous material.

(8) All other terms used in this part shall be defined as such terms are defined in Tennessee Code Annotated, Title 68, Chapter 46, Part 1 or in regulations promulgated pursuant to that part.

SECTION 68-46-304. (a) All large quantity generators shall complete a hazardous waste reduction plan on or before January 1, 1992, and all small quantity generators shall complete a hazardous waste reduction plan on or before January 1, 1994. Any generator first generating a hazardous waste stream after December 31, 1989 or first becoming a hazardous waste generator after December 31, 1989, shall determine whether he is a large quantity generator or a small quantity generator based on the amounts generated during the initial twenty-four (24) months of generation of the hazardous wastestream. Within the period ending twelve (12) months after this determination is made or by March 1 following the end of the twelve (12) month period, whichever is later, a hazardous waste reduction plan shall be completed [by large quantity generators (or until three-year period exceeds January 1, 1994 for small quantity generators)]. Upon completion of a plan, the generator shall maintain a current copy of the plan at the generating facility. A generator shall determine whether he is a large quantity generator or a small quantity generator, based on the amount of waste generated during calendar year 1989.

(b) For the purposes of this section and Section 305, a generator shall permit the commissioner or the commissioner's designee to inspect the hazardous waste reduction plan. The generator shall permit any officer, employee, or representative of the department at all reasonable times to have access to the plan. The generator shall furnish a copy of the plan upon request to the commissioner.

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SECTION 68-46-305. (a) A hazardous waste reduction plan shall include at least the following:

- (1) A dated and signed written policy articulating management support for the generator's hazardous waste reduction plan;
- (2) The scope and objectives of the plan, including the evaluation of technologies, procedures and personnel training programs to insure that unnecessary waste is not generated and to encourage hazardous waste reduction. Specific goals shall be set for hazardous waste reduction, as described in subsections (b), (c), and (d) of this section.
- (3) A description of technically and economically practical hazardous waste reduction options to be implemented and a planned schedule for implementation. These options shall be based on an internal analysis of hazardous waste streams conducted to review individual processes or facilities and other activities where waste may be generated and identify, opportunities to reduce or eliminate waste generation. Such analyses shall evaluate data on the types, amount and hazardous constituents of waste generated, where and why that waste was generated within the production process or other operations, and potential hazardous waste reduction and recycling techniques applicable to those wastes;
- (4) A description of the hazardous waste accounting systems that identify waste management costs and factor in liability, compliance and oversight costs to the extent feasible;
- (5) A description of the employee awareness and training programs designed to involve employees to the maximum extent feasible in hazardous waste reduction planning and implementation;
- (6) A description of how the plan has been or will be incorporated into management practices and procedures so as to insure an ongoing effort; and .

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(7) Other information about generation of hazardous waste not requiring disclosure of proprietary information as the board may require by regulation.

(b) As part of each plan developed under this act, a generator shall establish specific performance goals for the source reduction of each hazardous waste stream.

(c) The specific performance goals established under subsection (b) of this section shall be quantitative goals, expressed in numeric terms. Whenever possible, the units of measurement should be in pounds (or tons) of waste generated per standard unit of production, as defined by the generator. If the establishment of numeric performance goals is not practical, the performance goals shall include a clearly stated list of actions designed to lead to the establishment of numeric goals as soon as practical.

(d) As part of each plan developed under this act, each generator shall explain the rationale for each performance goal. Acts of God or other unforeseeable events beyond the control of the generator do not have to be considered in setting goals. The rationale for a particular performance goal shall address any impediments to hazardous waste reduction, including but not limited to the following:

- (1) The availability of technically practical hazardous waste reduction methods, including any anticipated changes in the future;
- (2) Previously implemented reductions of hazardous waste;
- (3) The economic practicability of available hazardous waste reduction methods, including any anticipated changes in the future. Examples of situations where hazardous waste reduction may not be economically practical include but are not limited to:

- (i) For valid reasons of prioritization, a particular company has chosen first to address other more serious hazardous waste reduction concerns;
- (ii) Necessary steps to reduce hazardous waste are likely to have significant adverse impacts on product quality; or
- (iii) Legal or contractual obligations interfere with the necessary step that would lead to hazardous waste reduction.

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(e) The board, by rule, may provide for modifications and exclusions for small quantity generators related to the kind of information to be included in the plan. The board may provide for exception by rule for generators whose hazardous wastestreams fluctuate widely due to contract work or manufacturing orders.

(f) A generator required to complete a hazardous waste reduction plan under subsection (a) of this section may include as a preface to its initial plan:

- (1) An explanation and documentation regarding hazardous waste reduction efforts completed or in progress before the first reporting date; and
- (2) An explanation and documentation regarding impediments to hazardous waste reduction specific to the individual facility.

SECTION 68-46-306. (a) All generators shall annually review their waste reduction plan and complete a hazardous waste reduction progress report which shall:

- (1) Analyze and quantify progress made, if any, in hazardous waste reduction, relative to each performance goal established under Section 305(b); and
- (2) Set forth amendments, if needed, to the hazardous waste reduction plan and explain the need for the amendments.

(b) Except for the information reported to the department under Section 308, the annual progress report shall be retained at the facility and shall not be considered a public record under Tennessee Code Annotated, Title 10, Chapter 7, Part 5. However, the generator shall permit any officer, employee or representative of the department at all reasonable times to have access to the annual progress report.

