POLLUTION PREVENTION

PROFESSIONAL DEVELOPMENT
CONTINUING EDUCATION COURSE

Technical Learning College

Printing and Saving Instructions

It is recommended that you download this pdf document and assignment to your computer desktop and open it with Adobe Acrobat DC reader.

Adobe Acrobat DC reader is a free computer software program and you can find it at Adobe Acrobat's website.

You can complete the course by viewing the course on your computer or you can print it out. This course booklet does not have the assignment (the test). Please visit our website and download the assignment (the test).

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Internet Link to Assignment…
http://www.abctlc.com/downloads/PDF/p2%20Assignment.pdf

State Approval Listing Link, check to see if your State accepts or has pre-approved this course. Not all States are listed. Not all courses are listed. Do not solely trust our list for it may be outdated. It is your sole responsibility to ensure this course is accepted for credit. No refunds.

Professional Engineers; Most states will accept our courses for credit but we do not officially list the States or Agencies acceptance or approvals.

State Approval Listing URL…
http://www.tlch2o.com/PDF/CEU%20State%20Approvals.pdf

You can obtain a printed version from TLC for an additional $129.95 plus shipping charges.

All downloads are electronically tracked and monitored for security purposes.

Some States and many employers require the final exam to be proctored.

Do not solely depend on TLC's Approval list for it may be outdated.

Most of our students prefer to do the assignment in Word and e-mail or fax the assignment back to us. We also teach this course in a conventional hands-on class. Call us and schedule a class today.

Responsibility

This course contains EPA's federal rule requirements. Please be aware that each state implements drinking water/wastewater/safety regulations may be more stringent than EPA's or OSHA's regulations.

Check with your state environmental agency for more information. You are solely responsible in ensuring that you abide with your jurisdiction or agency's rules and regulations.

Copyright Notice

Proper signage is necessary for a household hazardous waste collection facility.

Contributing Editors

James L. Six Received a Bachelor of Science Degree in Civil Engineering from the University of Akron in June of 1976, Registered Professional Engineer in the State of Ohio, Number 45031 (Retired), Class IV Water Supply Operator issued by Ohio EPA, Number WS4-1012914-08, Class II Wastewater Collection System Operator issued by Ohio EPA, Number WC2-1012914-94

Joseph Camerata has a BS in Management with honors (magna cum laude). He retired as a Chemist in 2006 having worked in the field of chemical, environmental, and industrial hygiene sampling and analysis for 40 years.

James Bevan, Water Quality Inspector S.M.E. Twenty years of experience in the environmental field dealing with all aspects of water regulations on the federal, state, and local levels. Teacher and Proctor in Charge for Backflow Certification Testing at the ASETT Center in Tucson for the past 15 years and possess an Arizona Community College, Special Teaching Certificate in Environmental Studies.

Dr. Pete Greer S.M.E., Retired biology instructor, chemistry and biological review.

Jack White, Environmental, Health, Safety expert, City of Phoenix. Art Credits.

Technical Learning College's Scope and Function

Welcome to the Program,

Technical Learning College (TLC) offers affordable continuing education for today's working professionals who need to maintain licenses or certifications. TLC holds several different governmental agency approvals for granting of continuing education credit.

TLC's delivery method of continuing education can include traditional types of classroom lectures and distance-based courses or independent study. TLC's distance based or independent study courses are offered in a print - based distance educational format. We will beat any other training competitor's price for the same CEU material or classroom training.

Our courses are designed to be flexible and for you do finish the material on your leisure. Students can also receive course materials through the mail. The CEU course or e-manual will contain all your lessons, activities and instruction to obtain the assignments. All of TLC's CEU courses allow students to submit assignments using e-mail or fax, or by postal mail. (See the course description for more information.)

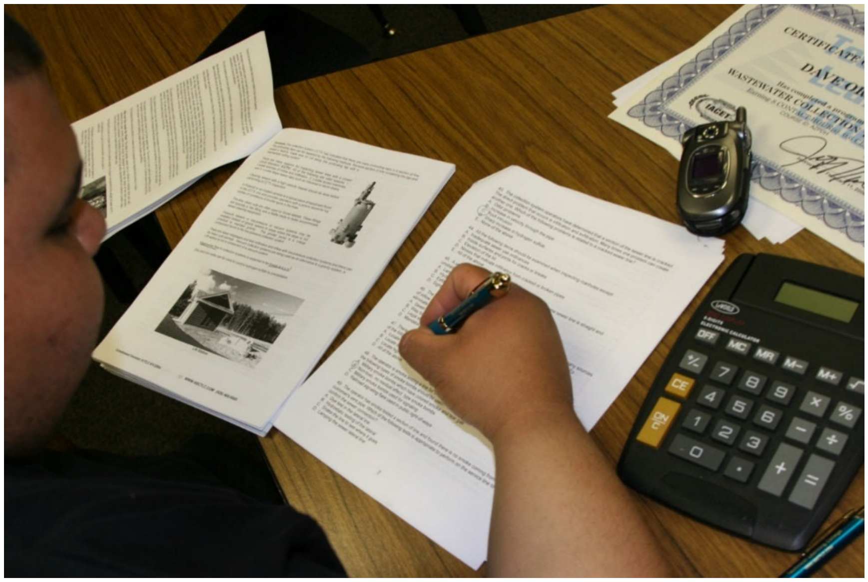
Students have direct contact with their instructor—primarily by e-mail or telephone. TLC's CEU courses may use such technologies as the World Wide Web, e-mail, CD-ROMs, videotapes and hard copies. (See the course description.) Make sure you have access to the necessary equipment before enrolling, i.e., printer, Microsoft Word and/or Adobe Acrobat Reader. Some courses may require proctored closed-book exams depending upon your state or employer requirements.

Flexible Learning
At TLC, there are no scheduled online sessions or passwords you need contend with, nor are you required to participate in learning teams or groups designed for the "typical" younger campus based student. You can work at your own pace, completing assignments in time-frames that work best for you. TLC's method of flexible individualized instruction is designed to provide each student the guidance and support needed for successful course completion.

Course Structure
TLC's online courses combine the best of online delivery and traditional university textbooks. You can easily find the course syllabus, course content, assignments, and the post-exam (Assignment). This student friendly course design allows you the most flexibility in choosing when and where you will study.

Classroom of One
TLC offers you the best of both worlds. You learn on your own terms, on your own time, but you are never on your own. Once enrolled, you will be assigned a personal Student Service Representative who works with you on an individualized basis throughout your program of study. Course specific faculty members (S.M.E.) are assigned at the beginning of each course providing the academic support you need to successfully complete each course. Please call or email us for assistance.

Satisfaction Guaranteed
We have many years of experience, dealing with thousands of students. We assure you, our customer satisfaction is second to none. This is one reason we have taught more than 20,000 students.



We welcome you to do the electronic version of the assignment and submit the answer key and registration to us either by fax or e-mail. If you need this assignment graded and a certificate of completion within a 48-hour turn around, prepare to pay an additional rush charge of $50.

Contact Numbers

Fax (928) 468-0675
Email   Info@tlch2o.com
Telephone (866) 557-1746

Course Description

POLLUTION PREVENTION P2 CEU COURSE

Review of pollution prevention, waste minimization techniques and related subjects. This course will cover the fundamentals and basic requirements of Environmental Protection Agency, Resource Conservation and Recovery Act (**RCRA**), EPCRA and other waste disposal rules and regulations. Reducing point and non-point source pollution--such as runoff from agricultural lands and urban roadways--and addressing cross-media environmental problems--such as the solid waste disposal problem posed by the sludge created in the abatement of air and water pollution.

“Pollution prevention" as used in this CEU course includes, and is not limited to, reducing or eliminating hazardous or other polluting inputs, which can contribute to both point and non-point source pollution; modifying manufacturing, maintenance, or other industrial practices; modifying product designs; recycling (especially in-process, closed loop recycling); preventing the disposal and transfer of pollution from one media to another; and increasing energy efficiency and conservation. Pollution prevention can be implemented at any stage--input, use or generation, and treatment--and may involve any technique--process modification, waste stream segregation, inventory control, good housekeeping or best management practices, employee training, recycling, and substitution. Indeed, any reasonable mechanism which successfully avoids, prevents, or reduces pollutant discharges or emissions other than by the traditional method of treating pollution at the discharge end of a pipe or a stack should, for purposes of this course, be considered pollution prevention.

Pollution prevention techniques seek to reduce the amount and/or toxicity of pollutants being generated. In addition, such techniques promote increased efficiency in the use of raw materials and in conservation of natural resources and can be a more cost-effective means of controlling pollution than does direct regulation. Many strategies have been developed and used to reduce pollution and protect resources, including using fewer toxic inputs, redesigning products, altering manufacturing and maintenance processes, and conserving energy.

This course is general in nature and not state specific but will contain different state and city waste reduction policies and ideas. You will need local P2 policies and regulations for the completion this course.

General Course Goals

I. EPA Knowledge

A. Understanding P2 Definitions and Related Terms.
B. Identify Types of Wastes.
C. Identify Types of Waste Disposal Methods.
D. Identify Recycling, Reuse, and Conservation Methods.

II. Municipal Solid Waste

A. Identify RCRA Definitions.
B. Identify Composting Methods.
C. Analyze Disposal Alternatives.

III. P2 Program Review

A. References.
B. Describe and Define Various P2 Polices, Objectives and Regulations.
C. Identify and Reduce Household Hazardous Waste.
D. Understand the Need for Proper Used Oil Disposal.
E. Understand the Need for Used Tire Disposal Techniques.
F. Medical Waste Disposal.
G. Identify Pesticides and Alternatives.
H. Identify Air Pollution.
I. Identify Biological Pollution Prevention Techniques.
J. Understand Groundwater Protection.
K. Identify Water Conservation Techniques.
I. Identify Energy Conservation Techniques.

General Course Learning Outcomes

1. Define EPA definitions.
2. Understand different waste applications and general environmental and pollutional concerns.
3. Define and explain different waste stream terms.
4. Awareness of different types of waste recycling methods and safety procedures.
5. Familiarization of EPA's and local agencies' methods of operation.
6. Understand recycling program fundamentals.
7. Understand water and soil quality fundamentals and damage for pollution.
8. Advanced waste minimization and pollution prevention understanding.

Course Procedures for Registration and Support

All of Technical Learning College correspondence courses have complete registration and support services offered. Delivery of services will include, e-mail, web site, telephone, fax and mail support. TLC will attempt immediate and prompt service.

When a student registers for a distance or correspondence course, he/she is assigned a start date and an end date. It is the student's responsibility to note dates for assignments and keep up with the course work. If a student falls behind, he/she must contact TLC and request an end date extension in order to complete the course. It is the prerogative of TLC to decide whether to grant the request.

All students will be tracked by their social security number or a unique number will be assigned to the student.

Instructions for Written Assignments

The Pollution Prevention correspondence course uses a fill-in-the-blank and an essay style answer key. Each chapter will have a written assignment. You may find a copy of the assignment in a Word format on TLC's website under the Assignment Page.

You can write your answers in this manual or type out your own answer key. TLC would prefer that you type out and e-mail each of the chapter examinations to TLC, but it is not required.

Feedback Mechanism (examination procedures)

Each student will receive a feedback form as part of their study packet. You will be able to find this form in the front of the course assignment or lesson.

Security and Integrity

All students are required to do their own work. All lesson sheets and final exams are not returned to the student to discourage sharing of answers. Any fraud or deceit and the student will forfeit all fees and the appropriate agency will be notified.

Grading Criteria

TLC will offer the student either pass/fail or a standard letter grading assignment. If TLC is not notified, you will only receive a pass/fail notice.

Required Texts

The Pollution Prevention course will not require any other materials. This course comes complete.

Environmental Terms, Abbreviations, and Acronyms

TLC provides a glossary that defines in non-technical language commonly used environmental terms appearing in publications and materials. It also explains abbreviations and acronyms used throughout EPA and other agencies. You can find the glossary in the rear of the manual.

Recordkeeping and Reporting Practices

TLC will keep all student records for a minimum of seven years. It is your responsibility to give the completion certificate to the appropriate agencies.

ADA Compliance
TLC will make reasonable accommodations for persons with documented disabilities. Students should notify TLC and their instructors of any special needs.

Course content may vary from this outline to meet the needs of this particular group.

You will have 90 days from receipt of this manual to complete in order to receive your Continuing Education Units (**CEUs**) or Professional Development Hours (**PDHs**). A score of 70 % is necessary to pass this course.

If you should need any assistance, please email all concerns and the final test to info@tlch2o.com.

Prerequisites: None

This course is graded on a "P" (credit) or "Z" (no credit) basis. If you desire a letter grade for this course, you must inform the instructor prior to submitting any of the assignments.

Note to students: Final course grades are based on the total number of possible points. The grading scale is administered equally to all students in the course. Do not expect to receive a grade higher than that merited by your total points. No point adjustments will be made for class participation or other subjective factors.

Note to students: Keep a copy of everything that you submit. That way if your work is lost you can submit your copy for grading. If you do not receive your graded assignment or quiz results within two or three weeks after submitting it, please contact your instructor.

We expect every student to produce his/her original, independent work. Any student whose work indicates a violation of the Academic Misconduct Policy (cheating, plagiarism) can expect penalties as specified in the Student Handbook, which is available through Student Services; contact them at (928) 468-0665. A student who registers for a Distance Learning course is assigned a **"start date"** and an **"end date."** It is the student's responsibility to note due dates for assignments and to keep up with the course work.

If a student falls behind, she/he must contact the instructor and request an extension of her/his ***end date*** in order to complete the course. It is the prerogative of the instructor to decide whether or not to grant the request.

You will have 90 days from receipt of this manual to complete in order to receive your Continuing Education Units (**CEUs**) or Professional Development Hours (**PDHs**). A score of 70 % is necessary to pass this course.

If you should need any assistance, please email all concerns and the final test to info@tlch2o.com.

Educational Mission

The educational mission of TLC is:

To provide TLC students with comprehensive and ongoing training in the theory and skills needed for the environmental education field,

To provide TLC students opportunities to apply and understand the theory and skills needed for continuing education,

To provide opportunities for TLC students to learn and practice environmental educational skills with members of the community for the purpose of sharing diverse perspectives and experience,

To provide a forum in which students can exchange experiences and ideas related to environmental education,

To provide a forum for the collection and dissemination of current information related to environmental education, and to maintain an environment that nurtures academic and personal growth.

Course Objective: To provide awareness in effective and efficient pollution prevention methods and generally accepted P2 policies.

Table of Contents

Important Information about this manual

This manual has been prepared to assist employees in the general awareness of dealing with the often-complex procedures and requirements for safely handling hazardous and toxic materials.

The scope of the problem of dealing with pollution is quite large, requiring a major effort to bring it under control. Employee health and safety, as well as that of the public, depend upon careful application of safe procedures and proper disposal methods. The manner in which we deal with pollution will affect the earth and its inhabitants for many generations to come.

This manual will cover general laws, regulations, required procedures and accepted policies relating to pollution control and waste disposal.

It should be noted, however, that the regulation of pollution and hazardous materials is an ongoing process and subject to change over time. For this reason, a list of resources is provided to assist in obtaining the most up-to-date information on various subjects.

This manual is not a guidance document for employees who are involved with pollution control. It is not designed to meet the requirements of the United States Environmental Protection Agency (**EPA**) or the Department of Labor-Occupational Safety and Health Administration (**OSHA**) or your state environmental or health departments.

This course manual will provide general guidance and could be used as a preliminary basis for developing general pollution prevention plans. This document is not a detailed industrial hygiene textbook or a comprehensive source book on occupational safety and health.

Technical Learning College, or Technical Learning Consultants, Inc. makes no warranty, guarantee or representation as to the absolute correctness or appropriateness of the information in this manual and assumes no responsibility in connection with the implementation of this information.

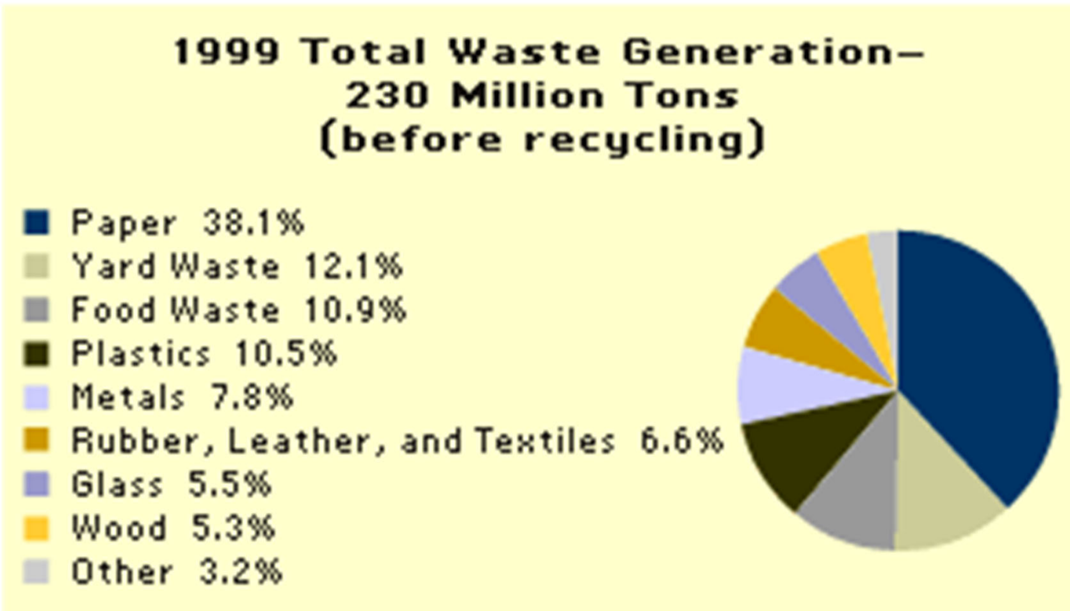
It cannot be assumed that this manual contains all measures and concepts required for specific conditions or circumstances. This document should be used for education purposes only and is not considered a legal document.

Individuals who are responsible for the health and safety of the public or workers at hazardous waste sites should obtain and comply with the most recent federal, state, and local regulations relevant to these sites and are urged to consult with OSHA, EPA and other appropriate federal, state and local agencies.

Introduction

EPA's effort to address our country's waste problems has concentrated for many years on improving how industrial wastes are treated, stored, and disposed of. We have made great strides: industry is handling its wastes far more responsibly, and land disposal is now being replaced by safer and more environmentally protective practices such as incineration and sophisticated new chemical and biological treatments.

But these advances are only half the answer. Looking toward the future, it is clear that the more waste we generate, the more waste we have to manage. That's why EPA is putting renewed emphasis on recycling and waste reduction (Pollution Prevention) as the truly long-term solutions to hazardous and solid waste management.

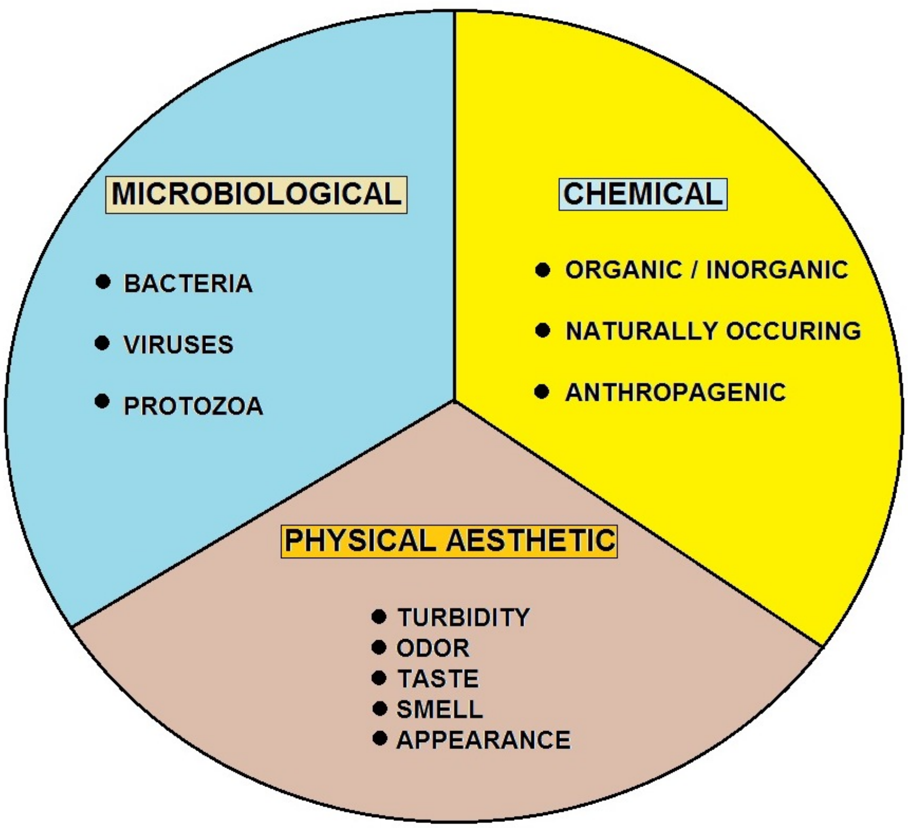


The term ***"source reduction"*** means any practice which -
(i) reduces the amount of any hazardous substance, pollutant, or contaminant entering any waste stream or otherwise released into the environment (including fugitive emissions) prior to recycling, treatment, or disposal; and

(ii) 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.

The term ***"source reduction"*** does not include any practice which alters the physical, chemical, or biological characteristics or the volume of a hazardous substance, pollutant, or contaminant through a process or activity which itself is not integral to and necessary for the production of a product or the providing of a service.

Getting customers responses from a household hazardous product collection event is key for reporting back to your funding agency. Most events are grant driven and all grantors require a final report. Collect all the data you can find to keep these agencies happy.



WATER QUALITY BROKEN DOWN INTO 3 BROAD CATEGORIES

Chapter 1

Pollution Prevention (P2)

Pollution prevention brings environmental protection together with disease protection. When we prevent environmental problems we protect human health in a variety of ways.

The philosophical framework of pollution prevention parallels that of public health, with its focus on primary prevention, education, technical assistance, and voluntary action.

Below are just a few examples of how pollution prevention and public health intersect:

- By reducing the hazards of certain industrial processes, we prevent workers from being exposed to those hazards.

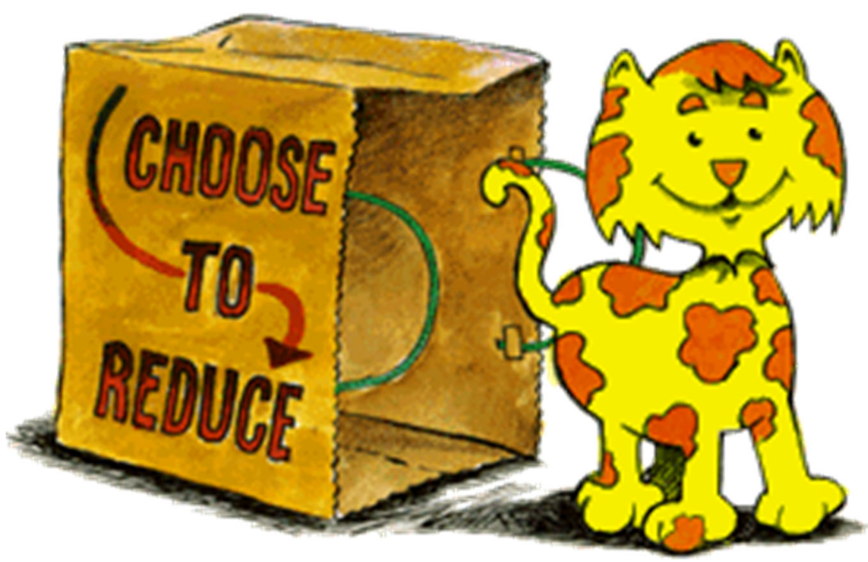
- By minimizing or eliminating the use and production of hazardous substances we can prevent those substances from entering the air, water, soil, and food chain.

- By finding alternative and substitute products for hazardous materials used in industrial processes and by consumers, we reduce the overall harmful effects both to human health and to the environment.

Pollution Prevention Pays

"***Pollution prevention pays***," say several of the nation's leading corporations. Increasingly, the nation is coming to understand prevention's value—as an environmental strategy, as a sustainable business practice, as a fundamental principle for all our society.

P2 is also a vehicle for "***reinventing***" traditional Agency programs and devising innovative alternative strategies to protect public health and the environment.



It is a key element of new EPA initiatives to focus attention on reducing risks from persistent, bio-accumulative toxic pollutants in the air, in water, and on land; to promote environmental justice and urban environmental quality; to empower state and tribal programs; to lower the incidence of climate change; and to demonstrate the results and benefits of our labors.

In addition, EPA is incorporating P2 into programs that encourage environmentally preferable purchasing and corporate eco-efficiency. P2 is a building block for private sector environmental performance and sustainability.

Benefits of P2

Individuals can undertake a wide range of P2 activities that offer environmental and economic benefits. The extraction and use of raw materials creates pollution and uses energy. By changing the way we use products and resources we can prevent pollution and often save money in the process. Specific benefits of P2 activities include:

- Cleaner air and water
- Less solid waste in landfills
- Conservation of natural resources
- Reduced soil erosion
- Savings on electric and water bills
- Increased property value

Source reduction, often called waste prevention, means consuming and throwing away less. Source reduction includes purchasing durable, long-lasting goods and seeking products and packaging that are as free of toxics as possible. It can be as complex as redesigning a product to use less raw material in production, have a longer life, or be used again after its original use is completed.

Because source reduction actually prevents the generation of waste in the first place, it is the most preferable method of waste management and goes a long way toward protecting the environment.

P2 Implementation

Have you ever wondered what you can do to prevent pollution? The following pages allow you to incorporate pollution prevention into your daily life:

Reduce driving time. Cars are big contributors to air pollution problems. Consider other possibilities whenever feasible: carpool, bike, walk, or use mass transit as part of your daily routine. If you drive, buy an energy-efficient automobile and keep its engine well-tuned.

Be careful with auto waste. Used oil can contaminate water supplies; used auto batteries contain lead, lead sulfate, and sulfuric acid which can leak into soil. Take used oil, auto batteries, and auto tires to a recycling center or an appropriate disposal facility.

Plant trees and shrubs. Trees in your yard may reduce heating and cooling costs and curb soil erosion. In addition, they beautify your property and may increase its value. Be sure to compost leaves, grass, and brush clippings and apply only as much fertilizer as needed.
Be an environmental consumer. The following items will help you be an environmental consumer:

- Reuse and recycle paper, glass, plastic, aluminum, scrap metal, and yard wastes.
- Look for recycling symbol on products you buy. Such symbols identify recycled or recyclable products.
- Avoid buying products that use unnecessary packaging - either plastic or paper.
- Buy household goods and foods in bulk to minimize packaging waste.
- Buy rechargeable batteries for flashlights, toys, and household items.
- Carry your own reusable shopping bag.
- Consider using reusable mugs, glasses, dishes, cloth towels and sponges.
- Encourage your community and your school to begin recycling.
- Maintain and repair products.
- Donate usable materials to charities or thrift shops.
- Patronize local businesses and buy locally-produced foods and goods, both to promote a vital local community and prevent pollution generated by travel and shipping.

Limit household hazardous waste. Purchase products containing toxic ingredients only when you cannot avoid using them and buy only as much as you need. Store hazardous products and materials carefully. Recycle unwanted hazardous products such as oil-based paint or find alternative uses.

Be careful with pesticides. Apply pesticides such as insecticides and herbicides carefully if they must be used. When using pesticides in or around your home, purchase only the amount needed and follow the instructions on the package carefully. Whenever possible, use natural pest-control methods rather than chemical pesticides. Reduce run-off by maintaining ample grass cover and shrubs.

Be aware of the dangers of lead to children. Keep kids away from surfaces covered with lead-based paint and renovations of older buildings. Test your drinking water to be sure it does not contain harmful levels of lead or other contaminants.

Reduce smoke, radon, asbestos and other indoor-air pollutants. Many stores sell test kits for measuring radon levels. A reading above 4 picocuries per liter could indicate a problem. When combined with radon, tobacco smoke further increases one's chance of developing lung cancer. Make your environment a smoke-free environment.

Assessing of Pollution Prevention Opportunities:

- Identify where the opportunities for pollution prevention exist: small businesses in the community which use toxic materials, small and large quantity hazardous waste generators, and wastewater treatment plants.
- Identify groups in the community dealing with toxic waste and its reduction, local chambers of commerce, and local departments of labor. Work with these groups to address P2.
- Measure the community's perceptions, attitudes, and needs to find out where and how pollution prevention efforts are or can be most effective.
- Identify practices within the health department (in both business offices and clinics) that create environmental hazards and/or raise the need for increased energy efficiency.
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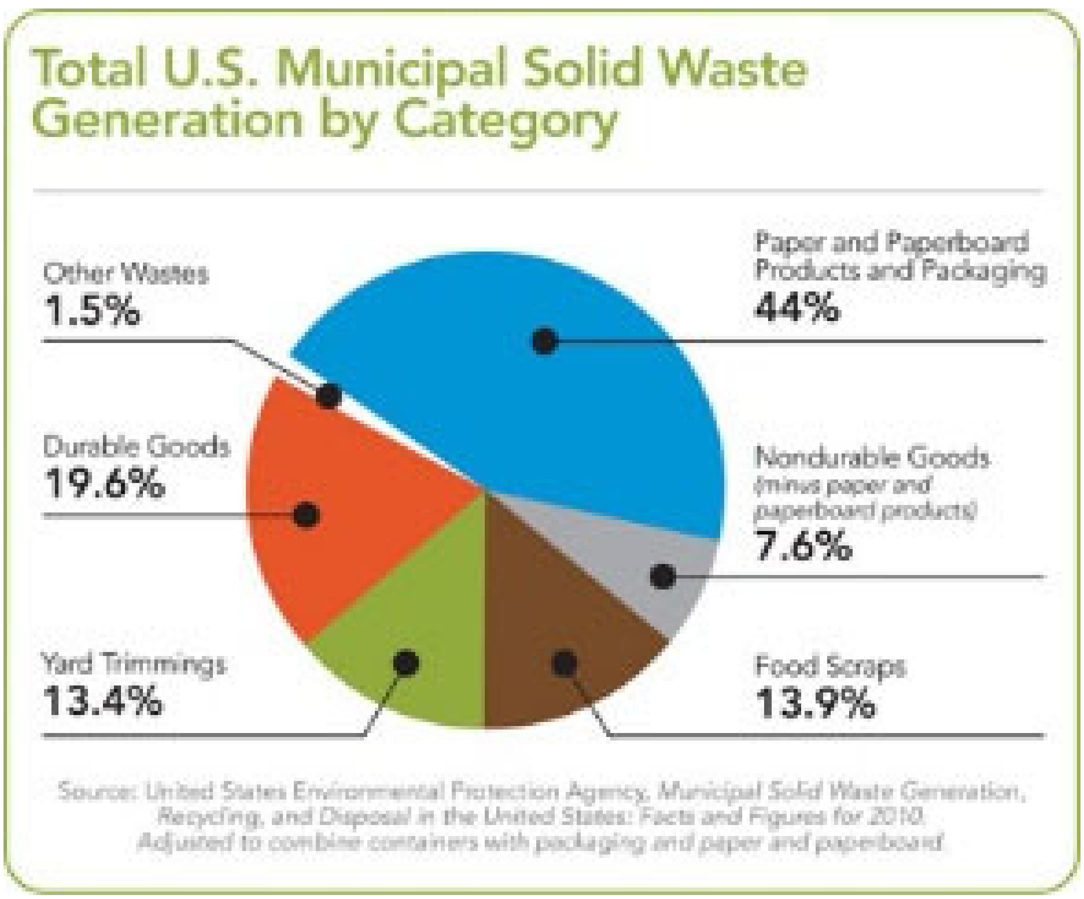


Building Pollution Prevention into Policy Development:

Use information gained through the assessment process to determine the need for resources and areas where pollution prevention policies could strengthen efforts to reduce use of and human exposure to hazardous substances.

Draft local ordinances encouraging substitution and other pollution prevention methods by individuals and businesses in areas with high rates of exposure to toxic substances.
Work with local and state legislative bodies to develop incentives for local businesses engaged in pollution prevention efforts.

Draft internal procurement and disposal procedures which prevent pollution for all local agencies.
Ensuring Community Access to Pollution Prevention Strategies and Resources Through:

Partnership activities:

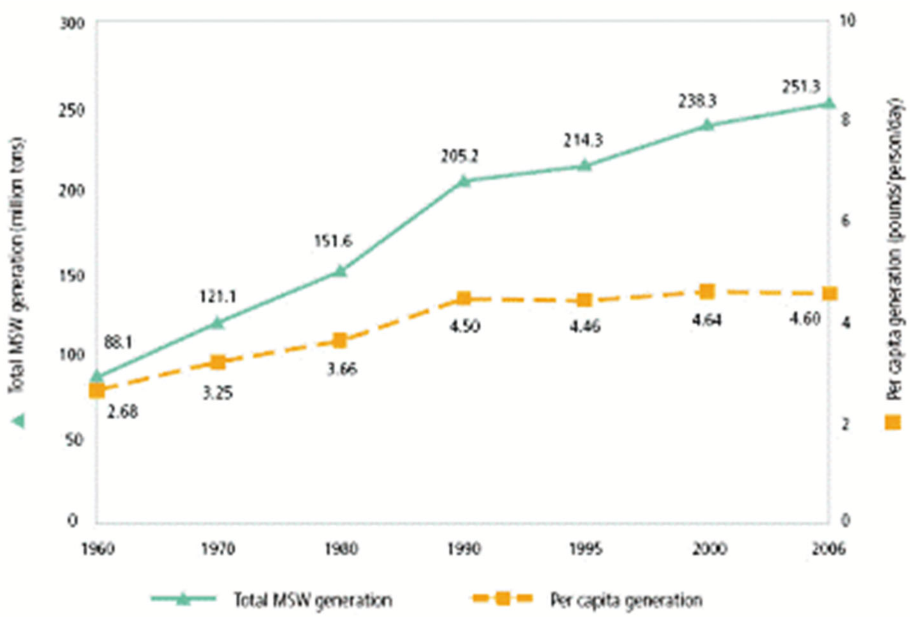
- Work with businesses, schools, environmental organizations, community groups, and others who may already be implementing pollution prevention strategies.
- Form partnerships with the private sector, and reward companies and businesses that implement pollution prevention activities.
- Work with the numerous regional, state, and local agencies which have an interest in pollution prevention.

Community outreach/environmental justice:

- Ensure that all populations in the community in need of information on pollution prevention get timely and accurate assistance.
- Target pollution prevention activities to communities which face exposure to multiple pollutants and hazards.

Educational activities:

- Be an advocate of reducing risks through pollution prevention.
- Be aware of P2 information resources and act as information broker and resource for others in the community.
- Continue to educate the public on ways to eliminate household hazardous waste and substitute safer products for toxic ones.



Enforcement activities:

- Encourage increased compliance with Federal and state environmental regulations; in some cases, encourage companies to go beyond compliance through pollution prevention.
- Educate the regulated community on ways to achieve compliance through pollution prevention.
- Report environmental health and safety risks in order to find opportunities for pollution prevention.
- Help reduce the waste from small quantity hazardous waste generators, and help those operators better manage the waste they generate.
- Hold accountable those who have committed to pollution prevention activities.

In-house activities:

- ➢ Prepare your department to be a community resource. This can be achieved by maintaining a data bank of the latest environmentally sound technical innovations, a list of safer product substitutions, and other pollution prevention information to share with the public.
- ➢ Reduce energy use.
- ➢ Promote reuse of raw materials over recycling.
- ➢ Substitute products that harm the environment with existing safer alternatives, such as non-bleached paper, water-based industrial solvents which do not emit volatile organic compounds (VOCs), renewable fuels, and other products.

Technical Assistance Programs

Businesses and municipalities interested in P2 should contact their state or regional technical assistance program or (**TAP**). The State P2 Programs page lists state and regional TAPs across the country.

TAPs provide businesses and municipalities with cutting edge environmental management assistance and help identify and implement measures that reduce or eliminate pollution at its source. Whether your organization is attracted by the environmental benefits, cost savings, or enhanced public image, TAPs offer a variety of services, most of which are free, non-regulatory, and confidential.

TAPs provide the following services:

Voluntary Onsite Audits. Most TAPs offer free customized technical assistance and will visit your facility to help you review your current operating practices. TAPs will help you identify opportunities for waste and emission reduction and/or elimination from your manufacturing or business processes and improve your compliance with environmental regulations. Most visits examine pollution sources, quantities, and costs from emissions, hazardous and non-hazardous waste, and wastewater discharge.

Information Clearinghouses. Many TAPs operate clearinghouses of P2 documents and information and provide access to the general public, regulatory staff, industry, and business. Some also provide technical information including case studies, reports, and fact sheets.

Planning Assistance. About half the states require industrial facilities to develop and implement comprehensive P2 plans. TAPs in these states, including New Jersey, California, and Washington, help assess industrial operations, as they relate to waste and pollution generation, and help incorporate P2 principles.

Hotlines. Many TAPs have hotlines available to industry and the general public where callers receive quick answers to waste management and P2 questions.

Research. Many TAPs also conduct research and collaborative projects with industry that support the development of P2 technologies and management strategies.

Workshops, Seminars, and Training. TAPs often hold a variety of educational and outreach events for local businesses and residents. TAPs have developed industry and process-specific training materials in a variety of sectors, from auto repair, to dry cleaning, to metal fabrication. These training opportunities help businesses learn about the latest P2 technologies and processes and identify P2 and cost saving opportunities in their facilities.

Paint Waste

Paint-contaminated wastes include filters, floor sweeping, masking, disposable rags, and mixing cups. These wastes may be hazardous because of heavy metals and solvents in the paints and thinners. You will need to test the waste to determine if they are hazardous and manage accordingly.

Do

- Use paints that contain no heavy metals whenever possible.
- Consider using low VOC and water based paints.
- Use a computerized paint mixing system.
- Use smaller paint cups.
- Reuse thinner until capability is exhausted.
- Use gun cleaners if using spray guns.
- Use HVLP or LVLP spray guns for higher efficiency. Use proper spray techniques and minimize over spray.
- Keep lids tight on all cans of solvent or paint.
- Vent particulates only through booth filter system.
- Check paint booth filters often for maximum effectiveness.

Don't

- Don't dispose of waste paint to the environment (air, water, sewer, ground, landfill).
- Don't evaporate paint waste.
- Don't shoot left over paint into the air.
- Don't mix more paint than you need for each job.
- Don't buy more paint than you need.

Delaware Department of Natural Resources and Environmental Control

The Dry Cleaning Industry

Dry cleaning establishments -- those facilities that are in the business of cleaning textiles in a non-aqueous liquid media -- produce a variety of wastes, including the following:

- spent solvent
- empty solvent containers
- spent filter cartridges
- cooked powder residue
- still residues from solvent distillation
- water contaminated with cleaning solvent

Most dry cleaning establishments produce hazardous waste because of the nature of the solvents used in the cleaning process. The volume of hazardous waste produced often places these facilities in the category of "**small quantity generator**". Treating or disposing of this waste constitutes a significant cost to the business. Even nonhazardous wastes must be properly managed, often at considerable expense, to avoid damage to the environment or public health.

Whatever the nature and characteristics of the waste may be, it all has one thing in common: All waste represents loss of resources and loss of money.

The most effective way to minimize the losses associated with waste is to avoid producing the waste in the first place. This is the concept behind DNREC's Pollution Prevention Program, which has produced this Fact Sheet to assist you and others in the dry cleaning business to reduce your losses while at the same time helping to improve the environment.

Businesses throughout the country have implemented waste reduction programs and found that there are many benefits to be gained from such an approach to the management of resources. Reducing the amount of waste your business generates can help you:

- reduce operating costs
- reduce waste disposal costs
- reduce long-term liability
- help sustain environmental quality
- improve workplace safety and health
- project a positive public image

Getting Started

Getting off to a good start is crucial to the success of any endeavor. Here are some important things to consider in undertaking a waste reduction program:

- Make a commitment to waste reduction. This commitment must start at the top, with the owner or manager of the shop, and extend to every employee.
- Involve the employees in designing and implementing waste reduction measures.
    - Provide training in waste reduction techniques and practices. Don't let this be a one-shot effort -- periodic "***refresher courses***" will help to increase employees' awareness of the importance of waste reduction.
    - Establish incentives to encourage workers to use waste reduction techniques and to suggest changes in design or operating procedures that would further reduce waste generation.
- Assess the shop's waste. Identify sources, types and amounts of waste being produced. This will make it easier to pinpoint areas where waste reduction techniques can be applied and to measure the success of your efforts.

Reducing Solvent Waste

Dry cleaning facilities typically use one of three cleaning solvents: perchloroethylene (commonly called "***perc***"), petroleum solvents (such as Stoddard, quick-dry, or low-odor), or Valclene (also known as fluorocarbon 113 or trichlorotrifluoroethane). In most cases, these solvents are classified as hazardous waste when disposed of and therefore require expensive treatment and/or disposal. Dry Cleaners may be able to reduce the quantity of solvent waste they produce by extending solvent life, increasing solvent efficiency, and recovering spent solvent.

Many techniques for accomplishing the reduction of solvent waste fall under two general categories:

1. improved housekeeping and
2. Modifications to processes, equipment, and operating practices.

Typical Quantities of Hazardous Waste From Dry Cleaning (Pounds of waste per 1,000 pounds of clothes cleaner)			
	Cleaning Method		
	PERC	Valclene	Petroleum Solvents
Waste Type	Average Quantity of Hazardous Waste (pounds)		
Still Residues	15	10	20
Spent Cartridge Filters: Standard (Carbon Core)	20	15	-
Spent Cartridge Filters: Adsorptive (split)	30	20	-
Cooked Powder Residue	40	NA	NA
Drained Filter Muck	NA	NA	NA

Why Pollution Prevention?

Since the early 1970's, environmental protection programs in the U.S. have been directed primarily at *controlling* not *preventing* pollution. Pollution control programs, in general, have consisted of discharge, storage, and treatment standards, information reporting, regulations, and economic incentives. Overall, these programs have been effective, but environmental protection challenges still remain. Pollution prevention evolved from a 1976 United Nations conference, called *Principles and Creation of Non-Waste Technology and Cleaner Production*, in response to the energy crisis begun three years earlier. How much energy could be saved, the conference asked, by reducing waste?

This conference represented a formal recognition of the limitations of end-of-pipe approaches to environmental problem solving. It became apparent that environmental protection challenges require a different approach. This approach to environmental protection involves continuing pollution control programs while at the same time developing and implementing broad-based pollution prevention programs.

Pollution Prevention Act of 1990
The Congress finds that:

(1) The United States of America annually produces millions of tons of pollution and spends tens of billions of dollars per year controlling this pollution.

(2) There are significant opportunities for industry to reduce or prevent pollution at the source through cost-effective changes in production, operation, and raw materials use. Such changes offer industry substantial savings in reduced raw material, pollution control, and liability costs as well as help protect the environment and reduce risks to worker health and safety.

(3) The opportunities for source reduction are often not realized because existing regulations, and the industrial resources they require for compliance, focus upon treatment and disposal, rather than source reduction; existing regulations do not emphasize multi-media management of pollution; and businesses need information and technical assistance to overcome institutional barriers to the adoption of source reduction practices.

(4) Source reduction is fundamentally different and more desirable than waste management and pollution control. The Environmental Protection Agency needs to address the historical lack of attention to source reduction.

(5) As a first step in preventing pollution through source reduction, the Environmental Protection Agency must establish a source reduction program which collects and disseminates information, provides financial assistance to States, and implements the other activities provided for in this Act.

You can find part of the P2 Act of 1990 and other related rules throughout this manual.

Improving Housekeeping Practices

This is often the easiest, quickest, and least expensive way to reduce waste. Good housekeeping includes effective inventory control and efficient operating procedures, such as the following:

- Keep storage and work areas clean and well organized, and keep all containers properly labeled.
- Inspect materials upon delivery, and immediately return unacceptable materials to the supplier.
- Monitor equipment efficiency (e.g., pounds of clothes cleaned per drum of solvent) on a regular basis in order to detect the occurrence of leaks or other problems that may result in unnecessary loss of solvent.
- Check hoses, couplings, pumps, valves, and gaskets frequently in order to detect leaks. Make repairs promptly.
- Keep all containers covered to prevent evaporation and spillage.
- Provide secondary containment in areas where solvents are stored.
- Keep waste streams separate to increase their potential for reuse, recycling, or treatment. Don't allow nonhazardous materials to become contaminated with hazardous materials, as this will result in all of the waste needing to be treated as hazardous waste.
- Clean lint screens regularly to avoid clogging of fans and condensers.

Modifying processes, equipment, and operating practices.
Sometimes even minor changes can result in a significant reduction in the toxicity and/or quantity of waste being generated, at little expense to the business. More major modifications may be economically feasible when all savings, such as avoided disposal costs and avoided liability, are taken into consideration. Here are some possible modifications you may want to consider:

- Size garment loads correctly. Overloading reduces the effectiveness of solvent recovery equipment; underloading makes less efficient use of solvent.
- Use spigots and pumps when dispensing new materials and funnels when transferring wastes to storage containers to reduce the possibilities of spills.
- Modify processes and equipment to reduce solvent vapor loss or to recover solvents for reuse. Add-on carbon adsorption or refrigeration units can recover valuable solvent. Equipment can also be modified to enhance heat and water conservation.
- Extract solvents from filters as thoroughly as possible. Gravity drainage and "cooking" are commonly used techniques.
- Use on-site recovery techniques to make solvents reusable. Distillation is a commonly used method of on-site recovery.
- If the solvents cannot be made reusable, try to find a way to recycle them. One possibility for accomplishing this is to purchase solvents from a company that will pick up and recycle the spent solvent.

Handling Other Wastes
Waste reduction applies to all waste generated, not just regulated hazardous waste. In developing a waste reduction program, don't forget to include the nonhazardous wastes being produced within the shop. Every waste is a potential candidate for reduction, reuse, or recycling. For example:

Replace disposable items with reusable ones.
Dry cleaners in some states are participating in an innovative program that reduces the need for plastic wrap. Customers can buy reusable nylon bags and use them to hold and transport their dirty clothes. After being cleaned, the clothes are hung on hangers and covered with the nylon bag rather than plastic wrap.
Reuse items as many times as possible before recycling or disposing of them.

- Use both sides of a piece of paper by making double-sided copies, or by using the blank side as scratch paper.
- Encourage customers to bring back hangers that they don't need.

Recycle everything you can.
Glass, plastic, and metal containers are recyclable in the Recycle Delaware program. So are newspapers, magazines, and telephone books. Other materials, such as office paper, cardboard, and non-container plastic and aluminum, are accepted by private recyclers.
SIDEBAR: Dry cleaning and laundry plants that might generate hazardous waste and be subject to Resource Conservation and Recovery Act (**RCRA)** requirements covering the generation, transportation, and management of hazardous waste include:

- Retail dry cleaning stores
- Industrial and linen supply plants with dry cleaning operations
- Leather and fur cleaning plants
- Self-service Laundromats with dry cleaning equipment
- Other facilities with dry cleaning operations

Following Up
As long as wastes are being produced, there is the potential for waste reduction. Less-polluting materials, equipment, and procedures are constantly being developed, so that wastes that are difficult or costly to control today may be easily eliminated tomorrow. Stay alert for such developments.

- When buying new equipment, look for equipment that will minimize both the amount of toxic materials used and the amount of waste produced. Dry-to-dry machines eliminate the transfer from wash unit to drying unit, thereby reducing both solvent loss and worker exposure.
- Reassess the shop's operations and waste handling practices periodically. A successful program requires diligence so as to avoid the temptation of slipping back into old, more wasteful ways of doing things and to identify additional waste reduction possibilities.
- Publicize the shop's commitment to waste reduction. Customers will feel good about doing business with a company that is environmentally responsible.

Sources of Additional Help
This Fact Sheet is not intended to be a comprehensive list of all of the techniques that could be used to reduce waste in a dry cleaning establishment. As each shop is unique, with its own combination of wastes and its own individual way of doing business, so will each waste reduction program be different from all others. A number of resources are available to help you develop and implement a program that will meet your shop's individual needs:

- The Northeast Industrial Waste Exchange may, be able to help you find companies that can use your wastes. You can call the Exchange directly at (315) 422-6512.
- The Delaware Manufacturing Alliance is a private, non-profit corporation which is dedicated to improving the quality, productivity, and profitability of Delaware manufacturers, and to serving as a prime service resource for the state's new and existing manufacturers. The DMA can be reached at (302) 452-2520.
- The International Fabricare Institute (**IFI**) and other trade associations may be able to provide additional helpful information to member dry cleaners interested in reducing their wastes and costs. The IFI, located in Silver Spring, Maryland, can be reached by calling (301) 622-1900.
- The RCRA/Superfund Hotline offers assistance with hazardous waste questions, as well as publications and other information pertaining to waste minimization. Call toll free at 800-424-9346.
- The Delaware Pollution Prevention Program in the Department of Natural Resources and Environmental Control (302) 739-3822 provides technical assistance, information resources, as well as assistance with other services that are available to your business.

This publication is one of a series of pollution prevention guides for various types of businesses. For more information on this and other pollution prevention or waste minimization programs, contact the Department of Natural Resources and Environmental Control at 739-3822 or 739-6400.

Reuse

Reusing items by repairing them, donating them to charity and community groups, or selling them also reduces waste. Use a product more than once, either for the same purpose or for a different purpose. Reusing, when possible, is preferable to recycling because the item does not need to be reprocessed before it can be used again.

During the past 35 years, the amount of waste each person creates has almost doubled from 2.7 to 4.6 pounds per day. The most effective way to stop this trend is by preventing waste in the first place. Waste prevention, also known as "***source reduction***," is the practice of designing, manufacturing, purchasing, or using materials (such as products and packaging) in ways that reduce the amount or toxicity of trash created. Reusing items is another way to stop waste at the source because it delays or avoids that item's entry in the waste collection and disposal system.

Source Reduction refers to any change in the design, manufacture, purchase, or use of materials or products (including packaging) to reduce their amount or toxicity before they become municipal solid waste. Source reduction also refers to the reuse of products or materials.

Source reduction, including reuse, can help reduce waste disposal and handling costs, because it avoids the costs of recycling, municipal composting, landfilling, and combustion.
Source reduction also conserves resources and reduces pollution, including greenhouse gases that contribute to global warming.

Source Reduction and Reuse Facts

- More than 50 million tons of MSW were source reduced in the United States in 1999.
- Containers and packaging represent approximately 24 percent of the materials source reduced in 1999, in addition to nondurable goods (e.g., newspapers, clothing) at 18 percent, durable goods (e.g., appliances, furniture, tires) at 11 percent, and other MSW (e.g., yard trimmings, food scraps) at 47 percent.
- There are more than 6,000 reuse centers around the country, ranging from specialized programs for building materials or unneeded materials in schools to local programs such as Goodwill and the Salvation Army, according to the Reuse Development Organization.
- Between 2 and 5 percent of the waste stream is potentially reusable according to local studies in Berkeley, California, and Leverett, Massachusetts.
- Since 1977, the weight of 2-liter plastic soft drink bottles has been reduced from 68 grams each to 51 grams. That means that 250 million pounds of plastic per year has been kept out of the waste stream.
- MSW Facts and Figures provides additional charts and statistics on source reduction, both nationally and by state.

Source Reduction and Reuse Benefits

- Saves natural resources. Waste is not just created when consumers throw items away. Throughout the life cycle of a product—from extraction of raw materials to transportation to processing and manufacturing facilities to manufacture and use—waste is generated. Reusing items or making them with less material decreases waste dramatically. Ultimately, fewer materials will need to be recycled or sent to landfills or waste combustion facilities.

- Reduces toxicity of waste. Selecting non-hazardous or less hazardous items is another important component of source reduction. Using less hazardous alternatives for certain items (e.g., cleaning products and pesticides), sharing products that contain hazardous chemicals instead of throwing out leftovers, reading label directions carefully, and using the smallest amount necessary are ways to reduce waste toxicity.

-

- Reduces costs. The benefits of preventing waste go beyond reducing reliance on other forms of waste disposal. Preventing waste also can mean economic savings for communities, businesses, schools, and individual consumers.

    - Communities. Over 4,000 communities have instituted "pay-as-you-throw" programs where citizens pay for each can or bag of trash they set out for disposal rather than through the tax base or a flat fee. When these households reduce waste at the source, they dispose of less trash and pay lower trash bills.

    - Businesses. Industry also has an economic incentive to practice source reduction. When businesses manufacture their products with less packaging, they are buying fewer raw materials. A decrease in manufacturing costs can mean a larger profit margin, with savings that can be passed on to the consumer.

    - Consumers. Consumers also can share in the economic benefits of source reduction. Buying products in bulk, with less packaging, or that are reusable (not single-use) frequently means a cost savings. What is good for the environment can be good for the pocketbook as well.

Ways to Reuse

- Using durable coffee mugs.
- Using cloth napkins or towels.
- Refilling bottles.
- Donating old magazines or surplus equipment.
- Reusing boxes.
- Turning empty jars into containers for leftover food.
- Purchasing refillable pens and pencils.
- Participating in a paint collection and reuse program.

Waste Prevention Tips

Courtesy of the New York City Trade Waste Commission

- Develop a facility- or company-wide waste prevention policy statement to demonstrate company support for waste prevention efforts. An official waste prevention policy statement, declaring support from top management for specific waste reduction goals and actions will show support for such programs. A policy statement should be clearly communicated to all employees and a system can be put in place to solicit employee feedback.
- Review your waste carting contract(s). Discuss recycling and waste prevention with your waste carter(s) and renegotiate rate structures to encourage waste prevention, *i.e.*, base hauling costs on a "per pull" rate rather than a flat monthly or yearly rate. If you pay per pull, adjust your pick-up schedule to ensure that containers are full each time they are collected. The New York City Trade Waste Commission has established maximum rates that carters are permitted to charge. For more information about the New York City Trade Waste Commission's role in regulating New York City waste carters contact (212) 676-6275.

Workplace P2 *A to Z*

Below is an A to Z listing of how to encourage pollution prevention in the workplace.

- **A**ssign life cycle responsibility to production management, linking cost and liability.
- **B**e the unsinkable champion of source reduction.
- **C**harge the true cost of waste created to the operating units and make them responsible for liabilities, management, and costs of the waste stream.
- **D**esign products for the environment with zero ultimate waste potential and cradle to grave functionality.
- **E**ducate each individual on what pollution prevention means.
- **F**ocus on optimizing the use of resources consumed in your process.
- **G**oals for pollution prevention need to be established so that everyone in the organization feels empowered to put them into practice.
- **H**ave pollution prevention incorporated into performance evaluations for middle management.
- **I**ncorporate pollution prevention into the development of new products and processes.
- **J**ust instill a philosophy of continuous improvement.
- **K**eep working hard with the non-believers - be patient.
- **L**ink zero discharge, total quality management and pollution prevention into your program.
- **M**anagement support needs to be enlisted. Have Management demonstrate their support by providing a written policy statement.
- **N**ever let leaks persist.
- **O**rganize innovative trainings for teaching pollution prevention concepts.

Saving the Bay Through P2
In 1998, 250 businesses participated in the "Businesses for the Bay" program and prevented more than 74 million pounds of waste from entering the Chesapeake Bay watershed. They also saved more than $900,000. Participants, ranging from marinas and gas stations to utilities and chemical manufacturers, developed preventive maintenance programs, improved procurement practices, modified manufacturing processes, and used alternative, less toxic products to achieve these results.

- **P**lan your waste reduction work and work your waste reduction plan.
- **Q**uickly shift from paper systems to paperless communications.
- **R**ecycling structures can be created that also compliments source reduction.
- **S**eek fundamental understanding of the sources of waste.
- **T**hink about sharing the money saved through pollution prevention with the originator(s) of the idea.
- **U**se and develop life cycle studies for processes and products.

- **V**alue personnel input on ways to improve the processes.
- **W**ork at publicizing your pollution prevention accomplishments.
- **X**eriscape - use low water consumption, drought resistant native plants and low impact irrigation in landscaping
- **Y**ou need to establish a culture of not wasting.
- **Z**ero waste should be the goal.

Battery and light bulb collection is essential for any household hazardous waste clean-up.

Bottom Line

P2 practices can improve a business's bottom line through reduced raw material and energy costs, treatment and disposal expenses, and associated labor costs. Many P2 strategies, such as substituting toxic materials with safer alternatives, are simple and inexpensive.

P2 practices reduce or eliminate:

- Treatment, disposal, and associated labor costs
- Wildlife and habitat damage
- Property devaluation
- Remediation costs
- Civil and criminal fines
- Permit fees
- Insurance costs
- Process disruption
- Down time

Cleaning Up Through P2
WEBCO Industries in Sand Springs, Oklahoma, demonstrates the potential for significant cost savings through P2 activities. The company eliminated solvent cleaning processes and saved $8,000 in operational costs, 18 employee-hours per week, and $18,000 in equipment costs.

Other Key P2 Benefits include:

Enhanced Public Image. Consumers more favorably view businesses that adopt and practice P2 strategies, and the marketing of these practices can increase profits.

Increased Productivity and Efficiency. P2 assessments help organizations identify opportunities to decrease raw material usage, eliminate unnecessary operations, increase throughput, reduce off-spec product generation, and improve yields.

Reduced Regulatory Burden. Improving environmental performance and reaching performance goals that go beyond compliance are ways to reduce regulatory burdens.

Decreased Liability. Handling hazardous and toxic materials brings high liability should an accident occur. Organizations that substitute toxic materials with safer alternatives reduce the liability and high costs associated with an unsafe environment.

Improved Environmental and Health Quality. P2 methods can help reduce the air, water, and land pollution that results from waste generation, treatment, and disposal, reduce worker and resident health risks and the environmental risks associated with pollutant emissions, and conserve natural resources and landfill space.

Doing More With Less
United Musical Instruments in Nogales, Arizona, worked with the Arizona Department of Environmental Quality's Pollution Prevention Unit to implement a closed loop system that reduced water use by 500,000 gallons per year, cut lab fees, and decreased sludge generation. These activities reduced hazardous waste by 58 percent in 3 years and saved the company $127,000 in the first year alone.

Example of various collection storage bins for light bulbs.

Trade Waste Commission Maximum Rates:

$30.19	per cubic yard for compacted trash
$12.20	per cubic yard of waste for loose trash
$ 2.66	for 55-gallon trash bags > 80% full
$ 1.45	for 30-gallon trash bags > 80% full

Discuss waste prevention opportunities with vendors. Contact vendors to determine which products can be delivered in returnable crates, racks, and containers.

Reduce the number of pallets purchased by standardizing the size of incoming and outgoing pallets. Ask vendors to supply incoming materials on pallets that can be used to ship out final products.

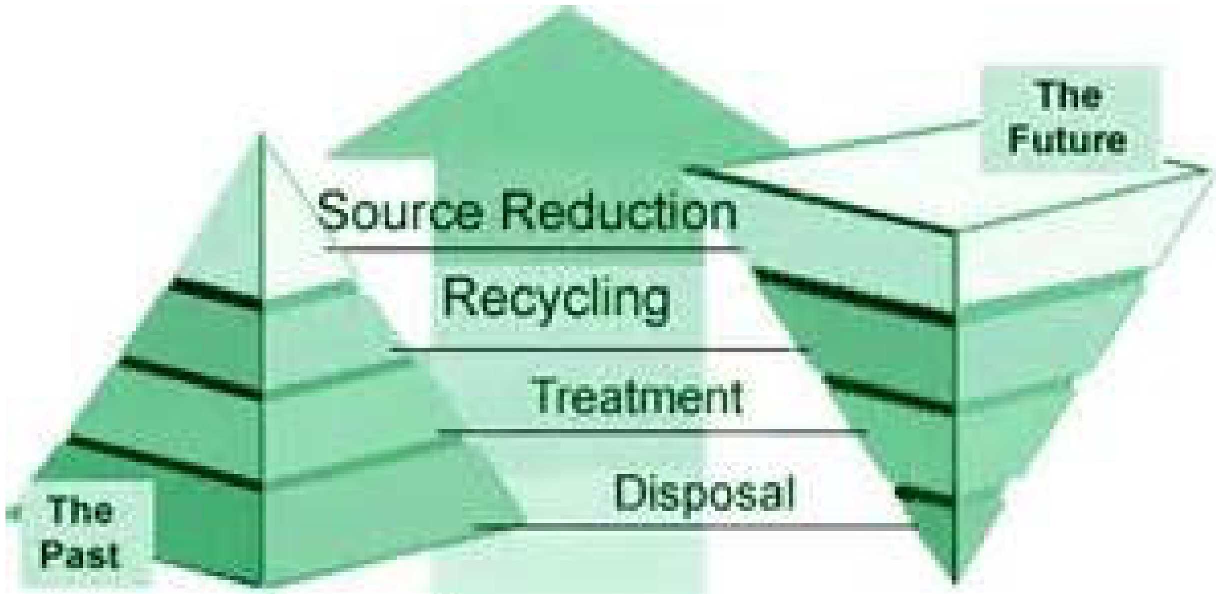
Install electric hand dryers, linen roll towels, or roll paper towels in restrooms instead of C-fold paper towels. C-fold towels are the most wasteful hand drying option in terms of solid waste generation per use and overall long-term costs associated with towel purchase, maintenance and labor, and energy use.
Provide monthly/quarterly reports to managers reflecting energy, water, and waste to encourage continued reduction efforts and to highlight successes.

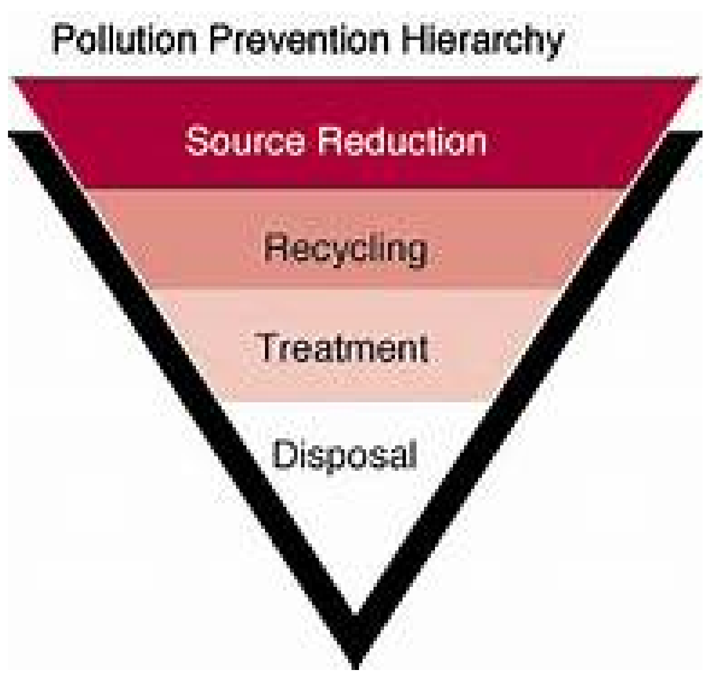
Providing store managers with monthly or quarterly reports detailing utility, waste disposal, and recycling quantities and costs, as part of the monthly Profit and Loss (**P&L**) statements, allows managers to see the true costs associated with energy use and waste management and can be used to motivate managers to reduce these costs. Ask for employee input. Employees know the most about the details of the jobs. They can best indicate what can and cannot be done to reduce waste effectively. Allowing employees to take ownership of a program allows employees to feel responsible for its success.