(c) Large quantity generators shall complete the first annual progress report required under subsection (a) of this section on or before March 1, 1993. Small quantity generators shall complete the first annual progress report required under subsection (a) of this section on or before March 1, 1995.

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SECTION 68-46-307. (a) The department may review a plan or an annual progress report to determine whether the plan or progress report reasonably contains the elements specified under Sections 305 and 306 of this act. If a generator fails to complete a plan containing the elements required by Section 307, the department may notify the generator of the specific deficiencies. The department also may specify a reasonable time frame, of not less than ninety (90) days, within which the generator shall modify the plan or progress report correcting the specified deficiencies.

(b) If the Commissioner determines that a plan or progress report has not been modified to address the deficiencies identified, the commissioner may issue an order for correction to the responsible person, and this order shall be complied with within the time limit specified in the order. Such order shall be served by personal service or shall be sent by certified mail, return receipt requested. Investigations made in accordance with this section may be made on the initiative of the commissioner or board. Prior to issuance of any order or the execution of any other enforcement action, the commissioner may request the presence of the alleged violator of this part at a meeting to show cause why enforcement action ought not to be taken by the department.

(c) Any order issued pursuant to subsection (b) of this section shall be subject to review in the same manner as for orders under Tennessee Code Annotated, Section 68-46-113.

SECTION 68-46-308. (a) Based on the annual progress report prepared pursuant to Section 306 of this act, each generator shall submit summary information on waste reduction activities to the department, as an element of the annual generator report submitted to the department.

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(b) The summary shall include:

(1) For each hazardous waste stream, one of the following, as appropriate;

(A) A statement of specific performance goals, and a report on the progress made in achieving these goals. The results should be reported in numeric terms, as set forth in Section 305(c), or goals; and

(B) A report on the actions taken toward establishing numeric goals.

(2) A narrative explaining the reported data; and

(3) A description of any impediments to reducing the generation of hazardous waste.

(c) The board, by rule, shall develop uniform reporting requirements for the data required under this section.

SECTION 68-46-309. Any generator or person who:

(1) fails to file any reports, records, or documents required pursuant to this act;

(2) who fails, neglects, or refuses to comply with any provision of this act or any order issued pursuant to this act; or

(3) who knowingly gives or causes to be given any false information in any reports, records, or documents required pursuant to this act; shall be subject to a civil penalty of up to ten thousand dollars (\$10,000). Any such penalty shall be assessed in the same manner as in Tennessee Code Annotated, 68-46-114. Each day such violation continues shall constitute a separate offense.

SECTION 68-46-310. Subject to available funding, the department may contract to make technical assistance available to assist generators and the department in carrying out the provisions of this act. The assistance shall emphasize strategies to encourage hazardous waste reduction.

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SECTION 68-46-311. A plan or annual progress report developed pursuant to this act and maintained at the generating facility shall not be considered a public record under Tennessee Code Annotated, Title 10, Chapter 7, Part 5. The board shall establish procedures to insure that information supplied to the department, as provided by this part, and defined as proprietary by regulation, is not revealed to any person without the consent of the person supplying such information. However, the summary information on waste reduction activities submitted to the department may be utilized by the commissioner, the board, the department, the United States Environmental Protection Agency, or any authorized representative of the commissioner or the board in connection with the responsibilities of the department or board pursuant to this part or as necessary to comply with federal law.

SECTION 13. Tennessee Code Annotated, Section 68-46-205(d)(1) is amended by adding the following as a new item to be appropriately designated:

() To review waste reduction plans prepared pursuant to this chapter;

SECTION 14. Tennessee Code Annotated, Section 68-46-205(b), is amended by deleting the following language:

Provided, however, that such fund shall not be used for hiring personnel for continuing programs of the Department of Health and Environment pursuant to part 1 of this chapter or for any long term research activities.

SECTION 68-46-312. In addition to all other enumerated powers in Tennessee Code Annotated, Title 68, Chapters 31 and 46, the board is authorized to promulgate rules and regulations to effectuate the purpose of this act, and to hear appeals from orders or assessments issued by the commissioner pursuant to this part. All such rules and regulations shall be promulgated in accordance with the provisions of Tennessee Code Annotated, Title 4, Chapter 5.

SECTION 16. This act shall take effect on July 1, 1990, the public welfare requiring it.

PASSED MARCH 21, 1990

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Facility Planning

In 1990, the Tennessee General Assembly enacted landmark legislation requiring waste reduction planning by industry. Large quantity generators must have a waste reduction plan finished by January 1, 1992.

CIS has developed training to help you prepare your plan. This handbook is a reference tool that shows you how to review your operations; identify and assess reduction options; and implement and measure progress. With it you'll draft a plan to reduce waste at your facility and comply with the Tennessee Waste Reduction Act of 1990.

What Is the Center for Industrial Services?

As a statewide industrial extension program of The University of Tennessee, CIS is dedicated to helping managers of Tennessee manufacturing firms find practical solutions to the technical and managerial problems they face daily. CIS operates a statewide Waste Reduction Assistance Program (WRAP) with funding from the Tennessee Department of Environment and Conservation. Through this program, CIS provides training and on-site waste reduction technical assistance for Tennessee companies.