Make sure that staff is aware of and familiar with all company waste prevention programs, policies, and objectives. Keep them informed and involved through regular meetings, training sessions, memos, instructional posters, and personal communications.

Provide incentives for participating in waste prevention programs and provide continuous feedback about program successes.

Employees are more willing to participate in a program if they are kept informed and can provide input. Incentives in the form of employee recognition, bonuses, prizes and other rewards, can help a program get off the ground or to ensure continued interest.


The Future
Source Reduction
Recycling
Treatment
Disposal
The Past


Pollution Prevention Hierarchy
Source Reduction
Recycling
Treatment
Disposal

Town of Smithville Pollution Prevention Survey *Example*

Business Name: ____________________________

Status: ______________________________

Contact Name: ____________________________Title:_________________________________

Street Address: ____

Business Telephone #:__________________________

Property Owner's Name__________________________Telephone#_____________________

Address:____

Years at present facility:_____ Type of Business______________________SIC______________

Water Account#:__________________________Type User________Fireline________________

Activities Conducted:____

Professional and Trade Organizations Facility belongs to:________________________________
____

Number of Employees:________________Shifts/days:________Days/weeks:________________

Average Consumption:- Estimate of water use: + Number of Employees = Average Discharge
______GPD _________GPD x35: ______GPD ______GPD
(Evaporators =Irrigation=Product)
Size of Turf Area:______________ Number of Sprinkler Heads:___________________________
Type of Vegataion:____

Types of Plumbing fixtures:____
Types of Mechanical/other fixtures:____

Pretreatment Systems:____
Maintenance Dates:___________Haulers:______________

Grease Trap: Sand/oil Int.: Acid Neutralizer:_____
Grease Interceptor: Hair Trap: Silver Reclamation:___
Solids Interceptor: Lint Interceptor: Other:______________
Number of Floor Drains:________Usage:____

Are there any of the following on the property:
Storm Sewers:________________Dry Wells:____
Private Wells:________________Abandoned Water Wells:_____________________________
Septic Tanks:______________________________Last Pumping?_________________________

Are any used for Waste Disposal?____
Do you have Material Safety Data Sheets?____

Pollutants of Concern:____

Are the stored chemicals properly stored and segregated on the property?__________________

How do you dispose of Hazardous Materials?____

Have you explored Alternative Raw Materials?____

Have you explored alternative Water Conservation Methods?______________________________

Have you explored Recycling?____

Is there a written Standard Operating Procedure(SOP)?_________________________________

Does it include how spills are handled?____

Are the employees trained and the SOP updated yearly?_________________________________

Is there a Pollution Prevention Program?_______Is the Program Documented?_______________

Recommendation:____

T.O.S. Evaluator ***Facility Representative***

Signature Date Signature Date

Example of a Small Town's Combination P2 and Water Source/Wellhead Protection Efforts

SWPP/WHPP Combination Protection Implementation Plan

1. Obtain and Research Federal and State Rules and Regulations pertaining to Source Protection/Wellhead Protection. Purchase a Regulatory Database and Compliance Reporter.
2. Attend Technical Advisory Committee Meetings, Citizen's Advisory Committee Meetings.
3. Research Capital Improvement Funding, Risk Management Funding.
4. Attempt to Qualify for ADEQ's Alternative Monitoring Program.
5. Delineate Source Water Protection Plan (SWPP)/Pollution Prevention Plan (P2).
6. Develop a Pollution Prevention Partnership (P3) T.O.S. Fire, Planning /Community Development, Sunflower County Sanitary District, Landfill Operators.
7. Solicit and Review Consultant Bids for Pollution Prevention Program (P2) Risk Management Plan/Wellhead if necessary S.O.P.s. Water Conservation Program and acquire Hydrogeologic Information for Delineation.
8. Accept Consultant's Proposal.
9. Produce a Hydrogeologic Sensitivity and Susceptibility Study, Based upon a 5-year Leachate Time of Travel. (Possibly Contract Out)
10. Solicit Grant Funding.
11. Prepare for Public Notification. Produce Favorable News Releases.
12. Develop SWPP/Wellhead Protection Ordinance with Assistance from the Law Department.
13. Prepare a Budget, Calculate Resources and Man-hours Needed.
14. Develop SWPP Presentation for Council.
15. Present Program to Council.
16. Amend Ordinance to Reflect Councils' Preferences.
17. Implement SWP Policy and Procedures.
18. Implement Pollution Prevention Plan Review, Review Land Uses and Zoning, Include Economic Development.
19. Perform SWAA's/Pollution Prevention Inspections/Surveys, Begin Chemical Inventory.
20. Develop Employee and Public Education and Awareness Campaigns, Outreach Programs.
21. Develop a Household Hazardous Waste Collection (HHWC) Day, Batteries, Oil, Paint, and Antifreeze (BOPA) collection location.
22. Maintain all Plans, Surveys, and Relevant Information; Adhere to State Record-keeping Requirements.
23. Research and Purchase a Combination Program Computer Database, Implement and Perform Data Management and Analysis.
24. Implement Employee and Public Education and Outreach Programs.
25. Create a Contingency Plan for Sensitivity Determinations.
26. Provide the Customer's Best Management Practices (BMP's), If Necessary.
27. Provide the Customer's Spill Prevention Control & Countermeasure Plan, If Necessary.
28. Annual Updating of Assessments.
29. Annual Review of Ordinance.

Some issues are regulatory, few are voluntary, and most are generally sensible ideas to protect our watershed against pollution and overdrawing. A few of these suggestions will postpone future treatment facilities, and will assist the Town in receiving Alternate Monitoring Guidelines.

Greenhouse Gas Contributions

Many human activities generate carbon dioxide, which contributes to global warming. Listed below are the reductions in carbon dioxide emissions that result from ten major P2 activities at home.

10. Plant a couple of additional trees around your home.

CO_2 REDUCTION = 20 LBS/YEAR

9. Use a push mower to cut your lawn instead of a power mower.

CO_2 REDUCTION = 80 LBS/YEAR

8. Replace your home's refrigerator with a high-efficiency model.

CO_2 REDUCTION = 220 LBS/YEAR

7. Buy food and other products with reusable or recyclable packaging instead of those in non-recyclable packaging.

CO_2 REDUCTION = 230 LBS/YEAR

6. Replace your current washing machine with a low-energy, low-water use machine.

CO_2 REDUCTION = 440 LBS/YEAR

5. Install a solar hot water system to help provide your hot water.

CO_2 REDUCTION = 720 LBS/YEAR

4. Recycle all of your home's waste newsprint, cardboard, glass, and metal.

CO_2 REDUCTION = 850 LBS/YEAR

3. Leave your car at home two days a week (walk, bike, or take the bus or subway to work instead).

CO_2 REDUCTION = 1,590 LBS/YEAR

2. Insulate your home, tune up your furnace, and install energy-efficient showerheads.

CO_2 REDUCTION = 2,480 LBS/YEAR

1. Purchase a fuel-efficient car (rated at 32 mpg or more) to replace your most frequently used automobile.

CO_2 REDUCTION = 5,600 LBS/YEAR

If your family did all of the items above, you could cut CO_2 emissions by more than 11,000 lbs per year!

Source Water Assessment Information Determination

1. Delineation of source water assessment areas (SWAAs).
2. Completion of an inventory within the delineated area of significant potential sources of contamination (SPSCs) and their associated contaminants.
3. Research information to purchase A Wellhead Protection Area (WHPA) Model or computer program to assist in this mission. A model with fate and transport capability. The model must be able to produce a representation of the Town's Aquifer system, and must be able to consider all Inputs and Withdrawals. The model must be able capable for Particle Tracking.
4. A final susceptibility determination. The susceptibility determination combines an assessment of the Hydrogeologic sensitivity of a source water to become impacted from releases of contaminants at the land surface with the SPSC's inventory information.

Source Water Protection Plan Objectives

1. Prevent Pollution Contamination of Water Resources.
2. Define and Map Aquifer. Identify areas of rapidly occurring Recharge.
3. Perform or Review Sanitary Surveys.
   A: Identify Industrial and Commercial Facilities, e.g. Gas Stations, Hospitals, Dry Cleaners, Plant Nurseries, Airport, Parks & Recreation Department.
   B: Identify areas of concern, e.g. Dry Wells, Storm Drains, Grease, Sand, Oil Interceptors, Floor Drains, Underground Storage Tanks, and Uncovered Storage.
   C: Document Hazardous Chemicals, Pesticides, and Fertilizers.
   D: Calculate Contamination Determination, Risk Factor.
   E: Review RCRA, Disposal of Hazardous Waste Procedures.
   F: Review Sunflower County's A.P.P.
   G: Review Hydrogeological Reports.
   H: Review construction of all existing wells.
4. Evaluate Zoning Maps.
5. Involve Stakeholders.
6. Identify Potential Pollution Sources, e.g. Wastewater Discharges, Illegal Dumping, Possible Spills.
7. Evaluate Wellhead Protection Program. (Consultant)
8. Develop Water/Pollution Monitoring Program, Monitoring Wells, Baseline Data Recording.

Implementation Schedule Goals

Begin Employee Awareness Campaign. (Kick-off)
Begin using combination program inspection reports. (See Attached)
Purchase Wellhead Protection Area Model computer program.
Start Chemical Inventories of all commercial & industrial facilities.
Produce Spill Containment & Countermeasures sample plan for customer assistance/internal use.
Produce BMP's.
Purchase a CD computer database environmental library with compliance writing capability.
Contact P3 agencies for meeting in March. Research the need for a Risk Management Contract.
Research the need for geological survey information rider. Suggest ADOSH/HazCom upgrades to sites, Cement slabs, Placards, etc.
Contact Law Department and inform of possible ordinance or need of assistance.
Employ grant writer

February
Review of other similar sized towns.
Visit ADEQ, Solicit Matching Funds, Grants, and attend relevant meetings.
Contact BOPA participants, Checker, Autozone, Sunflower Recycling, etc.
Review and accept Risk Management bids, if necessary.
Consider hiring P2 consultant, possible need for Council presentation.
Possibly apply for A.D.E.Q. AMP extension.
Facilitate 1st P3 meeting at Town Hall.
Start reviews of existing wells and construction of well site. Verify adequate construction.

March
Complete Water Conservation P & Develop MOU's between P3 agencies.
Develop Household Hazardous Product Disposal or Alternative Program.
Develop P2 budget; include new computer tracking database for combination program with access to TABS.

Preliminary Budget	**Approximately**
Risk Management Assessments/Community Right-to Know.	$50,000 *
Environmental and safety CD library/compliance reporter.	$2,000 1
Wellhead Protection Model Program	$2,000
New Computer tracking Database/Access to TABS	$5,000
BOPA expenses , Publications, Etc.	$1,500
Household Hazardous Waste Day	$100,000 2
P2 / Water Conservation/Safety Consultant	$75,000+ 3
Additional expenses, training, travel, meetings, novelties.	$7,000
Internet Access	More Research
Home Page	More Research
	$250,000

* Most Funding from Administrative Services. 1 Half Funds from Admin. Services 2 Most from ADEQ grant EPA assistance
3 Half from Admin. Services for CERCLA/Right to Know/ HazCom

A part-time employee will be necessary for these additional endeavors, possibly a Cross-Training work diversification program.

Hazard Cataloging (HazCat) Chemical Products for final disposal

Integrated Risk Information System (IRIS)

The Integrated Risk Information System (**IRIS**), prepared and maintained by the U.S. Environmental Protection Agency (**U.S. EPA**), is an electronic data base containing information on human health effects that may result from exposure to various chemicals in the environment. IRIS was initially developed for EPA staff in response to a growing demand for consistent information on chemical substances for use in risk assessments, decision-making and regulatory activities. The information in IRIS is intended for those without extensive training in toxicology, but with some knowledge of health sciences.

The heart of the IRIS system is its collection of computer files covering individual chemicals. These chemical files contain descriptive and quantitative information in the following categories:

- Oral reference doses and inhalation reference concentrations (RfDs and RfCs, respectively) for chronic noncarcinogenic health effects.
- Hazard identification, oral slope factors, and oral and inhalation unit risks for carcinogenic effects.

To aid users in accessing and understanding the data in the IRIS chemical files, the following supportive documentation is provided:

- An alphabetical list of the chemical files in IRIS.
- IRIS Background documents.
- A discussion of the limitations of IRIS information.
- An IRIS glossary of scientific terms, and a definition of acronyms and abbreviations used.

Risk Assessment and Risk Management

The information in IRIS is intended for use in protecting public health through risk assessment and risk management. These two processes are briefly explained below.

Risk assessment has been defined as "the characterization of the potential adverse health effects of human exposures to environmental hazards" (NRC, 1983). In a risk assessment, the extent to which a group of people has been or may be exposed to a certain chemical is determined, and the extent of exposure is then considered in relation to the kind and degree of hazard posed by the chemical, thereby permitting an estimate to be made of the present or potential health risk to the group of people involved.

Risk assessment information is used in the risk management process in deciding how to protect public health. Examples of risk management actions include deciding how much of a chemical a company may discharge into a river; deciding which substances may be stored at a hazardous waste disposal facility; deciding to what extent a hazardous waste site must be cleaned up; setting permit levels for discharge, storage, or transport; establishing levels for air emissions; and determining allowable levels of contamination in drinking water.

Essentially, risk assessment provides INFORMATION on the health risk, and risk management is the ACTION taken based on that information.

A complete risk assessment consists of the following four steps:

1. Hazard identification;
2. Dose-response assessment;
3. Exposure assessment; and
4. Risk characterization, with risk characterization being the transitional step to risk management.

The following discussion of the four steps of risk assessment was excerpted from "Principles of Risk Assessment: A Nontechnical Review":

Hazard identification involves gathering and evaluating data on the types of health injury or disease that may be produced by a chemical and on the conditions of exposure under which injury or disease is produced. It may also involve characterization of the behavior of a chemical within the body and the interactions it undergoes with organs, cells, or even parts of cells. Data of the latter types may be of value in answering the ultimate question of whether the forms of toxicity known to be produced by a substance in one population group or in experimental settings are also likely to be produced in humans.

Hazard identification is not risk assessment; we are simply determining whether it is scientifically correct to infer that toxic effects observed in one setting will occur in other settings (e.g., whether substances found to be carcinogenic or teratogenic in experimental animals are likely to have the same results in humans).

Dose-response assessment involves describing the quantitative relationship between the amount of exposure to a substance and the extent of toxic injury or disease. Data are derived from animal studies or, less frequently, from studies in exposed human populations. There may be many different dose-response relationships for a substance if it produces different toxic effects under different conditions of exposure. The risks of a substance cannot be ascertained with any degree of confidence unless dose-response relations are quantified, even if the substance is known to be toxic.

Exposure assessment involves describing the nature and size of the population exposed to a substance and the magnitude and duration of their exposure. The evaluation could concern past or current exposures, or exposures anticipated in the future.

Risk characterization generally involves the integration of the data and analysis of the first three components of the risk assessment process (hazard identification, dose-response assessment, and exposure assessment) to determine the likelihood that humans will experience any of the various forms of toxicity associated with a substance. (In cases where exposure data are not available, hypothetical risk can be characterized by the integration of hazard identification and dose-response evaluation data alone.)

A framework to define the significance of the risk is developed, and all of the assumptions, uncertainties, and scientific judgments of the preceding three steps are presented.

The Role of IRIS in Risk Assessment / Risk Management
IRIS is a tool that provides hazard identification and dose-response assessment information, but does not provide situational information on individual instances of exposure. Combined with specific exposure information, the data in IRIS can be used for characterization of the public health risks of a given chemical in a given situation, that can then lead to a risk management decision designed to protect public health.

The information contained in Section I (Chronic Health Hazard Assessment for Non-carcinogenic Effects) and Section II (Carcinogenicity Assessment for Lifetime Exposure) of the chemical files represents a consensus opinion of EPA health scientists representing the Program Offices and the Office of Research and Development. From 1985 to 1995, the consensus bodies were referred to as the RfD/RfC Work Group and the Carcinogen Risk Assessment Verification Endeavor Work Group, or CRAVE. The consensus process involves interpreting the scientific literature applicable to health effects of a chemical, and using established methodologies to develop values for oral reference dose, inhalation reference concentration, carcinogenic slope factor and unit risk.

The products of this work, summarized in IRIS and elaborated in chemical-specific support documents, have been subject to EPA's peer review policy since its issuance in 1994. As new scientific information becomes available, EPA will review it, as appropriate, and revise IRIS files accordingly.

For more information on the process for developing information for IRIS, contact the IRIS Hotline in EPA's National Center for Environmental Assessment, contractor facilities, Greenbelt, MD (Telephone 301-345-2870 or FAX 301-345-2876 or email Hotline.IRIS@epamail.epa.gov).

References
NRC (National Research Council). 1983. Risk Assessment in the Federal Government: Managing the Process. National Academy Press, Washington, DC.

U.S. EPA. 1985. Principles of Risk Assessment: A nontechnical review. Prepared for a risk assessment workshop. Easton, MD, March 17-18.

U.S. EPA. 1994. Peer Review and Peer Involvement at the US Environmental Protection Agency

Chapter Summary

What is Pollution Prevention (P2)?

Pollution prevention (P2) is any practice that reduces, eliminates, or prevents pollution at its source. P2, also known as "source reduction," is the ounce-of-prevention approach to waste management. Reducing the amount of pollution produced means less waste to control, treat, or dispose of. Less pollution means less hazards posed to public health and the environment.

Specific Pollution Prevention Approaches

Pollution prevention approaches can be applied to all potential and actual pollution-generating activities, including those found in the energy, agriculture, federal, consumer and industrial sectors. Prevention practices are essential for preserving wetlands, groundwater sources and other critical ecosystems - areas in which we especially want to stop pollution before it begins.

In the energy sector, pollution prevention can reduce environmental damages from extraction, processing, transport and combustion of fuels. Pollution prevention approaches include:

- increasing efficiency in energy use;
- use of environmentally benign fuel sources.

In the agricultural sector, pollution prevention approaches include:

- Reducing the use of water and chemical inputs;
- Adoption of less environmentally harmful pesticides or cultivation of crop strains with natural resistance to pests; and
- Protection of sensitive areas.

In the industrial sector, examples of P2 practices include:

- Modifying a production process to produce less waste
- Using non-toxic or less toxic chemicals as cleaners, degreasers and other maintenance chemicals
- Implementing water and energy conservation practices
- Reusing materials such as drums and pallets rather than disposing of them as waste

In homes and schools examples of P2 practices include:

- Using reusable water bottles instead of throw-aways
- Automatically turning off lights when not in use
- Repairing leaky faucets and hoses
- Switching to "green" cleaners

Why is Pollution Prevention Important?

Pollution prevention reduces both financial costs (waste management and cleanup) and environmental costs (health problems and environmental damage). Pollution prevention protects the environment by conserving and protecting natural resources while strengthening economic growth through more efficient production in industry and less need for households, businesses and communities to handle waste.


Treat
Eliminate
Segregate
Reduce
Pollution Prevention & Control
Dispose


BE THE SOLUTION
TO
STORMWATER POLLUTION!
When it rains, everything on the ground seeps into our drinking water or washes into street drains that lead to our streams, ponds, the Nissequogue River and Long Island Sound
Use Fertilizer Sparingly
Never Dump Anything Down Storm Drains
Vegetate Bare Spots In Your Lawn
Compost Yard Waste
Direct Downspouts Away From Paved Surfaces
Always Pick Up After Pets
Inspect And Pump Your Septic Tank Regularly
Utilize A Rain Garden Or Rain Barrel
Use A Car Wash Instead Of Washing It At Home
Have All Car Leaks Fixed
TOWN OF SMITHTOWN DEPARTMENT OF ENVIRONMENT AND WATERWAYS
www.smithtownny.gov

Chapter 1 Pollution Prevention Exercise

This is not your final assignment but an exercise for you to understand the purpose of this course. You can find the final examination on our website under Assignments. It is a multiple choice exam.

1. Tell me about yourself: Name, Experience, Education, and Reason for taking this course. (10 points)

2. Who is the responsible pollution prevention governmental agency in your State?

3. Give the name, telephone number, address and website. You will need to save this information for later assignments. (10 points)

4. Describe the benefits of Pollution Prevention or Pollution Control. (20 points)

5. Describe the drawbacks of Pollution Prevention. (20 points)

6. **Scenario:** You are a Pollution Prevention/Control Inspector at a large city. The Chief Inspector would like each Inspector to complete a pollution prevention survey for any SIU. (40 points)
 (40 points)

State Assistance Program *Example*

Each state will have similar programs. Courtesy of DEP. You can utilize the hyperlinks on the computer version.

Pennsylvania's Small Business Assistance Program

Complying with environmental regulations can be burdensome, especially for small businesses. Recognizing this, DEP created the Small Business Assistance Program. This program assists small businesses with regulatory compliance, provides information about cost saving pollution prevention practices, and ensures that small business are considered when new regulations are developed.

Pollution Prevention/Energy Efficiency Grant Program

Grants under the Act 190 Pollution Prevention (**P2**) Energy Efficiency (**E2**) Grant Program will be used to fund 80 percent of the total cost of a P2E2 site assessment, up to a maximum of $5,000 for Pennsylvania small businesses with 100 or fewer employees OR up to a maximum of $15,000 for holders of any DEP permit (or holder of an air permit from either the Allegheny County Department of Health or Philadelphia Air Management Services). (6/2/00)

Pennsylvania Environmental Assistance Network (PEAN)

PEAN is a partnership of public and private sector service providers offering pollution prevention, energy efficiency, and environmental management systems services.

Small Business Pollution Prevention Assistance Account

The Pollution Prevention Assistance Account is a loan program that helps small Pennsylvania businesses implement pollution prevention and energy-efficiency projects. Go to the Small Business Pollution Prevention Assistance Account web site for more information.

Electrotechnology Applications Center

The Electrotechnology Applications Center (ETAC) is working together with the DEP to help small and mid-size Pennsylvania businesses achieve and maintain compliance with the air quality regulations. Services include technological assessment (*1st consultation free*), laboratory analysis, process analysis and auditing, and technical training and course development. For more information, call Dr. Mike Vasilik, toll free, at 1-877-VOC-DOWN.

ENVIROHELP

ENVIROHELP is dedicated to helping small business owners understand and comply with regulations, to become more profitable and competitive by reducing raw material use, waste and energy consumption. All inquiries will remain confidential. The ENVIROHELP Hotline is (800) 722-4743 TDD# 800-208-0937. Services provided to small business include:

Chapter 2 Municipal Solid Waste (MSW)

Municipal Solid Waste (MSW)

MSW—more commonly known as trash or garbage—consists of everyday items such as product packaging, grass clippings, furniture, clothing, bottles, food scraps, newspapers, appliances, paint, and batteries. In 1999, U.S. residents, businesses, and institutions produced more than 230 million tons of MSW, which is approximately 4.6 pounds of waste per person per day, up from 2.7 pounds per person per day in 1960.Several MSW management practices, such as source reduction, recycling, and composting, prevent or divert materials from the wastestream. Source reduction involves altering the design, manufacture, or use of products and materials to reduce the amount and toxicity of what gets thrown away. Recycling diverts items, such as paper, glass, plastic, and metals, from the wastestream. These materials are sorted, collected, and processed and then manufactured, sold, and bought as new products. Composting decomposes organic waste, such as food scraps and yard trimmings, with microorganisms (mainly bacteria and fungi), producing a humus-like substance.

Other practices address those materials that require disposal. Landfills are engineered areas where waste is placed into the land. Landfills usually have liner systems and other safeguards to prevent groundwater contamination. Combustion is another MSW practice that has helped reduce the amount of landfill space needed. Combustion facilities burn MSW at a high temperature, reducing waste volume and generating electricity.

Solid Waste Disposal, disposal of normally solid or semisolid materials, resulting from human and animal activities that are useless, unwanted, or hazardous. Solid wastes typically may be classified as follows

Garbage: decomposable wastes from food

Rubbish*:* non-decomposable wastes, either combustible (such as paper, wood, and cloth) or noncombustible (such as metal, glass, and ceramics)

Ashes: residues of the combustion of solid fuels

Large wastes*:* demolition and construction debris and trees

Dead animals

Sewage-treatment solids*:* material retained on sewage-treatment screens, settled solids, and biomass sludge

Industrial wastes: such materials as chemicals, paints, and sand

Mining wastes*:* slag heaps and coal refuse piles

Agricultural wastes*:* farm animal manure and crop residues.

Disposal of solid wastes on land is by far the most common method in the U.S. and probably accounts for more than 90 percent of the nation's municipal refuse. Incineration accounts for most of the remainder, whereas composting of solid wastes accounts for only an insignificant amount. Selecting a disposal method depends almost entirely on costs, which in turn are likely to reflect local circumstances.

Reduce
Source reduction, often called waste prevention, means consuming and throwing away less. Source reduction includes purchasing durable, long-lasting goods and seeking products and packaging that are as free of toxics as possible. It can be as complex as redesigning a product to use less raw material in production, have a longer life, or be used again after its original use is completed. Because source reduction actually prevents the generation of waste in the first place, it is the most preferable method of waste management and goes a long way toward protecting the environment.

Solid Waste Hierarchy
EPA has ranked the most environmentally sound strategies for MSW. Source reduction (including reuse) is the most preferred method, followed by recycling and composting, and, lastly, disposal in combustion facilities and landfills. Currently, in the United States, 28 percent is recovered and recycled or composted, 15 percent is burned at combustion facilities, and the remaining 57 percent is disposed of in landfills.

Pay-As-You-Throw Programs
In communities with pay-as-you-throw programs (also known as unit pricing or variable-rate pricing), residents are charged for the collection of municipal solid waste—ordinary household trash—based on the amount they throw away. This creates a direct economic incentive to recycle more and to generate less waste.

Traditionally, residents pay for waste collection through property taxes or a fixed fee, regardless of how much—or how little—trash they generate. Pay-as-you-throw (PAYT) breaks with tradition by treating trash services just like electricity, gas, and other utilities. Households pay a variable rate depending on the amount of service they use.

Most communities with PAYT charge residents a fee for each bag or can of waste they generate. In a small number of communities, residents are billed based on the weight of their trash. Either way, these programs are simple and fair. The less individuals throw away, the less they pay. EPA supports this new approach to solid waste management because it encompasses three interrelated components that are key to successful community programs:

Environmental sustainability. Communities with programs in place have reported significant increases in recycling and reductions in waste, due primarily to the waste reduction incentive created by PAYT. Less waste and more recycling mean that fewer natural resources need to be extracted.

In addition, greenhouse gas emissions associated with the manufacture, distribution, use, and subsequent disposal of products are reduced as a result of the increased recycling and waste reduction PAYT encourages. In this way, PAYT helps slow the buildup of greenhouse gases in the Earth's atmosphere which leads to global climate change. For more information on the link between solid waste and global climate change, go to EPA's Climate Change and Waste Web site.

Economic sustainability. PAYT is an effective tool for communities struggling to cope with soaring municipal solid waste management expenses. Well-designed programs generate the revenues communities need to cover their solid waste costs, including the costs of such complementary programs as recycling and composting. Residents benefit, too, because they have the opportunity to take control of their trash bills.

Equity. One of the most important advantages of a variable-rate program may be its inherent fairness. When the cost of managing trash is hidden in taxes or charged at a flat rate, residents who recycle and prevent waste subsidize their neighbors' wastefulness. Under PAYT, residents pay only for what they throw away.

EPA believes that the most successful programs bring these components together through a process of careful consideration and planning. This Web site was developed as part of EPA's ongoing efforts to provide information and tools to local officials, residents, and others interested in PAYT.

Source Reduction (Waste Prevention)

Source reduction can be a successful method of reducing waste generation. Practices such as grass-cycling, backyard composting, two-sided copying of paper, and transport packaging reduction by industry have yielded substantial benefits through source reduction.

Source reduction has many environmental benefits. It prevents emissions of many greenhouse gases, reduces pollutants, saves energy, conserves resources, and reduces the need for new landfills and combustors.

You can find the current EPA waste regulations in the rear of this manual.

Combustion/Incineration

In incinerators of conventional design, refuse is burned on moving grates in refractory-lined chambers; combustible gases and the solids they carry are burned in secondary chambers. Combustion is 85 to 90 percent complete for the combustible materials.

In addition to heat, the products of incineration include the normal primary products of combustion—carbon dioxide and water—as well as oxides of sulfur and nitrogen and other gaseous pollutants; nongaseous products are fly ash and unburned solid residue. Emissions of fly ash and other particles are often controlled by wet scrubbers, electrostatic precipitators, and bag filters.

Burning MSW can generate energy while reducing the amount of waste by up to 90 percent in volume and 75 percent in weight.

EPA's Office of Air and Radiation is primarily responsible for regulating combustors because air emissions from combustion pose the greatest environmental concern.

In 1999, in the United States, there were 102 combustors with energy recovery with the capacity to burn up to 96,000 tons of MSW per day.

Resource Recovery

Numerous thermal processes, now in various stages of development, recover energy in one form or another from solid waste.

These systems fall into two groups: combustion processes and pyrolysis processes. A number of companies burn in-plant wastes in conventional incinerators to produce steam. A few municipalities produce steam in incinerators in which the walls of the combustion chamber are lined with boiler tubes; the water circulated through the tubes absorbs heat generated in the combustion chamber and produces steam.

Pyrolysis, also called destructive distillation, is the process of chemically decomposing solid wastes by heat in an oxygen-reduced atmosphere. This results in a gas stream containing primarily hydrogen, methane, carbon monoxide, carbon dioxide, and various other gases and inert ash, depending on the organic characteristics of the material being pyrolyzed.

Landfills

Sanitary landfill is the cheapest satisfactory means of disposal, but only if suitable land is within economic range of the source of the wastes; typically, collection and transportation account for 75 percent of the total cost of solid waste management. In a modern landfill, refuse is spread in thin layers, each of which is compacted by a bulldozer before the next is spread. When about 3 m (about 10 ft) of refuse has been laid down, it is covered by a thin layer of clean earth, which also is compacted. Pollution of surface and groundwater is minimized by lining and contouring the fill, compacting and planting the cover, selecting proper soil, diverting upland drainage, and placing wastes in sites not subject to flooding or high groundwater levels. Gases are generated in landfills through anaerobic decomposition of organic solid waste. If a significant amount of methane is present, it may be explosive; proper venting eliminates this problem.

RCRA

Under the Resource Conservation and Recovery Act (**RCRA**), state, tribal, and local governments primarily regulate landfills that accept MSW. EPA, however, has established national standards these landfills must meet in order to stay open. Municipal landfills can, however, accept household hazardous waste.

The number of landfills in the United States is steadily decreasing—from 8,000 in 1988 to 2,300 in 1999. The capacity, however, has remained relatively constant. New landfills are much larger than in the past.
Hazardous wastes have been defined by the federal Environmental Protection Agency as wastes that pose a potential hazard to humans or other living organisms for one or more of the following reasons:
(1) Such wastes are non-degradable or persistent in nature;
(2) their effects can be magnified by organisms in the environment;
(3) they can be lethal; or
(4) they may cause detrimental cumulative effects. General categories of hazardous wastes include toxic chemicals and flammable, radioactive, or biological substances. These wastes can be in the form of sludge, liquid, or gas, and solid.

Problems

Radioactive substances are hazardous because prolonged exposure to ionizing radiation often results in damage to living organisms), and the substances may persist over long periods of time. Management of radioactive and other hazardous wastes is subject to federal and state regulation, but no satisfactory method has yet been demonstrated for disposing permanently of radioactive wastes.

Resource Conservation and Recovery Act

The Resource Conservation and Recovery Act (**RCRA**) was enacted by Congress in 1976 and amended in 1984. The act's primary goal is to protect human health and the environment from the potential hazards of waste disposal. In addition, RCRA calls for conservation of energy and natural resources, reduction in waste generated, and environmentally sound waste management practices.

Hurricane Debris

Hurricanes generate high-velocity winds, cause oceans to surge well above high tide levels, and create waves in inland waters. Hurricanes leave behind debris made up of construction materials, damaged buildings, sediments, green waste, and personal property. Hurricane debris obstructs roads and disables electrical power and communication systems over wide areas.

Most of the damage and resulting debris is in the area where the hurricane first hits land; however, the destruction also can extend many miles inland. For example, in 1989, Hurricane Hugo made landfall at Charleston, South Carolina, and continued inland, causing great damage as it cut across the state and into North Carolina. The hurricane generated 400,000 tons of green waste in Mecklenburg County, North Carolina, 200 miles from Charleston.

This amount of green waste would have taken up two years of landfill capacity, while only two and a half years of capacity was available in the local landfill. The county considered burning the green waste, but rejected the idea to protect the county's air quality. Instead, all the debris was ground up into mulch and given away to local citizens and businesses for use.

Earthquake Debris

Earthquakes generate shock waves and displace the ground along fault lines. These seismic forces can bring down buildings and bridges in a localized area and damage buildings and other structures in a far wider area. Secondary damage from fires, explosions, and localized flooding from broken water pipes can increase the amount of debris. Earthquake debris includes building materials, personal property, and sediment from landslides.

Hard to believe, but as of 1/20/2002, Los Angeles is still collecting and managing debris from the Northridge earthquake that hit the city in January 1994. The amount of debris reached 3 million tons at the end of July 1995.Three months into the debris removal process, city officials decided to attempt to recycle as much of the debris as possible to conserve the remaining landfill capacity.

Most of the waste was construction and demolition (**C&D**) debris, which could be processed by local recycling businesses. City officials worked with the Federal Emergency Management Agency (**FEMA**) and local businesses to expand existing recycling capacity and approve permits, thereby enhancing the ability of these businesses to meet the city's waste management needs. The city developed contracts with existing businesses, provided them with clean source-separated materials, and piloted a project to recycle mixed debris. After one year, the city had created more than 10,000 tons of new, privately operated daily processing capacity for mixed and source-separated debris.

Tornado debris

Damage from tornadoes is caused by high-velocity rotating winds. The severity of the damage depends on the size of the tornado funnel and the length of time the funnel touches the ground. Damage is generally confined to a narrow path extending up to half a mile wide and from a hundred yards to several miles long. Tornado debris includes damaged and destroyed structures, green waste, and personal property.

The city of Sandusky, Ohio, did not have a plan for managing disaster debris when a tornado hit in July 1992. Cleanup took about two and a half months and involved approximately 600 tons of waste, most of which was green waste.

City officials found that the two greatest obstacles to managing the debris were communicating instructions to residents and sorting the green waste to maximize chipping and mulching efficiency.

Flood debris

Debris from floods is caused by structural inundation and high-velocity water flow. As soon as flood waters recede, people begin to dispose of flood-damaged household items. Mud, sediment, sandbags, and other reinforcing materials also add to the volume of debris needing management, as do materials from demolished and dismantled houses.

After the Midwest flood in the summer of 1993, officials in Lincoln County, Missouri, handled the flood debris through drop-off centers as well as county collection. The debris included appliances, wood, shingles, insulation, tires, materials containing asbestos, and household hazardous waste. To comply with state solid waste regulations and county recycling goals, county staff and contractors segregated the debris by waste type.

Scrap dealers picked up the appliances, and individuals salvaged the wood. Tires were cut in half for disposal in approved landfills or ground for roadside use. After the flood, the state of Missouri temporarily set aside its recycling policy, which prohibited landfilling of compostable materials, so that communities could landfill leaves and yard waste. A hazardous waste contractor collected and disposed of household hazardous waste.

Fire debris

While fires leave less debris than other types of disasters, they still generate much waste. For example, demolished houses contribute noncombustible debris. Burned out cars and other metal objects, as well as ash and charred wood waste, also must be managed. In addition, large-scale loss of plants serving as ground cover can lead to mud slides, adding debris to the waste stream.

In Malibu, California, one of the communities hit hardest in 1993 by coastal fires, 268 houses were destroyed; most of them burned to their foundations. Malibu removed fallen trees as well as dead trees that might have fallen on roads or homes, and chipped the trees for mulch.

The city left other dead trees standing to help prevent erosion. The city gave property owners six weeks to remove their own debris, then began removing remaining household debris. In clearing the fire debris from about 175 properties, the city collected the same amount of solid waste normally collected in an entire year. The city recycled some concrete and asphalt and lifted daily landfill limits to accommodate the rest of the debris.

Carpet

Along with the many benefits of carpet come a number of environmental considerations--including issues of material use, production wastes, indoor air quality, and ultimately, carpet disposal. The disposal issues surrounding used carpet are of concern because of carpet's relatively significant contribution to the nation's waste stream and the inherent difficulties with its recycling. Approximately 4 billion pounds of carpet are discarded every year in the United States, accounting for 1.1% of all municipal solid waste by weight, or about 2% by volume.

The bulky nature of carpet and the variety of materials used in its manufacture often create handling, collection, and recycling problems for local and state governments.

The carpet industry has been increasingly involved in developing solutions to these issues; however, much work remains to be done. Though still in their infancy, the leasing, refurbishing, and recycling programs now being offered to commercial buyers of modular carpet have begun to lead the way toward genuine product stewardship for carpet.

Understanding Carpet

Carpet is a composite product made from face fibers that are bonded to primary and secondary backing material, usually with an adhesive. Manufacturers make carpet from different face fibers, which makes carpet recycling programs more challenging, as most carpet recyclers only accept carpet made from a particular type of face fiber. The most common face fibers (and their respective percentage of the carpet market) are: nylon (57%), polypropylene "Olefin" (36%), polyester "**PET**" (7%), and wool (.4%).

Residential carpet comes in broad rolls and is typically placed over separate padding, whereas commercial carpet often integrates padding into its backing and comes in rolls or square tiles. While used pad is often recycled, most residential and commercial carpet is currently landfilled.

Because of its oversized and bulky nature, carpet is rarely used for waste-to-energy incineration, despite its high BTU value. Other management options are becoming available, however, particularly on the commercial side.

Reuse/Refurbishment

Due to the durable nature of carpet, direct reuse represents a good option. Carpet is often replaced long before it has become unusable. Good quality used carpet can be sold or donated to charities or building material reuse centers. Some carpet may also be refurbished by taking it back for cleaning, retexturing, and dyeing. The use of leasing programs for carpet, as opposed to the transfer of ownership through direct sale, would increase the reconditioning and reuse of carpet, but leasing is still extremely uncommon.

Recycling(carpet)

Some carpet recycling initiatives are underway. However, there are a number of barriers to effective recycling of carpet. The infrastructure for collection and processing of discarded carpet, especially from residential sources, is not well established, though it is growing. In addition, carpet manufacturers and recyclers have been concentrated in the southeastern United States, resulting in logistical issues for carpet recycling in other parts of the country. Inadequate markets for some resins, such as nylon 6,6, are a concern as well.

Building Products

Manufacturers, retailers, and consumers of building products are beginning to explore different ways of reducing the environmental footprint of these products. A broad range of products fall into this category. In the United States, some retailers of wood and wood products are looking at ways to promote wood reuse and recycling, along with the use of wood fiber substitutes.

Other groups are working together to develop standards for recycled plastic lumber. In Canada, the governments of Quebec and British Columbia have launched take back schemes for used paints.

The building products industry will likely be a fertile area for future product stewardship initiatives. Read on to learn about the environmental innovators in this industry.

You can find more about these areas and about the regulations in the rear of this manual.

Freon and Ozone Depleting Chemical Disposal

One of the single largest uses of chlorofluorocarbons (**CFCs**) in the United States is as a refrigerant in air conditioners, refrigerators and freezers. These CFCs are more commonly known as Freon. If improperly handled during the servicing of air conditioners, refrigerators and freezers Freon will be released into the atmosphere.

Effective July 1, 1992, new federal laws made it illegal to knowingly release refrigerants such as Freon into the atmosphere during the repair, servicing, maintenance, or disposal of refrigeration and air conditioning equipment. The refrigerant must be recovered by a qualified technician.

Do

Recycle waste Freon on the premises using EPA-certified recycling or recovery equipment.

Keep records of the dates and quantities of Freon recovered and recycled.

Manage filters from Freon recovery equipment as hazardous waste.

Don't

Don't evaporate or vent Freon to the atmosphere. ***This is illegal!***

Environmental Terms, Abbreviations, and Acronyms

TLC provides a glossary that defines in non-technical language commonly used environmental terms appearing in publications and materials. It also explains abbreviations and acronyms used throughout EPA and other agencies. You can find this in the rear of the manual

Recommended Sources for MSW Information

- *Background Press Information On Municipal Solid Waste Management* This series of documents has been organized to assist reporters covering municipal solid waste management issues. They provide background information on EPA's solid waste reduction and recycling goals.
- *Municipal Solid Waste in the United States: 1999 Facts and Figures:* Describes the national MSW stream based on data collected between 1960 and 1999. Includes information on MSW generation, recovery, and discard quantities; per capita generation and discard rates; residential and commercial portions of MSW generation; and the role of source reduction and other trends in MSW management.
- *Decision-Maker's Guide to Solid Waste Management, Volume II:* Contains technical and economic information to assist solid waste management practitioners in planning, managing, and operating MSW programs and facilities. Includes suggestions for best practices when planning or evaluating waste and recycling collection systems, source reduction and composting programs, public education, and landfill and combustion issues.

- Freon and ozone depleting chemicals (**ODC**) must be reclaimed and recycled.
- Failure to do so is a violation of federal law, state law, and university policy.
- Several landfills have personnel that are trained, equipped, and certified for handling these chemicals.

Empty Drum of CFC 11

ODC: Chloroform and Carbon Tetrachloride

Example of a compressor unit from a refrigeration unit. The Freon will be reclaimed before this unit is recycled for scrap metal.

The Freon from these refrigerators was reclaimed and recycled. The metal will also be recycled.

Vehicles

With an estimated 700 million cars, trucks, and other vehicles on the road worldwide, the impact of these products on the environment cannot be underestimated. And it is not just exhaust emissions that are cause for concern.

Vehicles require a lot of energy and materials to make, consume a lot of energy when used, and present unique waste disposal challenges at end-of-life. Indeed, with roughly 10.5 million vehicles reaching the end of their useful lives each year in the United States alone, what to do with all the non-readily reusable or recyclable "***stuff***" that makes up a car or truck is a huge challenge in and of itself.

From cradle to grave, the collective toll from vehicles on our natural world is perhaps more than that of any other consumer product today.
The good news is that steps are being taken to lessen the impact of vehicles on the environment. Some of the advances seen thus far, aside from improved fuel efficiency and the emergence of electric and hybrid automobiles, stem from vehicle recycling, cleaner manufacturing processes, and better design for servicing (e.g., less frequent oil changes) and re-manufacturing of parts (e.g., oil caps).

In fact, the automobile industry estimates that in the United States, 75 percent of a vehicle's weight is now being recycled (the percentage is far less by volume).

Much of the reclaimed materials end up in new vehicles. The parts most commonly recycled are ferrous and non-ferrous metal components-the chassis, engine block, radiator, etc.

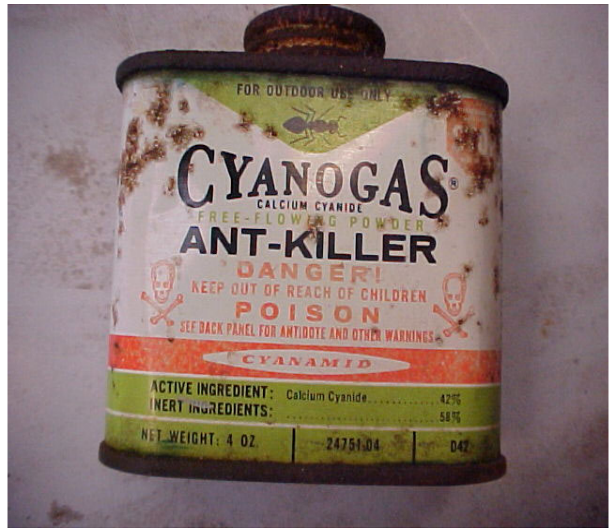
Components that are rarely recycled include the mixed plastics, fibers, and foam (collectively referred to as "**fluff"**), potentially hazardous materials like oils and anti-freeze, and non-hazardous materials such as tires. But industry is now starting to focus on these areas as well.

The European Union has passed laws to hold producers responsible for their cars post-life, through mandatory take back and recycling programs. No other countries are known to have producer responsibility legislation related to vehicles.

Several countries and political subdivisions (e.g., provinces, states, etc.), however, are considering establishing end-of-life vehicle stewardship programs.

Whereas most vehicle lifecycle analyses focus on auto emissions and fuel efficiency, this section will concentrate on the materials aspect of cars and trucks.

Federal Insecticide, Fungicide, and Rodenticide Act



7 U.S.C. s/s 136 et seq. (1972)
The primary focus of FIFRA was to provide federal control of pesticide distribution, sale, and use. EPA was given authority under FIFRA not only to study the consequences of pesticide usage but also to require users (farmers, utility companies, and others) to register when purchasing pesticides.

Through later amendments to the law, users also must take exams for certification as applicators of pesticides. All pesticides used in the U.S. must be registered (licensed) by EPA. Registration assures that pesticides will be properly labeled and that if in accordance with specifications, will not cause unreasonable harm to the environment.

The Resource Conservation and Recovery Act (RCRA)

The Resource Conservation and Recovery Act (**RCRA**) was enacted in 1976 to address the issue of how to safely manage and dispose of the huge volumes of municipal and industrial waste generated nationwide. The RCRA program is administered by EPA's Office of Solid Waste (**OSW**). Subtitles C and D of RCRA set forth the framework for EPA's comprehensive waste management program:

- RCRA Subtitle C establishes the regulatory structure for managing hazardous waste from the time it is generated until its ultimate disposal.
- RCRA Subtitle D establishes a system for managing solid (primarily nonhazardous) waste, such as household waste.

RCRA Subtitle I regulates underground storage tanks (**USTs**) that store petroleum or hazardous substances.

The Call Center also responds to requests for relevant publications and information resources. To speak with Information Specialists about regulatory questions or to order publications, call: (800) 424-9346.

FACTOR	TYPE	SOURCE(S)	PROBLEM
FECAL COLIFORM BACTERIA	BIOLOGICAL	HUMAN SEWAGE; LIVESTOCK WASTE	POSSIBLE PRESENCE OF PATHOGENIC (DISEASE-CAUSING) ORGANISMS
DISSOLVED OXYGEN (DO)	CHEMICAL	AIR; AQUATIC PLANTS	LOW LEVELS CAN KILL AQUATIC ORGANISMS
NITROGEN AND PHOSPHORUS	CHEMICAL	FERTILIZERS AND DETERGENTS FROM LAWNS AND RUNOFF	EXCESSIVE ALGAE GROWTH CAN LEAD TO LOW DO
ZINC, ARSENIC, LEAD, MERCURY, CADMIUM, NICKEL	CHEMICAL	LANDFILLS; INDUSTRIAL DISCHARGES; RUNOFF	GENETIC MUTATIONS OR DEATH IN FISH & WILDLIFE (HUMAN HEALTH THREATS AS WELL)
SALT	CHEMICAL	SALTWATER INTRUSION (IF NEAR OCEAN)	KILLS FRESHWATER SPECIES OF PLANTS AND ANIMALS
MUD, SAND, OTHER SOLID PARTICLES (TURBIDITY)	PHYSICAL	EROSION AND RUNOFF FROM DEVELOPMENT; AGRICULTURE	REDUCES PHOTOSYNTHESIS IN AQUATIC VEGETATION; INTERFERES WITH RESPIRATION IN AQUATIC ANIMALS

WATER QUALITY FACTORS

THIS DATA CURRENT AS OF THE FEDERAL REGISTER DATED JANUARY 10, 2002

40 CFR - CHAPTER I - PART 258

§ 258.2 Definitions

Unless otherwise noted, all terms contained in this part are defined by their plain meaning. This section contains definitions for terms that appear throughout this part; additional definitions appear in the specific sections to which they apply.

Active life means the period of operation beginning with the initial receipt of solid waste and ending at completion of closure activities in accordance with § 258.60 of this part.

Active portion means that part of a facility or unit that has received or is receiving wastes and that has not been closed in accordance with § 258.60 of this part.

Aquifer means a geological formation, group of formations, or portion of a formation capable of yielding significant quantities of ground water to wells or springs.

Commercial solid waste means all types of solid waste generated by stores, offices, restaurants, warehouses, and other non-manufacturing activities, excluding residential and industrial wastes.

Director of an Approved State means the chief administrative officer of a state agency responsible for implementing the state permit program that is deemed to be adequate by EPA under regulations published pursuant to sections 2002 and 4005 of RCRA.

Existing MSWLF unit means any municipal solid waste landfill unit that is receiving solid waste as of the appropriate dates specified in § 258.1(e). Waste placement in existing units must be consistent with past operating practices or modified practices to ensure good management.

Facility means all contiguous land and structures, other appurtenances, and improvements on the land used for the disposal of solid waste.

Ground water means water below the land surface in a zone of saturation.

Household waste means any solid waste (including garbage, trash, and sanitary waste in septic tanks) derived from households (including single and multiple residences, hotels and motels, bunkhouses, ranger stations, crew quarters, campgrounds, picnic grounds, and day-use recreation areas).

Indian lands or *Indian country* means:

(1) All land within the limits of any Indian reservation under the jurisdiction of the United States Government, notwithstanding the issuance of any patent, and including rights-of-way running throughout the reservation;

(2) All dependent Indian communities within the borders of the United States whether within the original or subsequently acquired territory thereof, and whether within or without the limits of the State; and

(3) All Indian allotments, the Indian titles to which have not been extinguished, including rights of way running through the same.

Indian Tribe or *Tribe* means any Indian tribe, band, nation, or community recognized by the Secretary of the Interior and exercising substantial governmental duties and powers on Indian lands.

Industrial solid waste means solid waste generated by manufacturing or industrial processes that is not a hazardous waste regulated under subtitle C of RCRA. Such waste may include, but is not limited to, waste resulting from the following manufacturing processes: Electric power generation; fertilizer/agricultural chemicals; food and related products/by-products; inorganic chemicals; iron and steel manufacturing; leather and leather products; nonferrous metals manufacturing/foundries; organic chemicals; plastics and resins manufacturing; pulp and paper industry; rubber and miscellaneous plastic products; stone, glass, clay, and concrete products; textile manufacturing; transportation equipment; and water treatment. This term does not include mining waste or oil and gas waste.

Lateral expansion means a horizontal expansion of the waste boundaries of an existing MSWLF unit.

Leachate means a liquid that has passed through or emerged from solid waste and contains soluble, suspended, or miscible materials removed from such waste.

Municipal solid waste landfill unit means a discrete area of land or an excavation that receives household waste, and that is not a land application unit, surface impoundment, injection well, or waste pile, as those terms are defined under § 257.2. A MSWLF unit also may receive other types of RCRA subtitle D wastes, such as commercial solid waste, non-hazardous sludge, conditionally exempt small quantity generator waste and industrial solid waste. Such a landfill may be publicly or privately owned. A MSWLF unit may be a new MSWLF unit, an existing MSWLF unit or a lateral expansion.

New MSWLF unit means any municipal solid waste landfill unit that has not received waste prior to October 9, 1993, or prior to October 9, 1997 if the MSWLF unit meets the conditions of § 258.1(f)(1).

Open burning means the combustion of solid waste without:

(1) Control of combustion air to maintain adequate temperature for efficient combustion,

(2) Containment of the combustion reaction in an enclosed device to provide sufficient residence time and mixing for complete combustion, and

(3) Control of the emission of the combustion products.

Operator means the person(s) responsible for the overall operation of a facility or part of a facility.

Owner means the person(s) who owns a facility or part of a facility.

Run-off means any rainwater, leachate, or other liquid that drains over land from any part of a facility.

Run-on means any rainwater, leachate, or other liquid that drains over land onto any part of a facility.

Saturated zone means that part of the earth's crust in which all voids are filled with water.

Sludge means any solid, semi-solid, or liquid waste generated from a municipal, commercial, or industrial wastewater treatment plant, water supply treatment plant, or air pollution control facility exclusive of the treated effluent from a wastewater treatment plant.

Solid waste means any garbage, or refuse, sludge from a wastewater treatment plant, water supply treatment plant, or air pollution control facility and other discarded material, including solid, liquid, semi-solid, or contained gaseous material resulting from industrial, commercial, mining, and agricultural operations, and from community activities, but does not include solid or dissolved materials in domestic sewage, or solid or dissolved materials in irrigation return flows or industrial discharges that are point sources subject to permit under 33 U.S.C. 1342, or source, special nuclear, or by-product material as defined by the Atomic Energy Act of 1954, as amended (68 Stat. 923).

State means any of the several States, the District of Columbia, the Commonwealth of Puerto Rico, the Virgin Islands, Guam, American Samoa, and the Commonwealth of the Northern Mariana Islands.

State Director means the chief administrative officer of the lead state agency responsible for implementing the state permit program for 40 CFR part 257, subpart B and 40 CFR part 258 regulated facilities.

Uppermost aquifer means the geologic formation nearest the natural ground surface that is an aquifer, as well as, lower aquifers that are hydraulically interconnected with this aquifer within the facility's property boundary.

Waste management unit boundary means a vertical surface located at the hydraulically down gradient limit of the unit. This vertical surface extends down into the uppermost aquifer.

[56 FR 51016, Oct. 9, 1991; 57 FR 28627, June 26, 1992, as amended at 58 FR 51547, Oct. 1, 1993; 60 FR 52342, Oct. 6, 1995; 63 FR 57044, Oct. 23, 1998]

You can find the current EPA waste regulations in the rear of this manual.

Chapter 2 Municipal Solid Waste Exercise

This is not your final assignment but an exercise for you to understand the purpose of this course. You can find the final examination on our website under Assignments. It is a multiple choice exam.

You are to find the best possible answer from 40 CFR - CHAPTER I - PART 258§ Definitions section. (1 point each)

1. __________________ means the person(s) responsible for the overall operation of a facility or part of a facility.

2. ___________________________means solid waste generated by manufacturing or industrial processes that is not a hazardous waste regulated under subtitle C of RCRA. Such waste may include, but is not limited to, waste resulting from the following manufacturing processes: Electric power generation; fertilizer/agricultural chemicals; food and related products/by-products; inorganic chemicals; iron and steel manufacturing; leather and leather products; nonferrous metals manufacturing/foundries; organic chemicals; plastics and resins manufacturing; pulp and paper industry; rubber and miscellaneous plastic products; stone, glass, clay, and concrete products; textile manufacturing; transportation equipment; and water treatment.

3. _________________means the period of operation beginning with the initial receipt of solid waste and ending at completion of closure activities in accordance with § 258.60 of this part.

4. _________________ means all contiguous land and structures, other appurtenances, and improvements on the land used for the disposal of solid waste.

5. _______________ means a liquid that has passed through or emerged from solid waste and contains soluble, suspended, or miscible materials removed from such waste.

6. _______________ means a geological formation, group of formations, or portion of a formation capable of yielding significant quantities of ground water to wells or springs.

7. ____________________________means all types of solid waste generated by stores, offices, restaurants, warehouses, and other non-manufacturing activities, excluding residential and industrial wastes.

8. ____________________ means any municipal solid waste landfill unit that is receiving solid waste as of the appropriate dates specified in § 258.1(e). Waste placement in existing units must be consistent with past operating practices or modified practices to ensure good management.

9. ____________________________means any solid waste (including garbage, trash, and sanitary waste in septic tanks) derived from households (including single and multiple residences, hotels and motels, bunkhouses, ranger stations, crew quarters, campgrounds, picnic grounds, and day-use recreation areas).

10. _________________________________ means a discrete area of land or an excavation that receives household waste, and that is not a land application unit, surface impoundment, injection well, or waste pile, as those terms are defined under § 257.2. A MSWLF unit also may receive other types of RCRA subtitle D wastes, such as commercial solid waste, non-hazardous sludge, conditionally exempt small quantity generator waste and industrial solid waste.

11. ______________________________means the geologic formation nearest the natural ground surface that is an aquifer, as well as, lower aquifers that are hydraulically interconnected with this aquifer within the facility's property boundary.

12.__________________________________ means a vertical surface located at the hydraulically down gradient limit of the unit. This vertical surface extends down into the uppermost aquifer.

13._________________________________means the person(s) who owns a facility or part of a facility.

14.___________________________ means any rainwater, leachate, or other liquid that drains over land from any part of a facility.

15. ________________________means any solid, semi-solid, or liquid waste generated from a municipal, commercial, or industrial wastewater treatment plant, water supply treatment plant, or air pollution control facility exclusive of the treated effluent from a wastewater treatment plant.

16. Definition of Solid waste

17. **Scenario:** Since you did such an outstanding job as a Pollution Control Inspector, your Director has placed you in a jobsharing program. Fortunately, you were placed as the Solid Waste Director. The City Manager would like for you to name and describe five different problems for a municipal waste collection facility (landfill) these can be materials that are difficult to handle or dispose of properly or governmental regulations.

18. Describe a remedy or plan of action for each of these problems.

19. The City Manager would like for you to produce a summary about RCRA for the City Council. This summary needs to be in plain English, easy to read and understandable. This summary will be a foundation for a series of newspaper articles that will be used to explain the need to raise the waste collection customer bill (sanitation or trash bill) for RCRA requirements. The City Manager is anticipating a negative impact for this campaign and would like to minimize the damage.

Chapter 3 Household Hazardous Waste

Household Hazardous Waste

Common household items such as paints, cleaners, oils, batteries, and pesticides contain hazardous components. One way to help determine if your household waste has hazardous components is to read the labels on products. Labels that read danger, warning, caution, toxic, corrosive, flammable, or poison identify products that might contain hazardous materials. Leftover portions of these products are called household hazardous waste (**HHW**). These products, if mishandled, can be dangerous to your health and the environment.

Although we cannot completely stop using hazardous products, we can make sure that leftovers are managed properly. The best way to handle HHW is to reduce the amount initially generated by giving leftover products to someone else to use.

To deal with household hazardous waste, many communities have set up collection programs to prevent HHW from being disposed of in MSW landfills and combustors. These programs ensure the safe disposal of HHW in facilities designed to treat or dispose of hazardous waste. More than 3,000 HHW collection programs exist in the United States.

Overview

Leftover household products that contain corrosive, toxic, ignitable, or reactive ingredients are considered to be "**household hazardous waste**" or "**HHW**." Products, such as paints, cleaners, oils, batteries, and pesticides that contain potentially hazardous ingredients require special care when you dispose of them. Improper disposal of household hazardous wastes can include pouring them down the drain, on the ground, into storm sewers, or in some cases putting them out with the trash.

The dangers of such disposal methods might not be immediately obvious, but improper disposal of these wastes can pollute the environment and pose a threat to human health. Many communities in the United States offer a variety of options for conveniently and safely managing HHW.

HHW Reduction, Reuse, Recycling, and Disposal Options

The options of reduction, reuse, recycling, and disposal—listed in order of EPA's preferred waste management hierarchy—are all important tools to safely manage HHW.

The following information can help you determine the best ways to reduce, reuse, or dispose of common household products that may contain hazardous ingredients. Each community is different, so check with your local environmental, health, or solid waste agency for more information on HHW management options in your area.

Americans generate 1.6 million tons of HHW per year.

- The average home can accumulate as much as 100 pounds of HHW in the basement and garage and in storage closets.

During the 1980s, many communities started special collection days or permanent collection sites for handling HHW. In 1997, there were more than 3,000 HHW permanent programs and collection events throughout the United States.

List of Common HHW Products

The following list shows common household items containing potentially hazardous ingredients that might be found in your garage, basement, or other storage space in your home.

Cleaning Products
- Oven cleaners
- Drain cleaners
- Wood and metal cleaners and polishes
- Toilet cleaners
- Tub, tile, shower cleaners
- Bleach (laundry)
- Pool chemicals

Automotive Products
- Motor oil
- Fuel additives
- Carburetor and fuel injection cleaners
- Air conditioning refrigerants
- Starter fluids
- Automotive batteries
- Transmission and brake fluid
- Antifreeze

Lawn and Garden Products
- Herbicides
- Insecticides
- Fungicides/wood preservatives

Other Flammable Products
- Propane tanks and other compressed gas cylinders
- Kerosene
- Home heating oil
- Diesel fuel
- Gas/oil mix
- Lighter fluid

Indoor Pesticides
- Ant sprays and baits
- Cockroach sprays and baits
- Flea repellents and shampoos
- Bug sprays
- Houseplant insecticides
- Moth repellents
- Mouse and rat poisons and baits

Workshop/Painting Supplies
- Adhesives and glues
- Furniture strippers
- Oil or enamel based paint
- Stains and finishes
- Paint thinners and turpentine
- Paint strippers and removers
- Photographic chemicals
- Fixatives and other solvents

Miscellaneous
- Batteries
- Mercury thermostats or thermometers
- Fluorescent light bulbs
- Driveway sealer

Reduction at Home

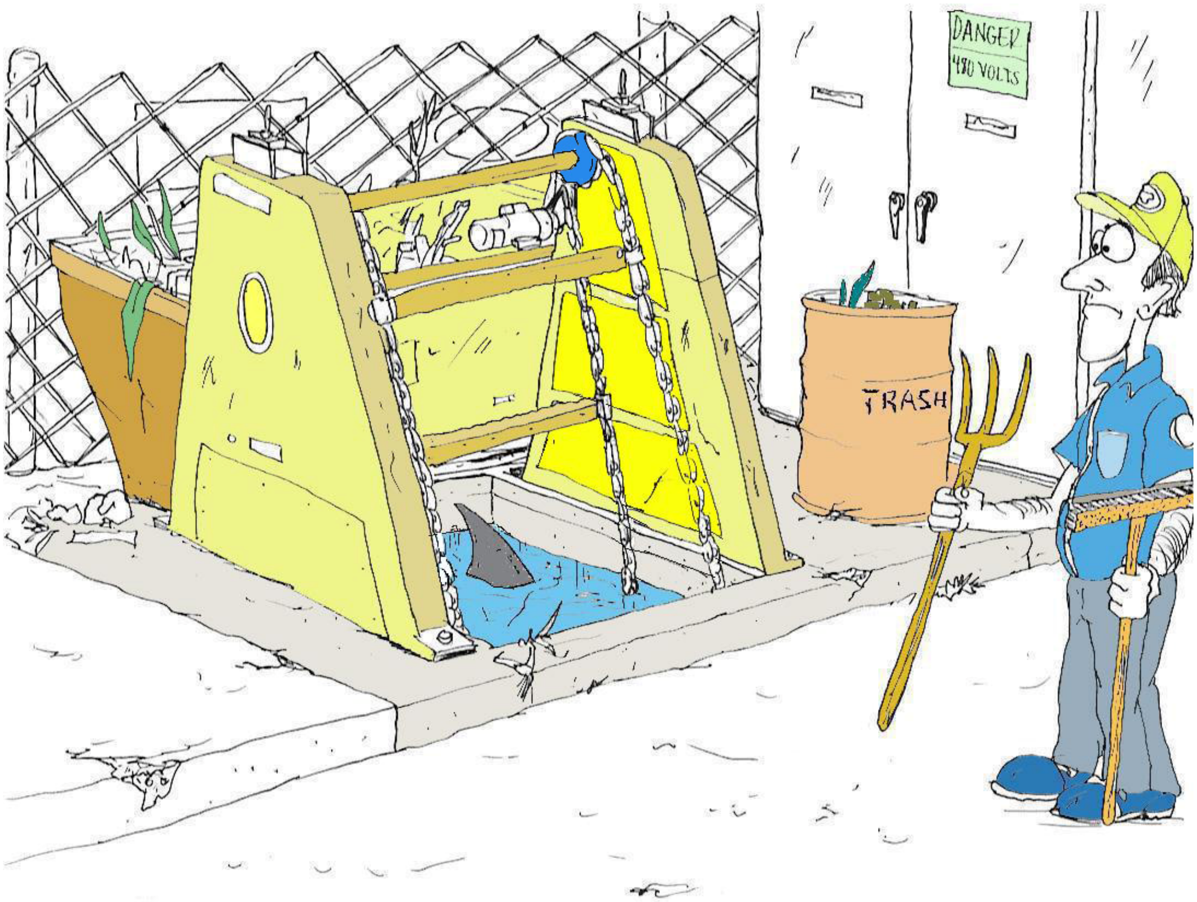
Consider reducing your purchase of products that contain hazardous ingredients. Learn about the use of alternative methods or products—without hazardous ingredients—for some common household needs.

Benefits of Proper HHW Management

- Reduction and recycling of HHW conserves resources and energy that would be expended in the production of more products.

- Reuse of hazardous household products can save money and reduce the need for generating hazardous substances.

- Proper disposal prevents pollution that could endanger human health and the environment.



Household Hazardous Waste Disposal Guide

Key to Guide

Type of Hazard		Disposal Option	
Poison!	☠	Take to Hazardous Waste Disposal Facility	Ⓕ
Corrosive!	✋	Call for Local Disposal	✆
Flammable	🔥		
Environmental Hazard	🐟		

Do not dispose of the following household hazardous waste items in the trash, in the sewer or on the ground.

Automotive

Auto batteries	✆	✋	🐟
Carburetor cleaner	Ⓕ	🔥	☠
Degreasers	Ⓕ	🔥	☠
Fuels	Ⓕ		🔥
Gasoline	Ⓕ		🔥
Oil Filters	✆		🐟
Used Antifreeze	✆		☠
Used Motor Oil	✆		🐟

Lawn and Garden

Bug Spray	Ⓕ		
Charcoal lighter fluid	Ⓕ	🔥	
Fertilizer *w/weed killer*	Ⓕ	☠	
Insect Killer	Ⓕ	☠	
Pool Chemicals	Ⓕ	✋	☠
Roach/Ant Killer	Ⓕ		☠
Rodent Bait	Ⓕ		☠
Weed Killer	Ⓕ		☠

Household Items

Aerosol Products*	Ⓕ	🔥	
Button Batteries	✆	🐟	
Batteries(rechargeable)	✆	🐟	
Drain Cleaners	Ⓕ		✋
Fluorescent Lights	✆		
Mothballs	Ⓕ		☠
Nail Polish/Remover	Ⓕ	🔥	

Home Improvements

Concrete Cleaner	Ⓕ		✋
Driveway Sealer	Ⓕ	🔥	
Furniture Stripper	Ⓕ	🔥	☠
Glue w/solvents	Ⓕ	🔥	
Latex Paint**	✆		🐟
Oil Based Paint	Ⓕ	🔥	
Paint Remover	Ⓕ	🔥	☠

Oven Cleaner	F	Paint Thinner	F
Polish w/solvents	F	Roofing Tar	F
Spot Removers	F	Stain/Varnish	F
Thermometers(mercury)	F	Wood Preservatives	F

Empty aerosols can be disposed of in the trash
** Whenever possible, dry out unusable latex pain and dispose of in the trash.

What Can I Do? Use it up! Store it carefully!

- Use products up before purchasing new products.
- Store hazardous products out of reach of children in a locked cupboard or high shelf.
- Purchase amounts that can be used up easily.
- Store in a dry place, and keep from freezing.
- Read and follow label safety directions.
- Store away from heat or flames.
- Do not use pesticides that are more than 10 years old, as they may be banned.
- Keep original label intact.
- If you can't use it up, follow the disposal guide for proper disposal.
- Store in original container.
- Do not mix products together.

Look for the following words on product labels:

caution! warning! danger! poison!

Mild to Moderately
Hazardous
Moderately Hazardous
Extremely Flammable,
Corrosive, or
Highly Toxic
Highly Toxic

To help protect the environment, choose the ***least hazardous product*** to get the job done.

Aerosol Evacuator Device, after spray cans have been evacuated, the metal is recycled.

Aerosol Information

1) Aerosol: small droplet or particle suspended in the atmosphere, typically containing sulfur. Aerosols are emitted naturally (e.g., in volcanic eruptions) and as the result of human activities (e.g., by burning fossil fuels). There is no connection between particulate aerosols and pressurized products also called aerosols (see below).

2) Aerosol: a product that relies on a pressurized gas to propel substances out of a container. Consumer aerosol products in the US have not used ozone-depleting substances (ODS) since the late 1970s because of voluntary switching followed by federal regulation. The Clean Air Act and EPA regulations further restricted the use of ODS for non-consumer products. All consumer products, and most other aerosol products, now use propellants that do not deplete the ozone layer, such as hydrocarbons and compressed gases.

Collection Options—Municipalities and Local Governments Facilitating Reuse, Recycling, and Proper Disposal

- Permanent collection or exchange. See if your community has a facility that collects HHW year-round. Some of these facilities have exchange areas for unused or leftover paints, solvents, pesticides, cleaning and automotive products, and other materials. By taking advantage of these facilities, materials can be used by someone else, rather than being thrown away.

Town of Sunflower
Household Products Collection Center
Waiver & Indemnification Form Example

Date: ___________________________

I, ____hereby make the following declarations:

I accept possession and title to the materials listed below:

Description of material	Size of Cont. (oz., liters, etc.)	# of Containers
i.e.: Latex Paint	Gallon	2
Spray Paint	16 oz.	3

1. I certify that any and all materials received from the **HPCC** will be used for Personal or non-profit purposes only, and will **NOT** be sold for profit to any person or business. I further certify that materials obtained from the **HPCC** will be used solely for their intended purpose(s). I also certify that any bulk latex paint materials received will be used for exterior applications only, as the **HPCC** program cannot certify that such materials do not contain harmful quantities of Lead, mercury or other hazardous ingredients.

2. I acknowledge that the above materials were collected from anonymous persons through **HPCC**. I further acknowledge that, because of the nature of that source, despite scrutiny and care by the **HPCC** staff, no guarantees or assurances as to material age, identity, character, condition, purity, or safety are made.

3. I further acknowledge that, even if the material is fresh and pure, some items such as pesticides can be dangerous, and that I and anyone else who uses such material have a duty to use appropriate safety equipment, follow label instructions and take other such precautions as dictated by prudence and the law. I agree a duty to safely and legally dispose of the materials and their containers at such time as the material is no longer needed or usable.

4. I hereby agree to indemnify, defend and hold harmless the Town of Sunflower officers, officials, employees and agents from any and all costs, claims or liability of any nature arising due to the storage, use, disposal, and/or transportation of the above listed materials and hereby waive any claims against those same parties arising out of said storage, use, disposal and/ or transport.

Signature:____

Address:____

Special Collection Days

If your community doesn't have a year-round collection system for HHW, see if there are any designated days in your area for collecting solid waste at a central location to ensure safe management and disposal.

- Local business collection sites. If your community has neither a permanent collection site nor a special collection day, you might be able to drop off certain products at local businesses for recycling or proper disposal. Some local garages, for example, may accept used motor oil for recycling.

PLANNING COLLECTION EVENT TIMELINE

	MONTHS PRIOR TO INITIAL EVENT						DAY OF EVENT		
TASK	**6-8**	**5**	**4**	**3**	**2**	**1**		**1**	**2**
HHW Collection Permits									
Planning Meeting									
Identify Site/Conduct Site Walk									
Prepare & Submit PBR Notification									
Prepare and Submit Ops Plan									
Ops Plan Review/Approval									
Insurance and Bonds									
Obtain Performance Bond									
Obtain Insurance Certificates									
HHW Collection Event Planning									
Arrange for Staffing									
Arrange for Transportation									
Arrange for Local Recyclers									
Coordinate and Load Equipment									
Prepare Paperwork and Manifests									
Set-up and Conduct HHW Event(s)									
Prepare and Submit Reports									

Disposal Options

Certain types of HHW have the potential to cause physical injury to sanitation workers, contaminate septic tanks or wastewater treatment systems if poured down drains or toilets, and present hazards to children and pets if left around the house. Some communities do allow disposal of HHW in trash, particularly those areas that do not yet have collection programs.

Call your local environmental, health, or solid waste agency for instructions on proper disposal. Follow their instructions and also read product labels for disposal directions to reduce the risk of products exploding, igniting, leaking, mixing with other chemicals, or posing other hazards on the way to a disposal facility. Even empty containers of HHW can pose hazards because of the residual chemicals that might remain.

Opportunities

To avoid the potential risks associated with household hazardous wastes, it is important that people always monitor the use, storage, and disposal of products with potentially hazardous substances in their homes. Below are some tips for individuals to follow in their own homes:

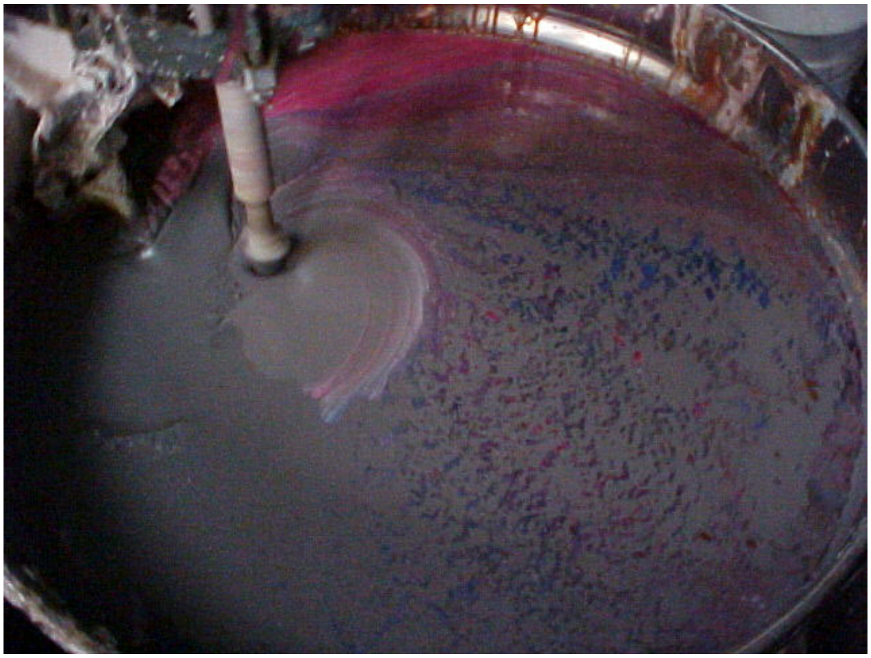
- Use and store products containing hazardous substances carefully to prevent any accidents at home. Never store hazardous products in food containers; keep them in their original containers and never remove labels. Corroding containers, however, require special handling. Call your local hazardous materials official or fire department for instructions.
- When leftovers remain, never mix HHW with other products. Incompatible products might react, ignite, or explode, and contaminated HHW might become un-recyclable.
- Remember to follow any instructions for use and disposal provided on product labels.

Call your local environmental, health or solid waste agency for instructions on proper use and disposal and to learn about local HHW drop off programs and upcoming collection days.

Some cities have resorted to calling their facilities and events, Household Products Collection Centers, thus dropping the unattractive word “Hazardous”.

Paint

Empty 1-Gallon Paint Can Crusher, Once the product has be drained into a 55-gallon drum, the can is crushed and the metal recycled



Collected latex paint being mixed and re-sold for graffiti removal. You can find several different markets to sell your used latex and oil based paint, even the sludge can be sold for wall texture and other purposes.

Paint drainage area with scrappers for sludge removal.

Automatic Paint Can Opener, may relive Work Related Muscle Injuries.

Mercury

Mercury is a naturally occurring substance that can cause serious health and ecological problems when released to the air, water, and soil through human activities. When mercury enters water (either through deposition from air or run-off from soil), biological processes transform it to a highly toxic form called methyl mercury, which builds up in fish and in animals that eat fish. People are exposed to mercury primarily by eating fish.

According to EPA's 1997 Mercury Study Report to Congress, coal-fired electric utilities are the largest source of human-caused mercury air emissions in the United States. However, mercury is also present in many products that become part of the solid waste stream, including fluorescent lamps, button batteries, thermostats, thermometers and other medical devices, pressure gauges, switches, relays, and dental supplies.

When solid waste is burned in a municipal solid waste or medical waste incinerator, the mercury that is present can be released to the atmosphere. EPA's 1997 report indicated that municipal and medical waste incinerators together account for 29 percent of human-caused mercury air emissions in the United States.

In recent years, there has been a growing focus on the need to decrease the use of mercury in household and commercial products and to prevent the mercury in existing products from entering the waste stream. Several states have passed legislation to reduce mercury in waste, relying on approaches such as banning the sale of certain mercury-added products, requiring product labeling, and implementing collection and recycling programs for some products.

In addition, numerous stewardship efforts have been initiated by government, industry, and non-governmental organizations, targeting a variety of mercury-containing products. Encouraging progress has been made on a number of fronts:

- **Batteries**—Since the early 1980s, battery manufacturers have reduced their use of mercury by over 98 percent.* Federal and state legislation, including the Mercury-Containing and Rechargeable Battery Management Act of 1996, has prohibited or severely restricted the sale of most types of mercury-containing batteries.
- **Thermometers**—Several states have banned the sale of mercury thermometers, and additional states are considering similar legislation.
- **Thermostats**—U.S. thermostat manufacturers have begun a program to collect used thermostats and recover the mercury they contain.
- **Medical waste**—EPA and the American Hospital Association have signed a Memorandum of Understanding that calls for the virtual elimination of mercury-containing hospital wastes.
- **Mercury-containing components in vehicles**—Maine's Department of Environmental Protection issued proposed legislation in October 2001 calling for a phase out in the use of mercury-added switches in vehicle hood and trunk lighting and in some antilock braking systems, and recommending that automakers be made responsible for the safe removal and management of mercury-added components from existing cars.
- Nationwide, several vehicle manufacturers have voluntarily reduced their use of mercury-containing switches in new models.

Fluorescent lamps—Since 1985, manufacturers have reduced the average mercury content of a typical four-foot fluorescent bulb by over 75 percent.** Manufacturers have also been researching mercury-free alternatives.

Grounded flammable drums, grounding is essential for all flammable fluids.

Batteries

Every year in the United States, billions of batteries are bought, used, and thrown out. In 1998 alone, over 3 billion industrial and household batteries were sold, and U.S. consumption of batteries is projected to increase by 5.8 percent annually through 2002. This growing demand for batteries can be traced largely to the rapid increase in cordless, portable products such as cellular phones, video cameras, laptop computers, and battery-powered tools and toys.

Because many batteries contain toxic constituents such as mercury and cadmium, they pose a potential threat to human health and the environment when improperly disposed. Though batteries generally make up only a tiny portion of municipal solid waste (**MSW**)--less than 1 percent--they account for a disproportionate amount of the toxic heavy metals in MSW. (One study showed that, as of 1989, consumer batteries contributed 88 percent of the mercury and 54 percent of the cadmium in MSW.) When MSW is incinerated or disposed of in landfills, under certain improper management scenarios, these toxics can be released into the environment.

Over the past decade, the battery industry, partly in response to public concerns and legislation, has played an active role in finding solutions to these problems. Industry efforts have touched on every stage of the product life cycle:

Redesign
Some battery manufacturers are redesigning their products to reduce or eliminate the use of toxic constituents. For example, since the early 1980s, manufacturers have reduced their use of mercury by over 98 percent. Many manufacturers are also designing batteries for a longer life.

You can find the current EPA battery waste regulations in the rear of this manual.

Reuse
Battery manufacturers are producing more rechargeable batteries each year, relative to the number of non-rechargeable batteries produced. The National Electrical Manufacturers Association has estimated that U.S. demand for rechargeables in growing twice as fast as demand for non-rechargeables.

Recycling

The effects of Lithium and water→

The Rechargeable Battery Recycling Corporation (**RBRC**) started a nationwide takeback program in 1994 for collection and recycling of used nickel-cadmium (**Ni-Cd**) batteries. The RBRC expanded in 2001 to include all portable rechargeable battery chemistries in its takeback program. This is the first nationwide takeback program that involves an entire U.S. industry.

Much of this progress has come in response to far-reaching legislation at the state and Federal level. Starting in 1989, 13 states took the lead by adopting laws (including battery labeling requirements) to facilitate the collection and recycling of used rechargeable batteries. In 1996, the U.S. Congress passed the Mercury-Containing and Rechargeable Battery Management Act, which removed barriers to and helped facilitate the RBRC's nationwide takeback program. In addition, many states have passed legislation prohibiting incineration and landfilling of mercury-containing and lead-acid batteries.

Although automotive and other industrial batteries are, more and more, being recycled and better designed, the focus of this section will primarily be on household batteries.

Note: Information in the above summary was taken from *Extended Product Responsibility: A New Principle for Product-Oriented Pollution Prevention*, prepared by the University of Tennessee Center for Clean Products and Clean Technologies under cooperative agreement with the U.S. EPA Office of Solid Waste.

Battery Separation at a HHW Collection Facility

Lead Acid Batteries

Lead acid batteries pose a potential threat to human health and the environment if improperly discarded. The two main components of these batteries are sulfuric acid and lead. Idaho law prohibits disposal of lead acid batteries in landfills, they must be recycled.

Do

Properly dispose of batteries by delivering them to:

- a wholesaler or retailer from whom you purchased the batteries,
- a permitted secondary lead smelter,
- a facility that recycles the batteries by extracting the lead, or
- a collection center that sends batteries to a smelter or recycler.

Avoid long-term storage of batteries. Dispose of them at least every 6 months.

Store batteries upright in a secure, covered location.

Check often for leaks. If a leak occurs, package and handle the spill as a hazardous waste.

Don't

Don't store batteries outside.

Don't place lead acid batteries in garbage or dumpster.

Don't take lead acid batteries to a landfill.

Don't incinerate (burn) batteries.

Don't pour battery acid on the ground or into a drain.

Propane Tanks

Any HHW or collection event will generate several full and empty propane tanks. You can either have a waste contractor or a local propane company pick-up these tanks from you. These contractors may charge you a fee to do so. Or you can recycle the left over propane and recycle the metal from the tanks yourself.

You can see from the tank evacuation device in the photograph that you need a secure base to remove the tightly seated valves on the 5-gallon and up propane tanks.

You can use the propane from the larger tanks to re-fill the smaller lantern size and torch bottles for yourself or your staff.

Propane tank being evacuated and later crushed for metal recycling.

Used Oil Filters (*also see the Used Motor oil chapter*

Used oil filters are exempt from state and federal hazardous waste requirements, including testing, if they are properly drained and recycled as scrap metal. Properly drained lightweight used oil filters may only be disposed of at a landfill if recycling as scrap metal is not possible.

Do

- Remove oil by puncturing filter and anti-drain back valve and hot draining for a minimum of 24 hours.
- Keep processed filters in a separate container that is clearly marked "***Used Oil Filters Only."***
- Put oil drained from filters into your "***Used Oil Only***" container.
- Locate a scrap metal recycler who can recycle your filters, if possible.
- Check with the landfill that accepts your solid waste to determine whether processed oil filters are accepted.

Don't

- Don't put undrained filters in the dumpster.
- Don't put processed filters in dumpster until you have determined that the filters are non- hazardous.

Motor oil collection tank, a money maker for sure.

Antifreeze (*also see the Used Motor oil chapter*)

Antifreeze is most commonly composed of ethylene glycol, with corrosion inhibitors and foam controllers added. Some antifreeze is composed of propylene glycol because it is less toxic to humans and animals. During use, antifreeze can pick up contaminants. If dissolved metal levels, such as lead or cadmium, are high enough, used antifreeze may be a hazardous waste.

Do

- When good antifreeze must be removed for repairs only, save it and return it to the system after the repairs have been completed.
- Separate spent antifreeze from other wastes.
- Consider keeping antifreeze in two separate, closed containers: one marked waste antifreeze only for antifreeze that cannot be reused, and one marked usable antifreeze only for antifreeze that can be reused.
- If on-site recycling is not feasible, recycle your antifreeze through a recycling service.
- If you recycle antifreeze on the premises, filters and other recycling by-products may be hazardous. You will need to make a waste determination.
- Consider purchasing equipment to recycle antifreeze on-site. Check manufacturers' warranties prior to putting recycled antifreeze into any vehicle.

Don't

- Don't mix waste antifreeze with any other waste. Keep it separate.
- Don't mix propylene glycol & ethylene glycol - it's harder to recycle.
- Don't ever dispose of antifreeze in a storm drain, septic tank, or dry well.
- Don't ever pour antifreeze on the ground.
- Don't discharge to a city sewer system without prior approval.

Recyclable Fluids Mixing Table

	Oil	Brake Fluid	Automatic Transmission Fluid	Power Steering Fluid	Ethylene Glycol	Hydraulic Fluid
Oil	SAME	NO	YES	YES	NO	YES
Brake Fluid	NO	SAME	NO	NO	NO	NO
Automatic Transmission Fluid	YES	NO	SAME	YES	NO	YES
Power Steering Fluid	YES	NO	YES	SAME	NO	YES
Ethylene Glycol	NO	NO	NO	NO	SAME	NO
Hydraulic Fluid	YES	NO	YES	YES	NO	SAME

Testing
Sometimes sending a sample of waste to a laboratory for analysis is the only way to determine if the waste is hazardous. Important tests for automotive repair shops include those for pH, volatile organics, total petroleum hydrocarbons, and heavy metals.

If you test a waste once, and continue to use the same industrial process, you may apply those test results when designating future batches of the same waste. For example, if you test your spent spray cabinet wash water and sludge once and find it to be non-hazardous, you may use this knowledge for future disposal of this waste.

Chapter 3 Household Hazardous Waste Exercise

This is not your final assignment but an exercise for you to understand the purpose of this course. You can find the final examination on our website under Assignments. It is a multiple choice exam.

Background: You back are in the Pollution Prevention/Control Department in the city. The job-sharing program did not last, it seems there was some internal management problems You are now all by yourself in your division. You have been developing a pollution prevention public awareness campaign but recent budget cut-backs have placed your television ad campaign and all awareness efforts on hold.

Scenario: The City Manager has come back from a nation conference on waste disposal and grant funding. He would like for you to design and operate either a household hazardous waste permanent collection facility or a 1-day collection event. He cannot give you any additional funds for this project. But he has informed you of grant opportunities on the State's website.

He promises that he will support your decisions and will fund your television and household collection project next year. He also has promised that if you can get the television ads funded from the grant promoting household hazardous waste, he will allow you to re-write your job description and will give you a raise.

It is your assignment to write a plan detailing how you will implement your collection event or facility and how you will fund it using either state, federal or private grant. You can use all three if you like. If your State does not offer a waste reduction grant, use a State that does and call it yours.

Detail the following, what products you will and will not collect and why.

- Your public awareness campaign methods and audience. (*See the Used Oil Chapter for ideas*)
- What are you going to call your facility or event? The public may raise a few eyebrows to "Hazardous Waste".
- List potential problems, volunteers, liability, and hazardous waste disposal.
- Are you going to offer usable products back to the public? Are you going to recycle any products?
- Can you get a buyer for certain products?
- Can you get any positive press for free? How can use your facility for disposal?

You may contract part of your disposal and/or collection event to a contractor, just describe those areas/items and payment options.

.

Chapter 4 Recycling

Recycling

The practice of recycling solid waste is an ancient one. Metal implements were melted down and recast in prehistoric times. Today, recyclable materials are recovered from municipal refuse by a number of methods, including shredding, magnetic separation of metals, air classification that separates light and heavy fractions, screening, and washing. Another method of recovery is the wet pulping process: Incoming refuse is mixed with water and ground into a slurry in the wet pulper, which resembles a large kitchen disposal unit.

A magnetic device pulls out large pieces of metal and other non-pulpable materials before the slurry from the pulper is loaded into a centrifuge called a liquid cyclone. Here the heavier non-combustibles, such as glass, metals, and ceramics, are separated out and sent on to a glass- and metal-recovery system; other, lighter materials go to a paper-fiber-recovery system. The final residue is either incinerated or is used as landfill.

Increasingly, municipalities and private refuse-collection organizations are requiring those who generate solid waste to keep bottles, cans, newspapers, cardboard, and other recyclable items separate from other waste. Special trucks pick up this waste and cart it to transfer stations or directly to recycling facilities, thus lessening the load at incinerators and landfills.

Recycling, including composting, diverted 64 million tons of material away from landfills and incinerators in 1999, up from 34 million tons in 1990.

Typical materials that are recycled include batteries, recycled at a rate of 96.9%, paper and paperboard at 41.9%, and yard trimmings at 45.3%. These materials and others may be recycled through curbside programs, drop-off centers, buy-back programs, and deposit systems.

Recycling prevents the emission of many greenhouse gases and water pollutants, saves energy, supplies valuable raw materials to industry, creates jobs, stimulates the development of greener technologies, conserves resources for our children's future, and reduces the need for new landfills and combustors.

Recycling also helps reduce greenhouse gas emissions that affect global climate. In 1996, recycling of solid waste in the United States prevented the release of 33 million tons of carbon into the air—roughly the amount emitted annually by 25 million cars.

Recycling turns materials that would otherwise become waste into valuable resources and generates a host of environmental, financial, and social benefits. After collection, materials (e.g., glass, metal, plastics, and paper) are separated and sent to facilities that can process them into new materials or products.

Recycling is one of the best environmental success stories of the late 20th century. Recycling, including composting, diverted 64 million tons of material away from landfills and incinerators in 1999, up from 34 million tons in 1990. By 1999, more than 9,000 curbside collection programs served roughly half of the American population.

Curbside programs, along with drop-off and buy-back centers, resulted in a diversion of 28 percent of the nation's solid waste.

You can find the current EPA waste regulations and recycling rules in the rear of this manual.

Buying Recycled

You think you have done everything possible in recycling your household, school, or office materials. Deep down, however, you suspect there's more to recycling than setting out your recyclables at the curb. In order to make recycling economically feasible, we must "***buy recycled***" products and packaging.

Benefits of Recycling

- Conserves resources for our children's future.
- Prevents emissions of many greenhouse gases and water pollutants.
- Saves energy.
- Supplies valuable raw materials to industry.
- Creates jobs.
- Stimulates the development of greener technologies.
- Reduces the need for new landfills and incinerators.

When we buy recycled products we create an economic incentive for recyclable materials to be collected, manufactured, and marketed as new products. Buying recycled has both economic and environmental benefits. Purchasing products made from or packaged in recycled materials saves resources for future generations.

Overview

Creating a strong market for recycled products is key to completing the recycling process or "***closing the loop***." Consumers close the loop when they purchase products made from recycled materials. Governments can promote buying recycled products through their own purchasing programs and guidelines. Manufacturers can participate as well by using recycled materials in their products.

Identifying Recycled-Content Products

Product labels can be confusing to consumers interested in buying recycled because of the different recycling terminology used. The following definitions might help clarify any uncertainty regarding manufacturers' claims.

For more detailed guidance, view a summary of the Federal Trade Commission's brochure entitled *Sorting Out Green Advertising Claims* or the Agency's Official Guidance for the use of environmental marketing claims.

- Recycled-content products are made from materials that would otherwise have been discarded. Items in this category are made totally or partially from material destined for disposal or recovered from industrial activities—like aluminum soda cans or newspaper. Recycled-content products also can be items that are rebuilt or remanufactured from used products such as toner cartridges or computers.
- Postconsumer content refers to material from products that were used by consumers or businesses and would otherwise be discarded as waste. If a product is labeled "recycled content," the rest of the product material might have come from excess or damaged items generated during normal manufacturing processes—not collected through a local recycling program.
- Recyclable products can be collected and remanufactured into new products after they've been used. These products do not necessarily contain recycled materials and only benefit the environment if people recycle them after use. Check with your local recycling program to determine which items are recyclable in your community.

A Recycled Products Shopping List

There are more than 4,500 recycled-content products available, and this number continues to grow. In fact, many of the products people regularly purchase contain recycled-content. The following list presents just a sampling.

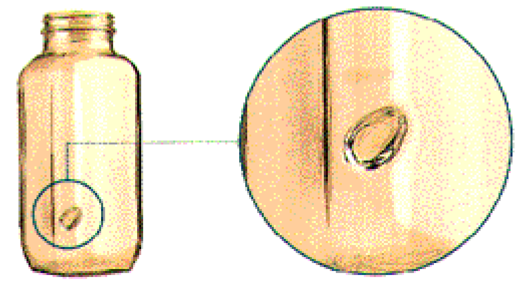
- Aluminum cans
- Cereal boxes
- Egg cartons
- Motor oil
- Nails
- Trash bags
- Comic books
- Newspapers
- Paper towels
- Carpeting
- Car bumpers
- Anything made from steel
- Glass containers
- Laundry detergent bottles

Assorted crushed glass

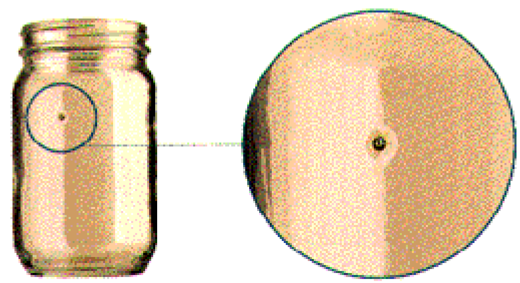
Recycled Glass

Recycled glass is called cullet. Glass container manufacturers recycle cullet, combined with soda ash, limestone and sand, to create "***new***" glass. It's important to know what kind of glass the industry needs. Cullet should meet four criteria:

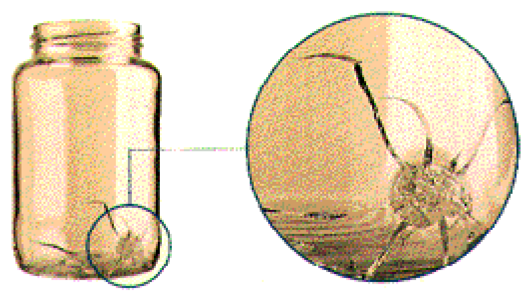
- Cullet must be separated by color
- Cullet must be contaminant free
- Cullet must meet market specifications
- Cullet must be container glass



Bubble caused by heat-resistant contaminant



Surface flaw due to a tiny "seed" of metal.



The effects of ceramic contamination

Glass manufacturers require cullet that's separated by color – clear, amber or green. Recycling glass by color helps manufacturers ensure the quality and color consistency of new containers.

Ideally, citizens should color-sort glass at the curb – that's the easiest and best place to separate glass by color and remove contaminants.

Community recycling programs that allow for mixed glass pickup may, in reality, be trading convenience for marketability.

Even if color separation doesn't happen at the curb, colors and contaminants should be sorted out early in the process.

Once the cullet gets broken or mixed, contaminants are difficult to remove and can spoil the quality of an entire load. New technologies for sorting by color are being researched. But for now, cullet must be color-sorted by hand. For suppliers, increased revenue potential often makes it worth the extra effort.

In comparison, mixed cullet has significantly lower demand and revenue potential. Glass manufacturers have limits on the amount of mixed cullet they can use for manufacturing new containers – and, generally, they prefer not to buy it. Other markets for mixed glass are growing. But, currently, they are limited.

UNACCEPTABLE for Glass Recycling

Common materials that contaminate cullet:

- *ceramic cups, plates and pottery*
- *Clay garden pots*
- *Laboratory glass*
- *Crystal and opaque drinking glasses*
- *Mirrors*
- *Windshields and window glasses*
- *Heat-resistant ovenware (for example, Pyrex or Visionware)*
- *Light bulbs*

Other contaminants include:

- *Ceramic and wire caps for beer bottles*
- *Lead collars from wine and champagne bottles*
- *Stones and dirt*
- *Metal caps, lids and neck rings*
- *Drinking glasses*
- *Hazardous glass containers (for example, acid containers)*

MIXED CULLET
Limited Market, Less Revenue

Mixed cullet may be used in the production of:

- *Road base construction, pipe backfill and storm drains*
- *Asphalt called "glasphalt," and sandblasting abrasive*
- *Fiberglass insulation*

Contaminated Cullet

Contaminated cullet can't be used in the production of new glass containers. Contaminants may be metal, gravel and dirt – or non-container types of glass – mixed in with the cullet. Contaminants are a risk to the glass manufacturer.

Contaminated cullet can slow down production, produce defective glass and damage glass manufacturing equipment.

It may be surprising to learn that not all types of glass can be recycled into new containers.

Almost all glass food and beverage containers can be accepted for recycling. Some examples of recyclable glass are soda bottles, food containers, beer bottles, wine and liquor bottles and juice containers. Household glass products, such as light bulbs and window panes, are unacceptable for producing glass containers.

Varying chemical compositions and different melting temperatures of these types of household glass can cause defects in new containers.

Cullet can be contaminated at any point during the process–at the curb, during collection, processing or shipping.

Quality control is the key to keeping and growing markets for recyclables. Collectors, haulers, suppliers and processors can reduce the risk and increase revenue by following these glass-recycling guidelines:

- Contact potential buyers to get their specifications and acceptance policies, ability to remove contaminants, transport preference (truckload or rail car) and "**furnace ready**" requirements.
- Ask about buyers' capacity to remove metals.
- Conduct inspections–before adding newly-collected glass to stored recyclables and during loading for shipment.
- Glass containers break sufficiently with handling to allow for economic transport. Crushing the cullet will not add to its value.
- If stored outdoors, cullet should be placed on a concrete pad–not on the ground or asphalt–to avoid contamination from dirt or gravel during loading. Cover cullet during cold or wet weather.
- When storing multiple loads of colored cullet, keep the cullet separated so no intermingling of colors can occur.
- Prior to loading cullet shipments, wash the truck bed. Inspect the truck bed and the tarp used to cover the load for any residue from a previous haul.

Grant Funding Public Recycling Education Letter Example

August 10, 2017

Nancy L. Howlett
Southwest Public Recycling Association
P.O. Box 27210
Tucson, Arizona 85726

SUBJECT: RECYCLING EDUCATION
PROPOSED PROGRAM: The Town of Sunflower will use grant assistance to purchase materials in order to conduct recycling public education. These materials will include informational gimmicks and a brochure. Educational gimmicks will include pencils and rulers which are made of recycled materials, activity books, computer monitor cleaners, T-shirts and coffee-cups. The Town is would like to utilize recycled materials in this endeavor. Each gimmick would include the statement "Sunflower Recycles".

These gimmicks and brochure will be used in the year 2017. The Town is currently developing an elementary education program that will offer Sunflower schools a classroom or assembly-style program for kindergarten through eighth grade students. The program will be adaptable to changing environmental conditions over the next 10 years. Pollution prevention (P2) is extremely critical because studies indicate that the regional landfills are rapidly filling and that there is a potential pollutional threat to our environmental and water supply.

This program will utilize an interactive multimedia computer presentation. A computer/video projector (LCD) will project the educational images and will be extensively used in assembly programs to educate students about the importance of pollution prevention, recycling and conservation.

This will be an entertaining and educational program that will be easily changed for different audiences. As many as 1,000 children are predicted to participate in the next two years.

With the brochure and gimmicks, the Town will implement the P2 Business Outreach Program. This program encourages the development and use of media and materials for pollution prevention across the various businesses throughout the Town. In the next ten years, 500 business are predicted to benefit from this program.

RECYCLING BROCHURE INFORMATION
The section of the project is describing the production of an educational brochure explaining the Town of Sunflower's Recycling Program and general waste minimization tips. This brochure is an excellent opportunity for pollution prevention education and a start for other environmental public education brochures to follow. The Town is requesting an initial order of 12,000 brochures which will be mailed to each resident in Sunflower.

The objective of this project is to use the brochures as informational materials which can inform the public to help them comprehend the function and the purpose of recycling and to emphasize pollution prevention in an understandable manner.

The Town has predicted that the recycling brochure will create a public awareness or an education of the importance of conserving our natural resources. This awareness should create a pollution prevention attitude that will be reflected by lower demand on existing landfills. This brochure will be a resource for the Town's Public Education Outreach Program and will benefit the public by optimizing and saving our natural resources.

At current projections, Sunflower's population is estimated at 13,500 and is growing at the rate of approximately 450 new residents per year. It is difficult to estimate the number of people who will be reached by the brochure, but the Town will make a substantial effort to reach every new resident within Town limits. This can be accomplished at public speaking engagements and with all new water service customers.

IMPLEMENTATI0N SCHEDULE: The Public Works Department will tentatively begin offering the Public School Outreach program in February of 2017. We are anticipating a minimum of 1 presentation per week for the months of March and April of 2018. The Department will combine a water conservation presentation with the pollution prevention presentation.

The Pollution Prevention Outreach Program the Public Works Department will offer free pollution prevention presentations to public schools and area businesses. This campaign will be advertised on television to promote the program.

IDENTIFY HOW ACTIVITIES WILL IMPROVE THE ENVIRONMENT: The Public Works Department has predicted that the Pollution Prevention Outreach Education Awareness programs will create a public awareness and/or education of the potential of chemical contamination of our environment and how to recycle which will extend our limited land space available for the landfill. This awareness should create a pollution prevention attitude that will be reflected by waste minimization and environmental contamination. This public education program is a critical function of the overall pollution prevention plan and will benefit the public by protecting our available water from further contamination. The Public Works Department predicts a five-percent per capita trash reduction following one year of town-wide business and public school outreach education.

The Town predicts 500 students will receive the Public Education Presentation within the year 2001. The Town predicts that small pollution prevention/conservation promotional gimmicks will reach student's homes and be seen by parents and family members as well.

The Town will make substantial efforts in meeting the general public needs. This will be accomplished by public speaking engagements, i.e., Rotary, Kiwanis, and business showcases. These general public presentations are estimated to reach an additional 500 people.

It is difficult to estimate a figure, but the Town will make a substantial effort to reach every resident within Town limits. This will be accomplished with the use of mail and media, i.e. television and radio public service announcements and newspaper ads promoting pollution prevention presentations.

OTHER POLLUTION PREVENTION SERVICES

Pollution Prevention Survey A qualified P2 technician will perform a waste minimization survey of both residential and commercial facilities and can recommend several pollution prevention tips. These tips will include proper recycling and disposal techniques, pest control solutions, and non-hazardous substitutes.

Town of Sunflower's Computer Home Page Web Site This Internet computer information tool will help assist customers in many different ways. The Water Department offers several different WebPages including Recycling to Household Hazardous Product Collection.

Channel 7 Television Campaign The Water Department has a television pollution prevention commercial announcement campaign that runs 4 times during the year. These forty-five second commercials have been received with great public support.

Thank you for your assistance with this project. If you have any questions or need additional information please contact me at (520) 479-5242, Ext. 379.

Two-Can Municipal Recycle Program Policy Example
What do I place in the Blue Container?

PLASTIC BOTTLES AND JUGS
Do
Plastic bottles and jugs which have a neck smaller than the base or a screw top lid such as soda bottles, detergent bottles and milk jugs. (Labels and caps do not have to be removed)

Don't
Plastic grocery bags, dry cleaning bags, sheets of plastic, pool covers, bubble wrap, styrofoam, plastic toys, PVC, garden hoses and plastic furniture.

METAL CANS
Do
Food cans, commonly known as tin cans that held soup, meat, pet food, tuna, fruit, vegetables and juice. (Labels do not have to be removed)

Don't
Scrap metal, wire coat hangers, electrical wire, auto parts, metal patio furniture and aerosol cans.

ALUMINUM
Do
Soda and beer cans, pet food cans

Don't
Aluminum siding or sheets of aluminum

GLASS
Do
Food and beverage containers such as juice, beer or wine bottles, baby food jars and salad dressing containers. (Labels and caps do not have to be removed) Bottles do not have to be absolutely clean. Rinsed out usually is good enough.

Don't
Light bulbs, ceramics, mirrors, glass ware and window glass.

PAPER
Do
Computer paper, writing paper, copy paper or index cards.

Don't
Tissues, napkins, paper towels, paper plates, diapers, sanitary napkins and wrapping paper.

NEWSPAPER / MAGAZINES
Do
Newspaper, newspaper inserts, soft bound magazines and catalogues.

Don't
Telephone books or any hardbound books.

CARDBOARD
Do
Corrugated storage boxes, shipping boxes, moving boxes with all packing material removed. Break down and flatten boxes - then place in blue recycle container.

Don't
Please no packing peanuts, Styrofoam, bubble wrap or foam.

CHIPBOARD
Do
Boxes made from recycled cardboard including food boxes (inserts and food liners must be removed), laundry soap boxes, cereal boxes, facial tissue boxes, gift boxes

and paper tubing (such as bathroom tissue rolls, paper towel rolls, etc.)
Don't
Frozen food boxes, waxed cartons (i.e., milk or juice)

PLEASE DO NOT BAG YOUR RECYCLE ITEMS BEFORE PLACING IN THE BLUE CONTAINER

Please do not contaminate your recyclable containers with refuse and yard waste. Gilbert maintains a three strikes and you're out policy. That means if your blue container is found to be contaminated three times within one year the Town inspectors will remove your blue containers.

GENERAL GUIDELINES

What is clean, dry and empty?
All materials placed in your blue container should be relatively clean (i.e., rinse out jars), dry (i.e., empty all soda and liquid from bottles) and empty (i.e., empty all packing materials from corrugated boxes).
Please do not place the following items in your blue container:

- Yard waste, grass
- Aerosol cans
- Food
- Gift wrap
- Diapers
- Paper towels, napkins, tissues, paper plates
- Styrofoam, packing peanuts, bubble wrap, foams
- Scrap metal, auto parts
- PVC
- Air conditioning filters
- Film plastic (grocery bags, dry cleaning bags, shrink wrap)
- Light bulbs, including fluorescent, neon, HID, and incandescent
- Batteries, including alkaline, magnesium, nickel, cadmium, lithium, zinc, carbon and zinc silver

When in doubt, please bag items and place in your black container!

PLEASE have your blue container out at the curb by 5am on your scheduled collection day.

Electronic Parts

Our "***plugged-in***" world relies on an ever-growing and constantly changing supply of electronic products. Electronic equipment currently represents only 1 to 2 percent of the country's waste stream, but it is quickly growing. The rapid introduction of new electronic products shows no sign of abating, as better, smaller, and cheaper products replace "***older***" models.

Electronic products also can contain a variety of toxic constituents. Cathode ray tubes, circuit boards, batteries, and other electronic components often contain hazardous constituents such as lead, mercury, and cadmium.

This growing, changing product stream presents new challenges and responsibilities in designing and managing electronic products to reduce their life-cycle environmental impacts.
By applying the principles of product stewardship, electronic equipment can be made with fewer toxic constituents and designed with upgradability, durability, and recyclability in mind, making these product systems more sustainable.

Various brochures available for an "Electronic Collection Event"


Computers and electronic components that collection facilities collect every day. Some collection sites will use high school programs that have students re-build the discarded electronic goods. Other will use an electronic recycler or computer business.

Consumer Drop-Off Model. The collaborating manufacturers will partner with any retailer willing to host a collection event. The retailer would contract with a recycler and charge consumers a "drop-off" fee for all products collected. Industry will supply funds for promotion, education, coupons and/or rebates.

Electronic Collection Event Flyer *Example*

Used electronic equipment has become one of our countries fastest growing waste streams. This equipment contains hazardous wastes that pose risks to our homes and environment.

Southwest Public Recycling Association (**SPRA**) a nonprofit environmental association is providing an electronic recycling collection event in partnership with the Town of Payson on May 4, 2017.

The location for this event is:
303 North Beeline in the Town Parking Lot across from Wal-Mart

The time for the event:
Saturday May 4, from 8:00 a.m. to 12:00

Electronic Items accepted include:
Computers
Computer peripherals
Telephones
Electronic Testing Equipment
Televisions
VCRs
Radios
Vacuum Sweepers
Sewing Machines

<u>Non Electronic items will not be accepted at this event.</u>

GET RID OF THOSE OLD ELECTRONICS IN YOUR GARAGE OR CLOSET……..
Call for more information for this worthwhile community event;
Rusty Randall - Payson Water Department 928-494-5242 Ext. 380
Ellen E. Cox – Executive Director of SPRA (520) 622-8082)
** Another Recycling Project Partially Funded By Arizona Department of Environmental Quality (ADEQ)**

Electronic Collection Industry Initiatives

Product stewardship practices are constantly evolving as industry works to achieve greater resource use efficiency and pollution prevention. A sampling of businesses implementing product stewardship principles is provided below. The mention of any company, product, or process at this Website does not constitute or imply endorsement by EPA. Also, please note that none of the claims made by these businesses have been verified by EPA. Because we seek to highlight the latest developments in product stewardship, we are interested in hearing about innovative strategies being implemented by business.

The **American Plastics Council (APC)** has participated in several projects looking at opportunities for recycling plastics from end-of-life electronics. In Minnesota, the APC joined with Sony, the Minnesota Office of Environmental Assistance, and other partners in a pilot project that evaluated strategies and costs for collecting, transporting, and processing used electronics. The partners have jointly issued a report that characterizes the types of plastics collected during the project and discusses what was learned about processing plastics. The APC has also published another report, entitled Plastics from Residential Electronics Recycling that summarizes what the organization has learned to date about recycling plastics from consumer electronics. The report draws on the results of the Minnesota study, as well as one conducted in San Francisco to determine whether recyclers could produce pure streams of certain plastic resins.

Apple Computer designs its products for ease of assembly and disassembly, using latches, snap-in connections, and single screw-types requiring no specialized tools. Apple is also taking steps to increase recyclability by using materials that can be easily recycled, marking materials with international recycling codes, standardizing designs and components to facilitate material use along product lines, and reducing the weight and material used in products. The "product design" section of its environmental Web site has detailed case studies on the Power Mac G4 and 7200.

Best Buy is the first electronics retailer in the country to offer recycling collection services to consumers. During the first phase of its electronics recycling program, in the summer and fall of 2001, Best Buy is holding two-day collection events in approximately 10 markets across the country. Consumers bring in their old electronics equipment, of any brand or model, for a fee. Best Buy is currently seeking corporate and government partners in its electronics recycling collection effort.

Compaq focuses on environmental stewardship during every phase of the product lifecycle. For example, when Compaq engineers begin the design of a computer, they consider the environmental impact of its component parts and their readiness to be recycled when the computer is no longer useful. Design for the Environment guidelines have been developed for use across Compaq product lines on a worldwide scale. Many of its products are designed to be easy to upgrade. For example, its notebook computer designs incorporate modular drive designs so that a user can interchange different hard drives, floppy drives, and CD-ROM drives in the same drive bays.

In June, 2001, Compaq and a Midwest electronics recycling firm launched the United Recycling Industries' (URI's) Electronics Take-Back Program. This program offers participating customers a 6 to 9 percent discount on Compaq products if consumers return used electronics equipment. URI provides shipping boxes and labels, while customers pay URI $27.99 to process up to 70 pounds of returned computers, monitors, and peripherals. URI's pilot program is currently open to residents and small businesses in seven Midwest states.

Electronics Industries Alliance (EIA) announced a pilot electronics recycling project in June 2001. Collaborating manufacturers, including Canon, Hewlett Packard, JVC, Kodak, Panasonic, Philips Electronics, Sharp, Sony, and Thomson, will test three different models of electronics collection and recycling beginning in October:

- **Municipal Collection Model.** The consortium of companies will contract private companies to recycle products they manufacture. The contracts will cover transportation from consolidation points to the recycling facilities. Municipalities will be responsible for collecting and consolidating used electronics.
- **Retailer Collection Model.** A selected number of retailers will hold collection events and direct returned equipment to private recyclers with whom the industry group has made arrangements. Collaborating manufacturers will reimburse the participating retailer for recycling costs based on the number of units sold. This model is intended to simulate and evaluate an advance disposal fee, which in reality (although not the case in the pilot) would be paid by the purchaser at the point of sale.
- **Consumer Drop-Off Model.** The collaborating manufacturers will partner with any retailer willing to host a collection event. The retailer would contract with a recycler and charge consumers a "**drop-off**" fee for all products collected. Industry will supply funds for promotion, education, coupons and/or rebates.

Project participants hope to generate data that will help guide the development of a cost-effective and efficient long-term electronics recycling program.

Intel has a number of product stewardship initiatives underway, including one design project involving an industry group to standardize server building blocks, such as the chassis, power supplies, and boards. This standardization allows consumers to upgrade, add, or remove components without having to purchase an entirely new system. In addition, all motherboards, PCs, workstations, and server major subassemblies can be disassembled and upgraded with only a screwdriver. Intel has prevented packaging waste by moving to lightweight shipping trays and tray caps, maximizing the number of CPUs that can be shipped in a box, and replacing foam padding with paper. To keep track of packaging use, the company established a database that can track the amount of packaging material shipped into each country.

Sony Electronics aims to reduce its products' power consumption by 30 percent by 2005, compared with average energy consumption of products manufactured in 2000. Many of the company's products have other environmental features as well. For example, the body and mounting brackets of one of its computer lines are aluminum for ease of recycling. This product is packaged only in cardboard. Another laptop computer is constructed with a rigid magnesium alloy for all four sides, which reduces the use of plastic and makes the product easier to recycle.

The company also uses a type of paper packaging called "***Bee Board***," which has unique shock-absorbing capabilities because of its honeycomb construction. A hollow construction enables designers to use paper and to make the overall material lighter. The company uses this honeycomb packaging for television sets and monitors made in Europe. Sony has also teamed with the Minnesota Office of Environmental Assistance and Waste Management, Inc., to establish a takeback and recycling program for Sony electronic products in Minnesota.

Sony is also working with the states of New Jersey and Connecticut, along with manufacturers Panasonic and Sharp, in a Recycling Infrastructure Development Pilot Program. The goal of this project is to stimulate the development of collection infrastructure, recycling technology, and end markets for household electronics in New Jersey and Connecticut.

IBM's PC Recycling Service allows consumers and small businesses to recycle any manufacturer's PCs, including peripherals. For a fee of $29.99, the customer receives a pre-paid mailing label and ships the computer equipment via UPS to Envirocycle, an electronics recycler in Pennsylvania. Depending on its age and performance capability, the computer will either be recycled in an environmentally responsible manner or refurbished for donation through Gifts in Kind International. If the computer can be donated, the donor receives a receipt which can be used for tax deduction purposes.

Customers can purchase the recycling service when they buy a new IBM computer or order the service separately by calling 1-888-SHOP-IBM.

Gateway's Your:)Ware Recycling Program offers customers a $50 rebate after they purchase a new Gateway computer and then donate or recycle their old system. Customers are responsible for finding a recycler or receiving organization for their computer, after which they submit confirmation forms to Gateway to receive the rebate.

For examples of innovative strategies being implemented by businesses, check out **Addressing End-of-Life Electronics Through Design: A Compendium of Design-for-Environment Efforts of the Electronics Industries,** published by the Electronic Industries Alliance (EIA).

The report describes how EIA member companies are using design for the environment (DfE) initiatives to minimize or eliminate adverse environmental impacts throughout their products' life-cycle. The dozens of brief success stories included in the report provide a snapshot of the efforts undertaken voluntarily by electronics companies to minimize the environmental impacts of their products.

State Initiatives
An increasing number of state and local governments are considering options for managing end-of-life electronic equipment such as televisions and personal computers. Their concern centers around the continued growth of this waste stream, the potential for hazardous constituents in these products to cause disposal problems, and the desire to recover valuable materials from these products.

A sampling of state and local governments' activity on end-of-life electronics is provided below. For more information on state legislature and local initiatives visit the National Recycling Coalition website.

EPA Region III launched this site as part of a partnership with Delaware, Maryland, Pennsylvania, Virginia, West Virginia, and the District of Columbia to recycle unwanted computers, computer equipment, and televisions. Environmental officials in these states are working with the Electronics Industry Alliance, electronics manufacturers, electronics retailers, waste management companies, and electronics recyclers to recycle obsolete equipment collected from residents and small businesses in the Mid-Atlantic States.

The eCycling Website is a resource offering state-by-state information on electronics collection sites and computer recyclers/reusers. The Website also provides background information on electronics waste.

Jobs Through Recycling (JTR) Website. EPA Office of Solid Waste.
The JTR Website contains an archive of JTRnet messages. JTRnet is a list serve for recycling market development professionals. The archive, entitled Netshare, is organized by topic, beginning with a request for information followed by a series of responses from other subscribers to the list server. Netshare contains an electronics section under the commodities topic.

ElectronicXchange.Org. A Web site operated by the Southern Waste Information eXchange, Inc. (SWIX). ElectronicXchange.Org is a non-profit clearinghouse and repository for businesses and government agencies looking for information regarding electronic equipment recycling and recovery, recycled products, current regulations/legislation, alternative and emerging technologies, trade journals and associations, technical reports, the availability of and demand for electronic scrap, and waste management services and products. The site also contains links to a number of SWIX publications, including Used T.V. and Computer Recycling and Management in Florida: A Resource Guide.

ElectronicsRecycling.Net: A Collaborative Resource for Electronics Recycling.
A collaborative effort between the recycling community, the plastics industry, and academia, this site offers a variety of resources on the electronics recycling industry. The site includes an industry overview, a list of notable projects, an industry directory organized by state, a section on legislation, and links to industry-related news articles and press releases.

Electronic Industries Alliance (EIA) Website.
The EIA represents the government relations interests of the diversified electronics industry. EIA's Environmental Issues Council maintains an extensive database of resources related to environmental issues affecting the electronics industry. Of particular note is its summary of international and domestic recycling initiatives.

International Association of Electronics Recyclers (IAER) Website.
The IAER represents and serves the interests of the electronics recycling industry in the development of effective and efficient infrastructure for managing the life cycles of electronics products.

Institute for Interconnecting and Packaging Electronic Circuits (IPC) Website.
The IPC brings together all of the players in the electronic interconnect industry: designers, board manufacturers, assembly companies, suppliers, and original equipment manufacturers to further the competitive excellence and financial success of its members worldwide.

The Reuse Collaborative Website.
The Reuse Collaborative Website offers a wealth of information on recirculating used computers to those in need. An online database allows users to post or search for used computers throughout the United States. The site also includes a number of resources for everything from quick tips on fixing computers to statistics and publications on reuse and recycling.

Publications
Electronics: A New Opportunity for Waste Prevention, Reuse, and Recycling. U.S. EPA Office of Solid Waste and Emergency Response. June 2001. EPA 530-F-01-006.

This fact sheet provides information on ways that households and businesses can reduce the environmental impact of electronics use and disposal through reuse, donation, recycling, and buying greener electronic products.

URL: http://www.epa.gov/epaoswer/non-hw/reduce/epr/products/eresources.html
The following product directories and databases provide a more comprehensive list of products and manufacturers.

- American Plastics Council's "Shop Recycled Mall," Recycled Products Database
- Pennsylvania Resource Council's Recycled Products Directories
- California Integrated Waste Management Board's Recycled Products Database

Related Links
EPA has assembled lists of buy-recycled related organizations, publications, and product information at the following two sites:

- Comprehensive Procurement Guidelines (CPG) Program Related Links
- WasteWise Related Links

Please find additional related links divided into the following categories:

Programs

- America Recycles Day
- Buy Recycled Business Alliance
- Buy Recycling Training Institute
- Comprehensive Procurement Guidelines
- EPA's Environmentally Preferable Purchasing (EPP) Program
- King County, Washington

Publications

- CPG Fact Sheets
- Official Recycled Products Guide
- WasteWise Update—Closing the Loop

Organizations

- Environmental Defense Fund
  257 Park Avenue, South
  New York, NY 10010
  Phone: 800 684-3322
- National Office Paper Recycling Project
  U.S. Conference of Mayors
  1620 Eye Street, NW., Suite 600
  Washington, DC 20006
  Phone: 202 223-3088
  Fax: 202 429-0422
- National Recycling Coalition
  1727 King Street, Suite 105
  Alexandria, VA 22314-2720
  Phone: 703 683-9025
  Fax: 703 683-9026
- Office of the Federal Environmental Executive
  Mail Code 1600
  401 M Street, SW
  Washington, DC 20460
  Phone: 202 260-1297

Acknowledgement

Pennsylvania's Department of Environmental Protection Agency
United States Environmental Protection Agency
Idaho Department of Environmental Quality Central Office
1410 N. Hilton, Boise, ID 83706
(208) 373-0502

Commingled Glass Recycle Bin

Chapter 4 Recycling Exercise

Scenario: You were successful in your Hazardous Waste Collection Event. The City Manager has kept his word and has promoted you to your new position as the Recycling Coordinator.

He has asked you for plans for a MURF center and has federal funding to support labor and a community development block grant to pay for part of the facility. The City Manager has told you that the State has mandated this project, but does not want you to make that public information for a couple of months.

City Council member Bill Fields has requested some information from you about recycling. The Councilman is concerned about the operating costs of the MURF. Councilman Fields and the City Manager do not get along on environmental issues and he believes that the City should cut back on environmental positions and programs.

History: There have been several attempts in the past for this same type of collection center. Three of these were private companies that are upset that the City did not support their recycling efforts and subsequently had to close their business.

He would like the following information to be given at the next council meeting.

You will have 10 minutes in order to convince the Council of your skills as a Recycling Coordinator.

How are you going to collect cardboard and paper products?

- What is the market or current value of these products? Is Cardboard worth the effort in collecting? (You can call your local recycling vendors or use the internet for prices)

- What are the numbers on the bottom of the plastic bottles and which ones do we collect?

- The plastic information has not been provided to you in order that you must research this matter, but there are two types of plastic listed in your glossary for your assistance.

Think about…
Not Required for credit.

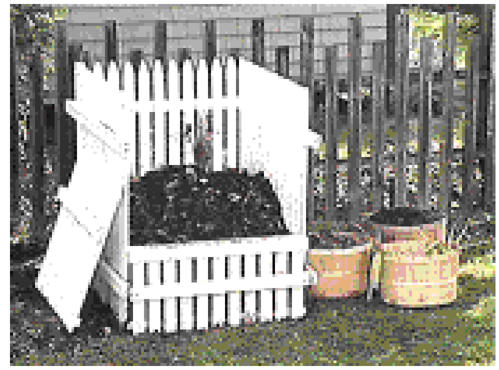
Rebuttal: As you have finished your speech, a former recycling business owner Mr. Jim Bevan of Bevan Waste Haulers has come to the podium and has requested to debate your stance. As Mr. Bevan addresses the Council, he only looks at Councilman Fields.

Mr. Bevan believes that you do not know what you are talking about and that he should be contracted by the City to run your facility. He wants your collection records and plans and is questioning your education and experience.

How are you going to respond?

Chapter 5 Composting

Composting



Another form of recycling is composting. Composting is the controlled biological decomposition of organic matter, such as food and yard wastes, into humus, a soil-like material. Composting is nature's way of recycling organic wastes into new soil used in vegetable and flower gardens, landscaping, and many other applications.

Composting operations of solid wastes include preparing refuse and degrading organic matter by aerobic microorganisms.

Refuse is presorted, to remove materials that might have salvage value or cannot be composted, and is ground up to improve the efficiency of the decomposition process.

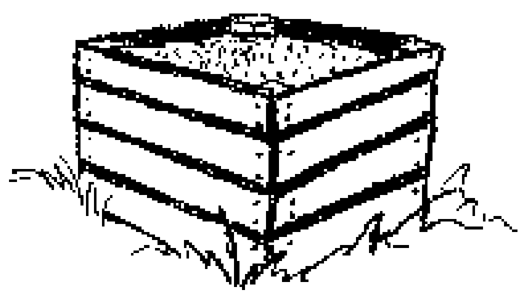
The refuse is placed in long piles on the ground or deposited in mechanical systems, where it is degraded biologically to a humus with a total nitrogen, phosphorus, and potassium content of 1 to 3 percent, depending on the material being composted.

After about three weeks, the product is ready for curing, blending with additives, bagging, and marketing.

Composting is an easy way to reduce waste and create a valuable gardening supply. You can recycle the natural nutrients and organic materials in leaves and yard waste as they would be in nature.

There are various types of bins you can buy or build. And a bin will fit in even the smallest backyard. But if you have lots of room, you can build your own bin from pallets. You can sift the finished compost to make a finer product. Learn how to make your own compost screen.

You can see examples of bins in use at a backyard compost demonstration site near you. Some municipalities provide bins to residents through a backyard composting program. If there is not one in your community, encourage your local officials to develop one.



Backyard Composting Programs *Courtesy of Pennsylvania's DEP*

Most of the programs advertised and distributed composting bins to residents. Some programs offered coupons for bins or building materials, redeemable at local participating stores. Costs to residents ranged from no charge to $10 for bins or materials valued between $25 and $35.

All of the programs were conducted by counties, although not all programs were countywide. All were funded at least partially with Act 101 composting grants. Most programs conducted training on how to use the bins, and two counties distributed bins only to residents who attended a composting workshop or took a test to prove they had read the composting literature.

"The response has been outstanding. We have had school-age children to senior citizens stop in to purchase bins," commented the Erie County coordinator for the program held in Millcreek Township. The average participation rate was approximately one resident in 433. Three programs distributed bins to one resident in fewer than 100: Wayne Township in Clinton County, and Snyder and Jefferson counties.

The programs with the best participation rates had little in common as to type of bin offered, coupons or cost. They did, however, have these features in common:

- smaller, rural populations (maximum 46,000 countywide);
- firm direction by an openly enthusiastic county recycling coordinator;
- other assistance, such as Penn State county extension offices, environmental groups and master gardeners/composters;
- solid media promotions;
- hands-on training and troubleshooting (remarked one coordinator, "If they have a problem, they call me."); and
- follow-up (Clinton and Snyder counties conducted surveys).

Montgomery County, which has distributed bins for the past four years, also has a successful program. With one notable exception, it has all the hallmarks of the programs with the highest participation rates: The county's population is 680,000, the highest among the 15 counties that responded to the survey. The recycling coordinator's comment is illuminating: "We are using a bin distribution as a carrot to entice people to learn about composting."

Coordinators in more populous communities appear to regard backyard composting as a public relations tool to increase support for their municipal composting programs. Melinda Kokus, who conducted the survey, agrees: "Waste reduction is not the goal of these programs. They make everyone involved feel good about composting and help to teach the basic how-to's."

Backyard composting appears to be an effective waste-reduction method in rural communities that can't afford collection programs, and where residents tend to have larger yards and gardens. In communities with more concentrated populations and smaller lawns, however, the municipal composting program is the waste reduction workhorse.

Benefits of Composting

- Keeps organic wastes out of landfills.
- Provides nutrients to the soil.
- Increases beneficial soil organisms (e.g., worms and centipedes).
- Suppresses certain plant diseases.
- Reduces the need for fertilizers and pesticides.
- Protects soils from erosion.
- Assists pollution remediation.

Believe it or not, compost can be used for:

- Bioremediation and Pollution Prevention
- Disease Control for Plants and Animals
- Erosion Control and Landscaping
- Composting of Contaminated Soils
- Reforestation, Wetlands Restoration,
- and Habitat Revitalization

These publications and other valuable information on composting are available on the EPA's Composting Website.

Overview

Composting is the controlled decomposition of organic materials, such as leaves, grass, and food scraps, by microorganisms. The result of this decomposition process is compost, a crumbly, earthy-smelling, soil-like material. Yard trimmings and food scraps make up about 25 percent of the waste U.S. households generate, so composting can greatly reduce the amount of waste that ends up in landfills or incinerators.

What to Put in the Mix

These are some items that can be put in a composting bin. Some food products should not be included because they can attract pests or compromise the quality of the compost. This list is not meant to be all inclusive.

Materials to Include

- Fruit and vegetable scraps
- Egg shells
- Coffee grounds with filters
- Tea bags
- Fireplace ash
- Leaves
- Grass
- Yard clippings
- Vacuum cleaner lint
- Wool and cotton rags
- Sawdust
- Non-recyclable paper

Materials to Exclude

- Meats
- Dairy foods
- Fats
- Oils (including peanut butter and mayonnaise)
- Grease
- Pet excrement
- Fish scraps
- Diseased plants
- Bones

Composting Process

Compost contains both carbon and nitrogen sources, which can be simplified as browns for carbon (e.g., leaves, straw, woody materials) and greens for nitrogen (e.g., grass and food scraps). Adequate sources of carbon and nitrogen are important for microorganism growth and energy. The ideal ratio is 30 parts brown to 1 part green. Odor and other problems can occur if the ratio or any of the factors discussed below are not in the correct balance.

The decomposition of organic materials in composting involves both physical and chemical processes. During decomposition, organic materials are broken down through the activities and appetites of various invertebrates that will naturally appear in compost, such as mites, millipedes, beetles, sowbugs, earwigs, earthworms, slugs, and snails. These microorganisms need adequate moisture and oxygen to degrade the organic materials in the most efficient manner.

Microbes in the pile create considerable heat and essentially "cook" the compost. Temperatures between 90 and 140 degrees Fahrenheit are common in properly maintained compost piles, but may not reach these levels in backyard compost piles. These high temperatures are necessary for rapid composting as well as for destroying weed seeds, insect larvae, and potentially harmful bacteria. When the compost is finished, it has a crumbly texture throughout the pile.

Composting Facts and Figures

- Red wigglers (i.e., the worms used in vermicomposting) eat their weight in organic matter each day.
- More than 67 percent of the municipal solid waste produced in the United States (including paper) is compostable material.
- There are more than 3,800 yard trimmings composting facilities nationwide.
- MSW Facts and Figures provides additional information such as the number of states with yard waste bans.

Opportunities

Whether composting occurs in the backyard, at a community site with yard trimmings, or in an industrial facility with mixed MSW, the resulting compost is a valuable product. Not only can compost be used as a soil additive for backyard gardens and farm lands or to beautify highways and other landscaping projects, but it also has many innovative uses. Below is a list of different composting programs. For a complete list of composting definitions, view EPA's report entitled *Organic Materials Management Strategies*.

- Backyard composting. Hundreds of thousands of individuals across the country compost in their own backyards, typically in a fenced off area or bin. Backyard composting provides a convenient way to reduce the volume of trash a household produces. It also provides a valuable product that can enhance the soil and increase the growth and health of the yard.
- Yard trimmings composting. Composting also occurs on a large scale, operated by private sector firms or community public works departments. At these sites, the compostable material is taken to a central location. There, it is typically processed in aerated windrows, where organics are formed into rows or long piles. Some sites will add compostable MSW into the mix to keep items out of the landfill. The finished compost can be sold, given away, or used by the company or municipality in local landscaping projects.
- Mixed MSW composting. Composting of mixed municipal solid waste is another option. This generally occurs at a medium-to-large scale facility, operated by private sector firms or community public works departments. Generally, mixed MSW is received at the site. Recyclables such as glass and aluminum, and non-compostables are removed early in the process. The remaining organic material is composted, generally using aerated windrows. In-vessel composting, where the material is left to decompose while enclosed in a temperature and moisture controlled chamber, is another possibility. Final screening steps remove any remaining plastic film and similar contents. The finished compost can be sold, given away, or used by the company or municipality in local landscaping projects.

- Vermicomposting. Although not significant in terms of waste diversion, vermicomposting is being used in some places and is popular in classrooms as a teaching tool. This method of composting uses a container of food scraps and a special kind of earthworm known as a red wiggler.
- Over time, the food is replaced with worm droppings, a rich brown matter that serves as an excellent natural plant food. Vermicomposting requires less space than normal composting methods, and is, therefore, ideal for classrooms, apartments, and other settings in high-density urban areas.
- Biosolids composting. EPA endorses the composting of biosolids (or sewage sludge) as a way of managing this material. EPA characterizes biosolids composting and offers guidance and technical assistance via the Office of Wastewater Management in EPA's Office of Water.

Related Links

Publications

- EPA has developed a list of compost-related publications.

Organizations

- The Composting Council
  P.O. Box 407
  Amherst, OH 44001-0407
  Phone: 440 989-2748
  Fax: 440 989 1553
- The Compost Resource

Acknowledgement

United States Environmental Protection Agency
Pennsylvania's Department of Environmental Protection Agency

Chapter 5 Composting Exercise

Scenario: After your Council meeting, the Council has tabled the MURF center for an unknown period of time. The City Manager has asked you to place the MURF center project on hold but will not give you an answer on your speech or the reason why the Center is on-hold. This is an example of normal operating conditions for the political arena.

You are disappointed and depressed from the possible rejection of your speech from Mr. Fields. Mr. Fields has not stated his stance on recycling but he was on a radio talk show this morning debating the need for a composting program. Mr. Fields believes that composting programs do not make money but cost money. He claims that several other cities have cancelled their composting efforts.

The City Manager has re-assigned you to the position of Special Projects Coordinator and would like for you to design a composting brochure that will be distributed at the garden club and at his Rotary meeting.

Assignment: He would like this brochure to be designed for the homeowner.   You can create your own artwork, slogan, logo or text for this brochure.

Chapter 6 Medical Waste Disposal

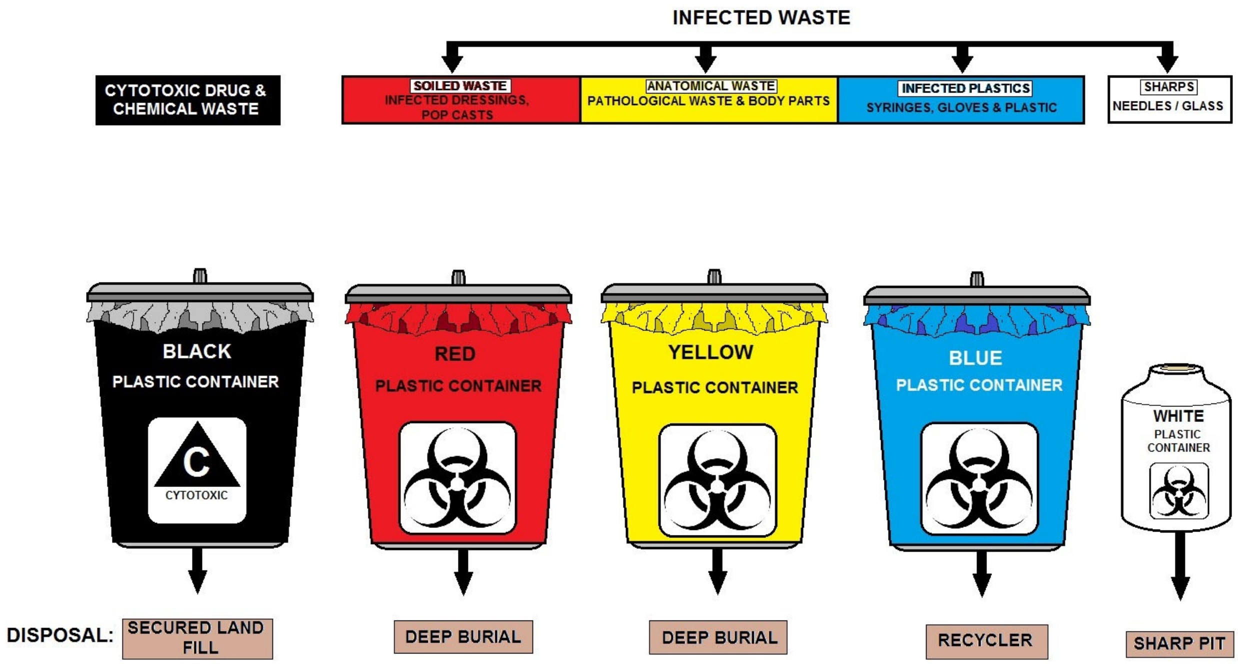
Medical Waste

EPA has regulations governing emissions from Hospital/Medical/Infectious Waste Incinerators as well as requirements under the Federal Insecticide, Fungicide and Rodenticide Act (**FIFRA**) for medical waste treatment technologies which use chemicals for treating the waste. The RCRA Hotline also provides up-to-date information on several EPA programs.

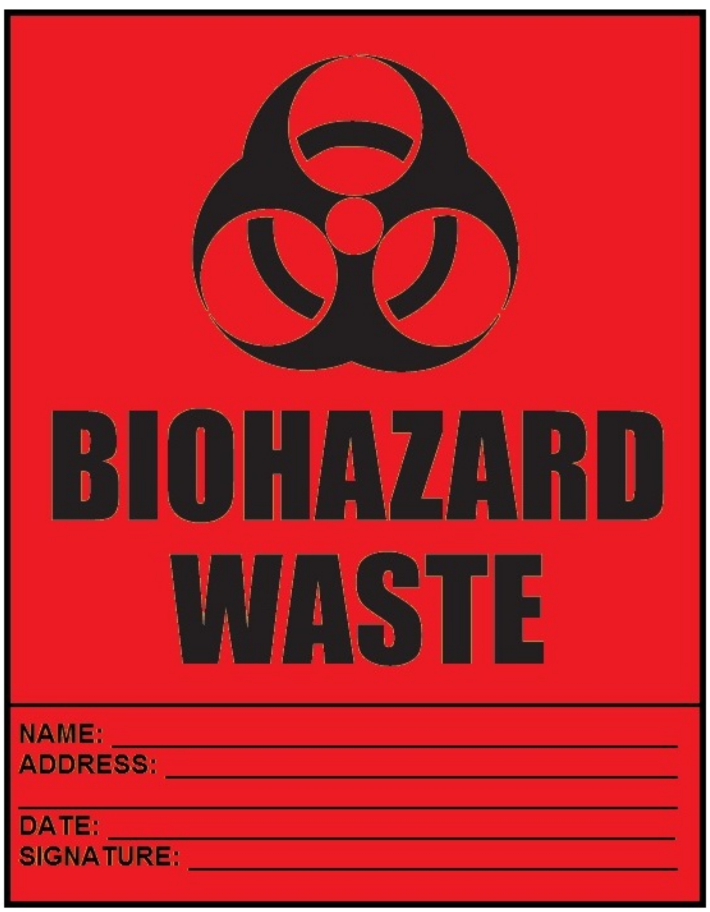
Definition: Medical Waste is generally defined as any solid waste that is generated in the diagnosis, treatment, or immunization of human beings or animals, in research pertaining thereto, or in the production or testing of biologicals, including *but not limited to*:

- soiled or blood-soaked bandages
- culture dishes and other glassware
- discarded surgical gloves-after surgery
- discarded surgical instruments-scalpels
- needles-used to give shots or draw blood
- cultures, stocks, swabs used to inoculate cultures
- removed body organs-tonsils, appendices, limbs, etc.
- lancets-the little blades the doctor pricks your finger with to get a drop of blood *Various*

Medications and Supplies that are disposed at Collection Events and Facilities.



DISPOSAL OF DIFFERENT TYPES OF BIOHAZARDOUS WASTE



BIOHAZARD WASTE LABEL

Frequently Asked Questions about Medical Waste:

1. What agency(ies) regulate wastes generated at health care facilities?
   Health care facilities include, but are not limited to hospitals, physician's offices, dental practices and veterinary hospitals. These facilities generate a variety of waste streams. Many of these waste streams are regulated at the state and local level while others may be governed by federal regulations. For example, regulations for office and municipal type waste are developed by states, whereas regulations for hazardous waste such as mercury or radioactive wastes are developed by the Federal government. Potentially infectious medical waste, sometimes referred to as Regulated Medical Waste is generally covered by state regulations.

2. What is the Medical Waste Tracking Act (MWTA)?
   Legislation was enacted in the late 1980s after medical wastes were found among other wastes washing up on several East Coast beaches. Concern over the potential health hazards associated with medical wastes on some beaches prompted Congress to enact the Medical Waste Tracking Act (MWTA) in 1988, which required EPA to create a two-year Medical Waste Demonstration Program. For the purposes of this two-year program the MWTA defined medical waste and those wastes to be regulated; established a cradle to grave tracking system utilizing a generator initiated tracking form; required management standards for segregation, packaging, labeling and marking, and storage of the waste. There were also record keeping requirements and penalties that could be imposed for mismanagement.

3. What is the status of the MWTA?
   The regulations promulgated under the MWTA expired on June 21, 1999. The Standards for Tracking and Management of Medical Waste were in effect from June 1989 to June 1991 in five states (New York, New Jersey, Connecticut, Rhode Island, Puerto Rico). During this time, EPA also gathered information and performed several studies related to medical waste management.

   The MWTA and EPA's associated program served to focus attention on the medical waste issue and provided a model for some states and other federal agencies in developing their own medical waste programs.

   The MWTA also required EPA to look at various treatment technologies available at the time for their ability to reduce the disease causing potential of medical waste. The technologies that EPA examined in 1990 included incinerators and autoclaves (both on site and off site), microwave units, and various chemical and mechanical systems.

4. What conclusions did EPA draw from the 2-year demonstration program?
   From the information gathered during this period, EPA concluded that the disease-causing potential of medical waste is greatest at the point of generation and naturally tapers off after that point, thus presenting more of an occupational concern rather than a generalized environmental concern. Risk to the general public of disease caused by exposure to medical waste is likely to be much lower than risk for the occupationally exposed individual.

5. How is the incineration of medical waste regulated?
Currently, over 90% of potentially infectious medical waste is incinerated. In August 1997, EPA promulgated regulations governing the emissions from Medical Waste Incinerators. These regulations include 1) stringent air emissions guidelines for States to use in developing plans to reduce air pollution from medical waste incinerators built on or before June 20, 1996, and 2) final air emission standards for medical waste incinerators (MWIs) built after June 20, 1996.
These guidelines and standards will substantially reduce MWI emissions. EPA estimates that mercury emission will decline by 94%, particulate matter by 90%, hydrogen chloride by 98%, and dioxin will be reduced by 95%.

6. Are there alternatives to incineration for treating and disposing of medical waste?
EPA's MWI standards and guidelines will affect the use of alternative technologies for treating medical waste. Because the new standards will be expensive to comply with, EPA estimates that few health care facilities are likely to install new MWIs and many facilities are likely to discontinue use of existing MWIs (we expect that 50% to 80% of the 2400 existing MWIs may be discontinued). Instead, facilities are likely to switch to other methods of waste disposal such as off-site commercial disposal or onsite disinfection technologies.

Here are many alternatives to incineration of this waste stream. Alternatives include thermal treatment, such as microwave technologies, steam sterilization, such as autoclaving, electropyrolysis and chemical mechanical systems, among others.

EPA has jurisdiction over medical waste treatment technologies which claim to reduce the infectiousness of the waste (i.e. that claim any antimicrobial activity) by use of a chemical. This jurisdiction comes from the Federal Insecticide, Fungicide and Rodenticide Act (**FIFRA**). Companies wishing to make such claims must register their product under FIFRA through EPA's Office of Pesticide, Antimicrobial Division.

Many states have regulations requiring medical waste treatment technologies to be certified, licensed, or regulated. Individual states have their own requirements. Many states refer to a document called, Technical Assistance Manual: State Regulatory Oversight of Medical Waste Treatment Technologies, developed by the State & Territorial Association on Alternative Treatment Technologies.

7. Do other Federal Agencies regulate potentially infectious medical waste?
Yes. Several Federal agencies have regulations which cover this waste stream. Refer to the list of several of the main ones on the front page of the list of regulating agencies.

8. Is EPA involved in any pollution prevention activities within the health care industry?
One June 24, 1998, the EPA entered into a voluntary partnership with the American Hospital Association (**AHA**) and its member hospitals to: 1) virtually eliminate mercury waste generated by hospitals by 2005; (2) reduce overall hospital waste volume by 33 percent by 2005, and 50 percent by 2010; and, (3) jointly identify additional substances to target for pollution prevention and waste reduction opportunities.

A number of workgroups have been convened to help achieve these goals. The workgroups include, but are not limited to: Baseline Data Collection, Model Mercury Virtual Elimination Plan, Model Comprehensive Waste Reduction Plan, Education Seminars, Awards Program and Clearinghouse of Best Practices and Service Providers.

Medical Waste disposal is regulated at the state level and we recommend that you look at the State Laws & Regulations to see what laws apply in your state.
Other Federal Agencies regulate different aspects of Medical Waste Management:

- Department of Transportation HAZMAT (DOTRSPA)
  Regulates Medical Waste transportation
- Food and Drug Administration (FDA)
  Regulates medical devices such as sharps containers which are designed to safely contain used needles
- Nuclear Regulatory Commission
  Regulates some types of radioactive medical waste
- Occupational Safety & Health Administration (OSHA)
  Regulates Medical Waste in the workplace
- US Postal Service (USPS)
  Regulates Medical Waste in the postal system

Other Agencies of interest in Medical Waste Management:

- Underwriters Laboratory (UL)
  Environmental and Public Health product certification programs

Chapter 6 Exercise

1. EPA has regulations governing emissions from Hospital/Medical/Infectious Waste Incinerators as well as requirements under the____ for medical waste treatment technologies which use chemicals for treating the waste. The RCRA Hotline also provides up-to-date information on several EPA programs.

2. ___________________________ is generally defined as any solid waste that is generated in the diagnosis, treatment, or immunization of human beings or animals, in research pertaining thereto, or in the production or testing of biologicals.

3. Are there alternatives to incineration for treating and disposing of medical waste?

4. Which other Federal Agencies regulate potentially infectious medical waste?

5. Is EPA involved in any pollution prevention activities within the health care industry?

6. What agency(ies) regulate wastes generated at health care facilities?

7. What is the Medical Waste Tracking Act (MWTA)?

8. How is the incineration of medical waste regulated?

9. ____________________: One dose or multiple doses of short duration spanning less than or equal to 24 hours.

10. ____________________: Any poisonous effect produced within a short period of time following an exposure, usually 24 to 96 hours.

Scenario: While you were having your Household Hazardous Waste Collection event in which you specifically advertised "No Medical Waste will be accepted" Later, you were surprised that the "No" was not printed in the local newspaper. You also had people drop off unknown 5-gallon buckets claiming that they were paint buckets and that you later found out that they contained medical waste.

Explain how you handled this situation.

Chapter 7 Tires

Tires

In 1996, the United States generated approximately 266 million used scrap tires. Historically, these scrap tires took up space in landfills or provided breeding grounds for mosquitoes and rodents when stockpiled or illegally dumped. Fortunately, markets now exist for 76 percent of these scrap tires—up from 17 percent in 1990. Through innovative uses of scrap tires, these markets continue to grow. The remaining scrap tires are still stockpiled or landfilled, however.

Every year, the United States faces the task of managing millions of scrap tires generated by an ever-growing population that relies on vehicles as the most popular means of transportation. In 1998 alone, approximately 270 million scrap tires were generated in the United States, weighing 3.4 million tons. When tires are illegally stockpiled or dumped, they can pose a hazard to human health and the environment. Tire piles act as breeding grounds for rats and mosquitoes, and they are also prone to fires, which are very hard to extinguish and emit many noxious pollutants to the air, water, and soils.

Many states have targeted this problem by restricting land disposal of tires, setting up recycling programs, and trying to develop markets for the collected scrap tires. Bans on disposing of scrap tires in landfills are in effect in 33 states, and over 30 states collect disposal fees on tires to fund disposal and management and, in some cases, to support research and market development for tire recycling

Over the past decades, many innovative uses have been found for recycled tires. For example, ground rubber from scrap tires is recycled into rubber products, such as rubber-modified asphalt, playground cover, and flooring material. Tire material has also been employed as an alternative to pea stone in septic systems. Facilities such as cement kilns and pulp and paper mills use scrap tires as a combustion fuel, burning approximately 42 percent of all scrap tires generated annually and utilizing the energy.

Tires produce the same amount of energy as oil and 25 percent more energy than coal. New technologies and pollution control equipment allow facilities to burn tires at high temperatures, reducing air emissions.

Despite the fact that alternative uses for scrap tires exist, it is estimated that roughly 500 million scrap tires were lying in stockpiles as of 1998 (Scrap Tire Use/ Disposal Study: 1998-1999 Update, Scrap Tire Management Council, September 1999). To further alleviate the scrap tire problem, more actions must be taken farther up the product chain. Beyond recycling, there is work underway by some tire manufacturers to increase the recycled content of new tires they manufacture to reduce the use of virgin materials and, at the same time, provide a significant end market for scrap tires. Manufacturers also strive to design tires with increased durability, thus prolonging the useful life of tires. Lastly, reuse of scrap tires via retreading gives tires a new useful life. Combustion and tire-derived fuel

The leading use for scrap tires is combustion fuel. Tire combustion should no longer bring to mind large billowing clouds of thick black smoke and offensive odors. New technologies and pollution control equipment burn tires at higher temperatures and reduce air emissions. In addition, cement kilns and pulp and paper mills supplement more traditional heating fuels, such as oil and coal, with scrap tires. These facilities burn approximately 57 percent of all scrap tires generated annually. A beneficial alternative when used as fuel, tires produce the same energy equivalent as oil, and an equivalent 25 percent higher than coal.

Retreads
Another market for scrap tires involves removing the outside, or tread, of the tire and adding a new tread—retreading. Retreading saves millions of gallons of oil each year as it takes only 7 gallons of oil to retread a used tire compared to 22 gallons to produce a new tire.

Retread tires not only offer considerable environmental and economic benefits, but they also provide quality, comfort, and safety comparable to that of new tires. For years, retread tires have been safely used on school buses, trucks, cars, fire engines, and other emergency vehicles. Retreaders sell approximately 33 million retread or recapped tires annually.

Civil engineering projects
In 1996, civil engineering projects used 10 million scrap tires to create artificial reefs, boat bumpers, crash barriers at racetracks, playground equipment, slope stabilizers, and erosion layers on dams.

Benefits of Retread Tires
- **Save resources by requiring 70 percent less oil for production.**
- **Contain 75 percent postconsumer material.**
- **Cost 30 to 70 percent less.**
- **Save landfill space.**

Grinding tires
Another growing recycling market is the use of ground scrap tires in running tracks, playground surfaces, and shoe soles. Ground tires provide cushioning, maintain traction and shape, improve drainage, and are durable. Highway departments also mix ground tires with asphalt for paving because the mixture can last longer than asphalt alone. About 24.5 million scrap tires, or 9 percent, are recycled through the use of ground rubber from scrap tires or by using cut, stamped, or punched rubber from scrap tires.

Landfill disposal
Even with all of the reuse and recycling efforts, almost one quarter of the scrap tires end up in landfills each year. Landfilling scrap tires can cause problems due to their uneven settlement and tendency to rise to the surface, which can harm landfill covers. To minimize these problems, many states require chipping or grinding of tires prior to disposal.

One innovative approach under development incorporates chipped/ground tires into the landfill itself as part of drainage or gas and leachate collection layers.

Stockpiles and Illegal Dumping

Over the years, more than 800 million scrap tires have accumulated in stockpiles. A tire's physical structure, durability, and heat-retaining characteristics make these stockpiles a potential threat to human health and the environment. The curved shape of a tire allows rainwater to collect and creates an ideal habitat for rodents and mosquitoes.

Prone to heat retention, tires in stockpiles also can ignite, creating fires that are difficult to extinguish and can burn for months, generating unhealthy smoke and toxic oils. Illegal tire dumping pollutes ravines, woods, deserts, and empty lots. For these reasons, most states have passed scrap tire regulations requiring proper management.

EPA Scrap Tire Publications

To obtain any of the following documents, call the EPA RCRA, Superfund, and EPCRA Hotline at 800 424-9346; TDD 800 553-7672 (hearing impaired); in the Washington, DC, metropolitan area, 703 412-9810, TDD 703 412-3323.

- *1997 Buy Recycled Series: Vehicular Products*
- *Air Emissions from Scrap Tire Combustion. EPA600-R-97-115.*
- *Analysis Of Ambient Monitoring Data In The Vicinity Of Open Tire Fires*. EPA453-R-93-029. 1993.
- *Environmental Fact Sheet: EPA Guideline for Purchasing Retread Tires*. EPA530-SW-91-045. 1991.
- *Environmental Fact Sheet: Purchasing and Maintaining Retread Passenger Tires*. EPA530-F-95-019. 1995.
- *Guideline For Federal Procurement of Retread Tires; Final Rule*. EPAOSW-FR-90-005. 1988.
- *Profile of the Rubber and Plastics Industry*. EPA310-R-95-016. 1995.
- *Project Summary: Characterization of Emissions from the Simulated Open Burning of Scrap Tires*.
  EPA600-S2-89-054. 1990.
- *Project Summary: Pilot-Scale Evaluation of the Potential for Emissions of Hazardous Air Pollutants from Combustion of Tire-Derived Fuels*. EPA600-SR-94-070. 1994.
- *State Scrap Tire Programs: Quick Reference Guide*. EPA530-B-93-001. 1993.
- *Summary of Markets for Scrap Tires*. EPA530-SW-90-074B. 1991.
- *Writing Business Plans for Recycling Enterprises: Plastics, Glass, or Rubber.* Association of Small Business Development Centers, funded through EPA. 1998.

Chapter 7 Exercise

Scenario: The City Manager was happy with your composting assignment and was delighted with your logo and artwork. He said that the Garden Club and Rotary wants him to return and give more presentations. The City Manager likes that. He would like for you to purchase a tire costume and come to his presentations as a Tire Ambassador.

For some reason, you have suggested a Tire Recycling or Proper Disposal Campaign outreach awareness program and would rather focus the resources in developing a friendly mascot/logo/mission in which the City Manager can distribute coffee cups and other items instead of dressing as the Tire Ambassador. You think that he will get more positive publicity with this approach at these meetings.

Assignment: The City Manager wants you to design this mascot/logo/mission/slogan with or without artwork and have it printed on coffee cups before the next Rotary meeting.

Chapter 8 Used Motor Oil

Used Motor Oil

Mismanagement of used motor oil is a serious, but little-recognized, environmental problem. Every year, privately owned automobiles and light trucks generate over 300 million gallons of used crankcase oils. The majority of this oil -about 200 million gallons per year - is generated by individual consumers ("***do-it-yourselfers***," or DIYs) who change their own oil.

All automotive oils can be recycled safely and productively, saving energy and avoiding environmental pollution. Unfortunately, most DIY used oil is handled improperly.

Some is emptied into sewers, disrupting treatment plants or going directly into waterways. Some is dumped directly onto the ground to kill weeds or is used to suppress dust on dirt roads. Millions of gallons are thrown into the trash, often ending up in landfills, from which the oil can contaminate ground and surface water. Only 10 percent is properly collected and sent off for recycling.

This mismanagement causes needless damage to streams, groundwater, lakes, and the oceans and wastes a valuable nonrenewable resource, causing us to be more dependent on foreign imports of oil. For instance:

- The Coast Guard estimates that sewage treatment plants discharge twice as much oil into coastal waters as do tanker accidents - 15 million gallons per year versus 7.5 million gallons from accidents. A major source of this pollution is dumping of oil by do-it-yourselfers into storm drains and sewers.

- More than 40 percent of the water quality trouble calls received in the Seattle area are related to used oil and other wastes dumped down storm drains, usually by do-it-yourselfers, contaminating water bodies.

To solve the used oil problem, we must stop careless, destructive practices and make sure that oil is, in fact, recycled. Dealing with the millions of sources involved demands a bottom-up, rather than a top-down, approach. Improving used oil management is one area where local governments, often working with private sponsors and civic organizations, are in an ideal position to help solve a major environmental problem.

Facts about Used Oil

The damage used oil causes comes from mismanagement.

Re-refining used oil takes only about one-third the energy of refining crude oil to lubricant quality.

If all used oil improperly disposed of by do-it-yourselfers were recycled, it could produce enough energy to power 360,000 homes each year or could provide 96 million quarts of high-quality motor oil.

One gallon of used oil used as fuel contains about 140,000 Btu of energy.

A gallon of used oil from a single oil change can ruin a million gallons of fresh water - a year's supply for 50 people.

Concentrations of 50 to 100 parts per million (ppm) of used oil can foul sewage treatment processes.

Films of oil on the surface of water prevent the replenishment of dissolved oxygen, impair photosynthetic processes, and block sunlight.

Oil dumped onto land reduces soil productivity.

Toxic effects of used oil on freshwater and marine organisms vary, but significant long-term effects have been found at concentrations of 310 ppm in several freshwater fish species and as low as 1 ppm in marine life forms.

Publicity about used oil recycling can triple do-it-yourselfer participation!

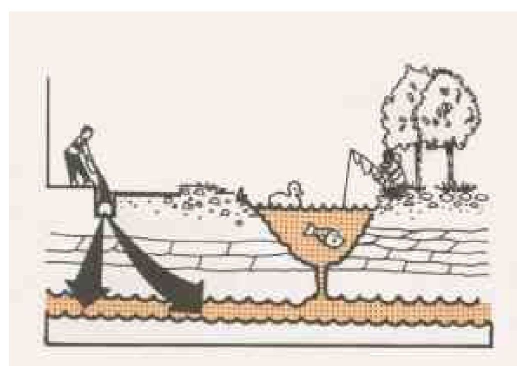
Estimate of disposition of DIY used oil in 1981

21% Miscellaneous (42 million gallons/year) (used on machinery, stored, used as a pesticide, used to treat wood, etc.)

4% Burned (8 million gallons/year)

14% Taken to service stations or recycled (28 million gallons/year)

40% Disposal (80 million gallons/year) (poured on roads, driveways, yards, or into sewers)Put in trash or garbage to be collected (42 million gallons/year)



"***Do-it-yourselfers***" mismanage at least 61% of the oil they handle.

(NOTE: Some miscellaneous uses can also constitute mismanagement.)

[Source: Analysis of Potential Used Oil Recovery from Individuals, Market Facts Inc., March 1981]

The Used Motor Oil Situation Today

With the broad national decline in recycling programs of all kinds, undesirable DIY practices are increasing. Even as early as 1981, studies estimated that at least 60 percent of DIY oil was either dumped (emptied into sewers or spread on roads, driveways, and yards) or simply thrown into the trash. Only 14 percent of used oil was taken to service stations or other collection points for proper recycling. Today, although comparable figures are not available, indications are that recycling rates are even lower.

Fortunately, interest in the used oil issue is on the upswing. By 1988, over half the states either had a used oil recycling program or were planning to start one.

Existing programs are successful. Michigan, which started its program as a pilot in 1979, expanded it in 1982 to include the entire state using funding from both state and private sources. With recycling centers in 62 of its 83 counties, Michigan estimates that its program recycles an extra 1 million gallons of DIY used oil per year. Since the State of Washington began a public education campaign in 1987, DIY recycling increased 21 percent over 1986. Virginia has one of the most active DIY used oil recycling programs on the East Coast, providing 527 collection centers, mostly at service stations. In 1987, it reported 327,000 gallons of DIY oil collected - about 620 gallons per station.

What Communities Can Do About Used Oil

This section was written to help local officials or civic groups set up programs encouraging do-it-yourselfers to recycle their motor oil and to make sure that each community's used oil is handled safely and responsibly, conserving a valuable resource and preventing environmental damage. Drawing on the experience of many states and municipalities across the country, it covers a variety of issues: step-by-step design of an appropriate program, costs and logistics of implementation, publicity, and the organization of public and private groups. It also contains useful references and materials, including facts and figures on the problem itself, lists of state programs that can provide support, and sample publicity materials.

History Of the Used Oil Problem

During the 1960s, automotive engine oil market distribution patterns changed radically. Service station sales gave way to sales in retail stores. Major oil companies began selling large volumes of automotive oils through retail outlets because sales volumes permitted widespread discounts. Many stores began using oil as a "***loss leader***," losing money on the oil but making it up with sales of other items to consumers who came to buy oil.

In 1961, service stations accounted for about 70 percent of all sales of lubricating oil for passenger cars. Ten years later, at the onset of the energy crisis, this share dropped to about 50 percent, while mass marketers such as convenience stores and supermarkets expanded their sales share from 7 percent to 28 percent - a fourfold increase. Today, mass marketers outsell service stations 8 to 1.

High energy prices contributed to the shift toward do-it-yourself oil changing and, for a time, also encouraged a strong recycling industry since used oil and crude prices rise and fall in parallel. In 1983, for instance, when crude oil cost about $29 per barrel, service stations and other collectors were paid up to .40 per gallon for used automotive oil. Retail lubricating oil outlets, such as Sears, accepted used oil throughout the country while the Muscular Dystrophy Association set up well-publicized community programs, using oil collection proceeds to support their organization. Today, with crude oil prices less than half the 1983 levels, used oil recycling has changed. Most service stations have to pay a small amount per gallon to have used oil taken away and others that once accepted used oil from do-it-yourselfers either no longer do so or now charge a fee. Recycling centers, established only as pickup points for used oil collectors, also no longer receive fees and often no longer cover all their own costs. This fundamental change in the economics of recycling has greatly reduced voluntary efforts.

Basic Elements of an Oil Recycling Program

In many cases, local recycling programs are cooperative efforts between local governments (towns, cities, and counties) and one or more private or semiprivate sponsors, such as environmental or civic groups, or service organizations. Local governments often assist in collecting used oil through collection centers or curbside pickup.

Sponsors often help governments design and organize their programs, run the publicity campaigns and outreach, and enlist the help of resourceful and committed volunteers.

Other arrangements can be equally successful such as those run entirely by local governments or by private sponsors. Private companies can also help - used oil haulers and recyclers may act as business sponsors; car dealerships or local oil retailers also reap benefits from the publicity and customer goodwill these programs generate.

If you are thinking of setting up an oil or any other environmental program, consider the following basic pointers:

1. Learn the facts about used oil in your state: Call your state DIY used oil recycling coordinator or environmental protection agency for information on the status of DIY used oil recycling in your state.

2. Bring the most effective participants together: If your local government is thinking of sponsoring a program, seek out community sponsorship. If your community group is willing to sponsor a program, you may want to identify the most appropriate local government agency with which you can work and secure the maximum support from local business.

3. Design and implement the program as a group: Work together with the other participants to decide how the program will run - the type of pickup it will use, who will collect and recycle the used oil, how the program may link with other local recycling efforts, how it will be publicized, and so on.

General issues may include enlisting additional volunteers, soliciting funds, finding haulers and recyclers and assessing their performance, running collection operations, and tracking progress and accomplishments.

Key Issues Before You Commit to Action

Recycling used oil can be a rewarding experience. It is an ideal way for interested groups to get constructively involved in environmental action because it deals with an important environmental problem that is best addressed at the local level.

A successful program demands commitment, energy, and sustained involvement. Before you begin, make sure that you're prepared to deal with the following fundamental needs:

- Ensuring adequate resources: Used oil recycling programs are not expensive to run and can rely heavily on volunteer labor and in-kind contributions. They do need money, however, for purposes like equipping pickup or collection operations and designing, printing, and mailing publicity materials. States may offer financial assistance, but each local program will probably have to raise money on its own as well.

- Properly managing used oil risks: Programs must prevent other materials from being mixed with used oil. Mixing can be environmentally damaging and also may prevent haulers or recyclers from accepting your used oil.

- The key point do-it-yourselfers must understand is never to mix used oil with gasoline, solvents, pesticides, or other household chemicals before recycling. Small businesses and consumers also must never use collection centers as dump sites for solvents or other hazardous materials.

- Paying adequate attention to haulers' and recyclers' performance: The most obvious and dramatic environmental damage caused by used oil in recent years has been traced to unsafe hauling and recycling operations. One of the most important contributions to environmental quality local programs can make is to conduct a "safety assessment" of the performance of current and prospective haulers and recyclers in their areas.

This section should help you address these issues effectively. Rely on it for basic information and ideas, but be creative, too!

Public Perceptions of the Harmfulness of Various Used Oil Practices

Use as fuel for oil furnace	66%
Use as weed killer	75%
Applying to roads	53%
Burying in the ground	77%
Placing in closed container in the trash	88%
Pouring down the sewer	95%
Pouring on the ground	9%

Most consumers recognize the damage that can be done by used oil, yet only 14 percent of DIY used oil has been recycled in recent years.

Source: Analysis of Potential Used Oil Recovery from Individuals, Market Facts Inc., March 1981

State Law prohibits the disposal of oil by emptying it in the sewers or storm drains, putting it in the garbage, or pouring it on the ground.

Organization of the Effort: Cooperation Is the Key

Local recycling programs can be operated by various groups working independently or together. Participants might include a local civic association, such as an environmental group or a service organization, an agency of the local government, such as the department of public works or the sanitation department, or a local business or trade group. Support from other civic groups, business people, and other local leaders is also helpful.

Whoever is involved, programs usually have a primary sponsor in either the government or the private sector. The sponsor's activities can vary widely, depending on available resources and expertise. Some civic group sponsors can be directly involved in actually collecting oil, but collection may often be left to a private business or to a local government department.

Key sponsor activities include:

- Research: The sponsor should research local DIY used oil recycling problems, potential new collection sites, the state DIY recycling program (if one exists), haulers and recyclers, and sources of financial and in-kind support.

- Program Design: The sponsor should help design the program itself, choosing likely central collection points, enlisting the cooperation of service stations or retailers, working out the logistics of curbside collection, designing publicity, and coordinating the used oil program with other local recycling efforts or household hazardous waste collection programs.

- Publicity/Education: This is often the most essential activity of sponsors. Sponsors should create news coverage in local media, line up speakers and speaking engagements, design and distribute signs and bumper stickers, and run a variety of media events or other promotional activities to publicize the program.

Roles and Relationships of Participants
Government

Depending on the local government's available resources, it can take a major or a minor role in the program. Local governments can conduct used oil recycling programs entirely on their own, but may find programs are more successful, and more affordable, if local groups carry much of the responsibility, including taking the lead as the primary sponsor. A common role of local government is to coordinate collection, leaving civic groups, private business, or other participants to handle research, program setup, and promotion. Governments can also play a leadership role by procuring products made with recycled used oil.

Civic Groups

Civic groups can provide essential resources - people and time. They add credibility to the local program by lending their names to publicity and helping gain access to the local media and influential local leaders. They also can provide essential resources to the program itself - volunteers, a central phone for citizens to call for information about the program, and, perhaps, a central office. They can also raise funds or solicit in-kind services for brochures, telephones, printing, advertising, and office expenses.

Many effective local civic groups are linked to national organizations, especially organizations that have already supported used oil programs at the local level (such as the League of Women Voters). Some criteria for effectiveness include:

Size: Larger organizations have more depth (more volunteers, more funding) and, in most cases, more credibility with the community.

Stability: The older the organization, the more likely that it will remain available to continue the used oil program.

Management ability: A used oil program needs good management. The sponsor should have a track record of handling similar complex projects.

Compatible aims: The sponsor goals should be reasonably compatible with those of the recycling program. Environmental organizations are likely candidates, but used oil can be a high-priority issue for other groups, too. In agricultural areas, for instance, 4-H or the Future Farmers of America may have an interest in helping farmers to recycle oil and not to misuse it as a pesticide on animals or for dust suppression.

Potential Sponsoring Organizations

The following are examples of groups that could sponsor an used oil or another recycling program

Civic Organizations - League of Women Voters, Loins, Jaycees, Volunteer Fire departments, garden clubs

Educational Groups - Cooperative Extension Service, PTA

Environmental Groups - Audubon Society, Sierra Club, Izaak Walton League

Service Groups - American Legion, Elks Club, Lions Club, Loyal Order of the Moose, Kiwanis Club, Rotary Club, Veterans of Foreign Wars

Youth Groups - 4-H Club, Future Farmers of America, Boy Scouts, Campfire Girls

Local Government Groups - Environmental Protection Office, Mayor's Office, Public Works Department, Sanitation Department, Water and Sewer Department

Local Industry or Business Groups

Local businesses can provide and manage DIY collection centers, contribute money and resources to promote the program, conduct their own promotions, provide speakers for public and private meetings, and help organize other groups.

In soliciting participation from businesses, look first to those with a special interest in oil sales or recycling -haulers, recyclers, or sales centers (convenience stores, discount centers, automotive parts outlets).

Local business associations, such as those serving oil distributors or car dealerships, can be invaluable in promoting the program overall and in coordinating participation among their memberships.

Finding a Sponsor

Every community will probably have many potential candidate organizations that can sponsor or participate in a used oil or any other recycling program (see list on this page). Whether you are an individual, belong to a service organization, or work for a government agency, the first step to take before contacting other possible participants is to gather basic information and sketch out the programs tentative goals and objectives. You can then approach others with a reasonably specific proposal.

Sources of Outside Endorsement
Business leaders
Chairperson of local Chamber of Commerce
City/county commissioner
City Council Director
Civic group leaders
Director of state energy office
Director of state used oil program
Environmental leaders
Fire Chief
Mayor
Governor
Director of state motor vehicle administration
Newspaper editor
School board members
Legislators (state and federal)
American Petroleum Institute local chapter president
Radio or TV personalities
Director of state natural resources or environmental protection department

Assembling the Facts

The next step is to gather all pertinent factual information on the used oil recycling situation in the area in which you plan to build a program. Your program's civic or business sponsors are usually the appropriate groups to conduct this research. Use your network of contacts at the state and local level, as well as any other identified groups offering technical support.

Questions to research before designing a program include the following:

- Have used oil recycling programs been attempted before?
  If so, what was their experience?

  Contact groups that might have prior experience in sponsoring used oil recycling programs, including groups like the local chapter of the Izaak Walton League.

- Are there any particular local environmental problems needing special attention in your area?

  Examples might include dumping oil into sewers, which causes disruption of treatment plants or pollutes waterways, or changing oil on public lands. Contact the city government or environmental groups for this kind of information.

- Where do do-it-yourselfers buy their oil, and about how much is sold?

Check convenience stores, auto discount stores, department stores, supermarkets, and other possible outlets; they will be among the best places to advertise the program.

- What used oil haulers and recyclers are currently active in the area, and have they performed adequately?

Get names from service stations, the Yellow Pages, and state and local used oil programs. Be in touch with your state environmental protection agency and other used oil programs for information about the performance of these haulers and recyclers.

- Do any publicly accessible collection points now exist?

Check service stations, fire stations, landfills, car dealerships, taxi and rental car fleet garages, auto discount stores, and local governments.

- Where should convenient additional points for collecting used oil be located?

Consider high-traffic areas in the city center or popular shopping areas.

- Does the community support any other recycling efforts with which a used oil program could be linked?

Examples include drop-off stations, buy-back centers, and curbside collection of newspaper, aluminum, plastics, and glass.

- Does the community have a program to collect household hazardous wastes (solvents, paints, pesticides, etc.)?

Check with the local public works or environmental department. It may be possible to include DIY used oil recycling in their collection program.

- What local, state, and federal standards will apply to the program?

These could include standards for health, zoning, spill control, and fire prevention; containment specifications; and waste management requirements. Check with your local government and with your state used oil coordinator.

- What kind of interest might the local media generate?

Contact newspapers and radio and TV stations.

- What kind of finding or technical support can you tap into?

Consult your state program or neighboring local programs first. Your own organization, local businesses, and local government are other good sources.

Setting Program Goals

To guide the actual design of the program, it is important to lay out its goals and objectives as clearly as possible.

If specific local environmental problems need attention, focus on solving them first. Problems might include the dumping of oil into sewers, do-it-yourselfers changing oil in parks or other public areas, poor performance of local used oil haulers or recyclers, or lack of segregation of household hazardous wastes (such as pesticides, antifreeze, paint thinners, household cleaners, and contaminated rags) from used oil prior to recycling.

Likely Collection Station Locations

Auto supply stores
Automobile service stations
Convenience stores
Discount stores
Car dealerships
Retail outlets that provide oil changing service
Recycling drop-off centers
Fire stations
State auto inspection stations
Municipal garages
Government and private garages
Landfills open to the public (especially in rural areas)
Marinas

Other goals could include linking the used oil program with other local recycling programs for paper, glass, or aluminum. Where established household hazardous waste programs exist, these too might well be integrated with the used oil effort.

Plan now how you will evaluate program progress. Not only will a formal tracking system help in managing the program and allocating dollars and volunteer efforts where they are most needed, but any facts you gather will be highly useful to state and federal programs interested in promoting used oil recycling.

Deciding on Collection Methods

The collection system is the cornerstone of the entire program. The more convenient and accessible the collection, the more used oil will be returned for recycling. Of the several methods available, choose the one best suited for your local area and your available resources.

The two basic collection programs are (1) at curbside, either as a regular part of trash and garbage collection, or as part of pickups for other recyclable materials (such as glass, plastics, aluminum, and paper), and (2) at central collection stations. Curbside collection is the more convenient, and therefore the more effective method.

Curbside Collection

Used oil can be collected at the curb with regular trash pickup or with other recyclables. The used oil program must work with the collectors so that they can integrate used oil into their operations. Trash collection trucks or trucks designed for collection of recyclables can be retrofitted with a used oil collection tank or a rack on which to store containers of used oil.

The used oil will need to be transferred from the truck to a holding tank until it is picked up by a reputable hauler.

This approach is being successfully used in several areas of the country. Curbside collection must be continually announced and promoted.

Willingness of Consumers to Recycle Used Oil Given
Various Incentives

If they had a special container to hold oil
If a collection center existed where oil was purchased
If oil were picked up at their homes
If service stations nearby would take used oil
If they could take it to where they shop for pickup
If they could take it to a convenient place

A large majority of the public says it would be willing to recycle oil properly if it were convenient.

[Source: Analysis of Potential Used Oil Recovery from individuals. Market Facts Inc., March 1981]

Finding a Hauler/Recycler

The used oil, whether from central collection points or at curbside, must be picked up in a timely manner by responsible, authorized used oil haulers and sent to reputable recyclers. Your program must ensure that haulers:

- Have valid licenses and operate in a safe and environmentally sound fashion.

- Maintain regular records of quantities of used oil collected, delivered, and handled.

- Deliver used oil to reputable management facilities.

The last requirement is probably the most important. Environmental damage linked directly to used oil mismanagement tends to be associated with substandard recycling facilities.

Haulers and recyclers are often listed in the Yellow Pages. You will have identified used oil haulers and recyclers through your initial contacts with commercial facilities that recycle oil and through the state used oil program.

If possible, you should evaluate recyclers to check that their operations are environmentally sound. Although much may be evident from a visit (substandard operations tend to look substandard), important shortcomings may not be evident to the lay person. The heart of every operation is the materials being processed. A recycler should know where its used oil is coming from, should check the oil it receives to see whether it is acceptable for processing, and should store it properly on site. Good operations have documented procedures for accepting oil, require laboratory checks of each shipment, and keep each client's oil segregated until after testing. Their receiving and storage areas are neat and clean, with no evidence of spills, and their storage areas include containment berms or other containment enclosures.

A processing area in a good recycling operation will likewise include containment measures to prevent losses and contain spills. Closed process systems are more desirable than open systems; they prevent vapor losses and should be free of strong odors. The basic concern in processing is to avoid uncontrolled losses that might result from haphazard processing or lack of maintenance.

Product storage areas - like receiving areas - should be neat and clean, with no evidence of spills. If the product is transferred to drums for shipment, the main storage area should include containment protection. Finally, all recyclers should be in compliance with all applicable state and federal requirements. You should check to make sure all necessary inspections have been conducted and that any violations noted during inspections have been corrected. After talking to the facility operator, you can verify your findings by calling the appropriate agencies and speaking with the local inspector.

Antifreeze Storage Containers, You should plan on having a steady stream of anti-freeze at your collection facility.

Ideas for Promoting an Used Oil or any Other Environmental Program
Once the basic framework of the program has been set up, the most important next step is to make the public aware of the program. The typical do-it-yourselfer is usually a male between 16 and 45 years old (people older than 45 usually have their oil changed for them). Many of those younger than16 will be driving someday and may become do-it-yourselfers. Your campaign should therefore have three targets – current do-it-yourselfers, young people in school, and the general public.

Promotional activities for a used oil recycling program should have two goals - first, to educate the public about the used oil problem and to encourage more responsible oil management and, second, to tell do-it-yourselfers exactly how to use the program to recycle oil.

Your educational efforts should raise awareness of the damage used oil can do, its value as a resource, and how to change auto oil in an environmentally sound manner. You should emphasize that used oil that is re-refined or made back into a motor oil is as good as regular oil and that purchasing recycled oil helps support the used oil re-refining industry. Encourage the purchase of re-refined oil where it is available. The publicity portion should alert do-it-yourselfers about (1) the location of collection points, (2) the availability of curbside collection (if any), (3) how to obtain appropriate containers, and (4) any other elements of your program aimed directly at the do-it-yourselfer.

Promoting a used oil program involves taking advantage of all possible opportunities to bring your message to the public, educating them about the importance of the used oil issue and how to manage their oil properly, and telling them how to take advantage of your program's services.

Since do-it-yourselfer activity is seasonal, your promotions may not have to run the full year, but education of the general public and young people can be a year-round activity.

The program should be in full operation during the time when do-it-yourselfers are most likely to change their oil – the spring through summer months. Have all collection sites in operation by the time warm weather arrives. Promotion should be in high gear one to two months beforehand to give do-it-yourselfers plenty of time to take advantage of new services. For instance, in the Northeast, a program might begin its publicity in March when winter weather is over. Publicity would peak in May and June, the spring months when most DIYs would be changing their oil, and again in September, the beginning of cooler weather. In the warmest U.S. climates, seasonal variations may be minor and you will want consistent, year round publicity.

Below are some suggestions of ways to promote your program. Although they introduce proven approaches, you should be creative and invent more ways yourself.

Program Kickoff

An open meeting is one way to kick off your program by combining public education and publicity to recruit more volunteers and increase participation among DIYs, potential collection centers, and local area leaders.

Time: Pick two hours on a weekday evening or a weekend day.

Invitations: Invite any community service organizations already interested, as well as representatives of business and government.

Press Coverage: Meet with a reporter from a local newspaper two to three weeks in advance. Provide the reporter with background information about the problem, your program, and the groups involved.

Announcements: Send public service announcements to local radio and TV stations stating the purpose of the meeting and its date, time, and location.

Press Release: One week before the meeting, send out a press release to local newspapers.

This first meeting will serve to get people involved. Stress the basics about the nature of the used oil problem and its solution. By the time the meeting is over, you should have a list of the names and phone numbers of additional volunteers.

If your state has a used oil recycling coordinator, he or she would be an excellent speaker at the kickoff meeting. This is also a time to call on local celebrities or community leaders to ask them to lend their influence to the program (see list of possible candidates in previous chapter).

Used Oil Recycling Hotline

The used oil program should, if possible, have a publicly advertised, local telephone "***hotline***" that people can dial during normal business hours (and if possible on weekends) to get information regarding collection center locations, how to obtain suitable used oil containers, and how to participate in the program as a volunteer.

This might be provided by the civic group sponsor, but could also be run by the local government. In addition, if your state has its own used oil hotline, that fact should be advertised locally as a part of your program.

Newspapers, Television, and Radio

(See water conservation chapter for more examples)
Public service announcements are a good way to get your message out through newspapers, television, magazines, and radio. There is usually no charge. You can use them as reminders to do-it-yourselfers to change their oil properly and take advantage of collection centers.

They are also invaluable for publicizing special events. Use public service announcements as a vehicle for outside endorsements from business and community leaders.

Full-length articles and editorials are another way to promote your program through newspapers, community newsletters, and local consumer publications. These may include feature articles by environmental editors or correspondents, editorials supporting the program, letters to the editor from prominent people in the community, and so forth. Solicit this type of coverage and be prepared to supply background material as necessary. Keep a list of press and media contacts for your area so that you can reach them quickly.

Where possible, generate news coverage of the program through announcements of special events, progress made, major contributions, new endorsements or testimonials, newly established collection sites, or tie-ins with other environmental and energy groups, businesses, or local government. Send out press releases and call reporters with developments as they occur. Radio and television offer special opportunities for publicity and education through participation of program members or supporters in public affairs shows.

A press release should answer the basic reporting questions of "who, what, when, where, and why." This information should be found in the first sentence or two of the release so the reporter or news department can quickly learn what the press release is about and decide whether it deserves coverage. Learn local press schedules and send releases so they reach reporters three or four days before the events you want covered.

Public Service Announcements on Radio and Television

All broadcast stations must provide airtime for public service announcements. Ask station managers about their requirements and format. Such announcements are not difficult to produce on television, they may be nothing more elaborate than a slide of your program logo with a brief audio message in the background. Many stations will work with public interest groups to design short, inexpensive announcements.

Samples:

15-second announcement:

IF YOU CHANGE YOUR CAR'S OIL YOURSELF, REMEMBER TO RECYCLE IT PROPERLY. CALL THE SPRINGFIELD USED OIL RECYCLING PROGRAM AT 222-7777 FOR THE LOCATION OF A COLLECTION STATION NEAR YOU. THAT'S 222-7777.

20-second announcement:

USED OIL IS NOT A WASTE. IT'S A VALUABLE RESOURCE, BUT IT CAN CAUSE SERIOUS HARM TO LAKES AND STREAMS IF THROWN AWAY. PROTECT THE ENVIRONMENT BY CALLING THE SPRINGFIELD USED OIL RECYCLING PROGRAM AT 222-7777 FOR THE LOCATION OF A CONVENIENT USED OIL COLLECTION STATION NEAR YOU. THAT'S 222-7777.

Never editorialize in a press release. On your press release you should provide the name of a person reporters can contact for additional information. Make sure, however, that this person actually does have additional information and will not simply repeat what is already in the release. If your program is new and unfamiliar to the media, attach a background paper to fill in the basics on the program itself.

News conferences are useful, too, but only if you have something substantial to announce (such as receiving a grant or establishing a cooperative working relationship with the city). If possible, have a local "name" on hand to add focus to the coverage. Also, try to hold the conference somewhere that will generate good pictures for the press or television - at a recycling center with trucks in the background, for example.

Posters, Handouts, and Brochures

Printed materials of all kinds can be distributed through many outlets. Posters with the program logo should be prominently displayed at all collection centers and, where possible at points of purchase. Brochures and leaflets can be distributed wherever motor oil is sold - especially at discount stores, supermarkets, and department stores catering to do-it-yourselfers. (See Appendix B for sample brochures and poster.) Handouts can be both educational and promotional, warning against pollution, teaching proper management techniques, and publicizing local collection programs.

Try to distribute these materials to everyone who may be a do-it-yourselfer by persuading stores selling lubricating oil to place them where the oil is displayed or near the cash register, or to insert them into each bag carried away. The local office of your state motor vehicle department may be willing to distribute them with licenses or registrations.

Bumper stickers are also effective, with very high visibility to exactly the right audience. They can be distributed (perhaps at the collection centers) to everyone who actively participates in or supports the program. Local motor vehicle fleets can be asked to put your bumper sticker on each of their vehicles to help promote the program.

Mailings and Mailing Inserts

Regular or special-purpose mailings are another powerful technique for education and publicity. Often local businesses, such as banks, department stores, insurance companies, or utility companies, can be convinced to include inserts or brochures from your program in their mailings as a public service. These can be used to remind people of collection center locations, as educational tools to instruct do-it-yourselfers on proper oil changing and oil management techniques, and so forth.

Schools

High schools are natural places to present short programs on the benefits of used oil recycling. Future do-it-yourselfers can be reached with information on the damages caused by used oil, how to change automobile oil properly, and how to participate in your local collection program - either as a recycler or as a volunteer helping run the program. Drivers' education classes are a perfect place to include this information. You may even be able to persuade your state to include used oil recycling in motor vehicle examinations or study guides.

Suggested Locations for Notices, Posters, and Promotional Materials

At point of purchase of oil (display, at cash register, as bag inserts)
Used oil collection stations
Municipal and other government offices
Public libraries
Chamber of Commerce information racks
Nature centers
High school auto shop classrooms
College bulletin boards
Grocery store bulletin boards
Office and factory bulletin boards
Bank lobbies
Banks and utility companies' monthly mailings

Incentive Programs

Beyond education and an appeal to public concern for the environment, incentive programs offering money and other prizes can be very useful for increasing participation. Such incentives include:

- Merchandise discount coupons given with the original purchase of motor oil, redeemable on return of used oil.
- Instant prizes issued on the return of used oil, redeemable for merchandise.
- Large-prize contest coupons, issued at the point of purchase and entered into a drawing when oil is returned to a participating collection center. Prize drawings could be held at regular intervals, such as quarterly, with winning numbers posted at participating collection points.
- Inexpensive kickoff prizes, such as funnels or used oil containers, offered at collection sites to all participants during the first days or weeks of the program.

Administrative Issues

This section discusses program management, funding and budget issues, tracking the progress of your program over time, and legal requirements.

Maintaining your Program

Collection centers, public displays, information centers, and other possible elements of your program will need to be maintained throughout the year. In addition to routine checks, schedule major maintenance activities at the beginning and end of the oil-changing season in your area -usually in the spring and fall. These are the times to renew or replace faded signs and posters, print new batches of brochures and fliers, and clean and maintain collection centers. Short-term volunteer labor can help. You could recruit extra hands from local high schools or scout troops or through public meetings.

Tracking Program Accomplishments

(Essential for the success of any environmental program)

Tracking the success of your program, while not essential, can help you manage and publicize it better - you can use the facts you gather to boast about success or publicize problems you need help to solve. Ask collection site operators and curbside pickup participants to report on a regular basis, monthly if possible, on the amount of used oil collected and turned over to used oil haulers. If money is being paid for the oil and is going to the collection sites rather than to the program, ask for copies of their payment records. In addition, ask haulers to report the amount of used oil collected and conveyed to recyclers.

Answering the following questions will help program tracking:

1. Is the program staying within its budget? If not, where can financial requirements be adjusted?

2. How much oil is being recycled each month? How do comparisons against the previous year's performance stack up - are trends up or down?

3. Which collection centers are the most successful?
   (Follow-up analysis may indicate why.)

4. Is the program complying with its schedule? Should it increase the frequency of curbside pickups?

5. Is oil being picked up from collection centers so do-it-yourselfers always find collection tank space available?

6. Are the collection centers having any problems with storage capacity, schedules, contamination, sanitation or housekeeping, incentives, publicity, or schedules of collection? If so, what techniques have been used at
other collection centers to solve these problems?

7. Are used oil collectors and haulers having problems with handling increased quantities of oil, routing, frequency of pickup, or contamination?

8. Which public education efforts have worked well? Which have not?

9. Which advertising efforts have brought the greatest response?

10. Are there any problems with incentive programs?

Some of this information will come from collection station operators. To minimize the burden on these operators, you might gather the information in person at two-month intervals during the oil changing reason and at six-month intervals off-season. Keep your questions short, direct, and simple to answer.

Since it is inconvenient to measure precise volumes of oil recycled, expect estimates rather than exact numbers. Be sure to express your thanks for each station's continued participation, preferably in follow-up letters as well as in person.

You will assemble other information, such as budget figures, from haulers (who should be keeping much more detailed and exact records than collection centers) or from the public (perhaps through informal surveys).

NOTE: Any statistics generated will also interest your state used oil coordinator and federal agencies interested in used oil issues (the U.S. Environmental Protection Agency (**EPA**) and the Department of Energy).

Legal Requirements

You and others involved in your program should be aware of any legal issues relating to health safety, and environmental performance that could affect your activities. There are a few federal requirements affecting used oil management; state requirements vary. EPA Regional Offices can provide information on current federal regulations. States may have their own laws and regulations governing used oil recycling; your state used oil program would be the authority on these and any other requirements.

Generally, the most significant legal issue is to keep used oil from being mixed with any hazardous waste. The easiest way is to prevent mixing used oil with any other substances. Since preventing mixing will be as important to a reputable hauler as it is to your program, all participants should be willing to cooperate on this issue.

Other important legal requirements include making sure that you are complying with local zoning, health, safety, environment, and fire laws. Contact the pertinent local agencies for advice.

Sample Brochure

WHAT HAPPENS THEN ?

Used oil can be re-refined into a good-as-new lubrication oil. Oil never wears out, it just gets dirty. It takes 42 gallons of crude oil to produce 2 1/2 quarts of new lubricating oil. But just one gallon of used oil can be re-refined into the same high quality 2 1/2 quarts of lubricating oil.

Used oil can be reprocessed into a fuel oil. One gallon of used oil reprocessed for fuel contains about 140,000 BTUs, of energy and can be burned very efficiently.

Recycling used oil could reduce national petroleum imports by 25.5 million barrels of oil per year, and save much of the energy to process it. (University of Alabama/ Alabama Energy Division, 1986.)

Washington State law declares that it is the policy of the state to collect and recycle used oil (Chapter19.114, RCW). Additionally, it is unlawful to spill oil into the ground water or surface waterways of the state (Chapter 90.48, RCW).

THE USED OIL PROBLEM: *What Can You Do?*

Waste oil has the most negative environmental impact of all automotive products because it's insoluble, persistent, and contains toxic chemicals and heavy metals. Oil sticks to everything from beach sand to bird feathers. It floats on and pollutes our waterways. It is slow to degrade and evaporate. A small amount seriously contaminates large quantities of drinking water.

HOW BIG IS PROBLEM?

More than 4.5 million gallons of used oil are discarded every year in Washington State.

More than 2 million gallons of used motor oil (enough to fill a medium sized tanker) ends up in Puget Sound. Much of it is dumped into storm drains that empty into streams and lakes that feed the Sound.

Used oil is the largest single source of oil pollution (over 40 percent) in our nation's waterways. Most is dumped by do-it-yourselfers.

In 1960, service stations performed 90 percent of the automotive oil changes. Today do-it-yourselfers change about 60 percent of the automotive oil.

Most used oil changed by do-it-yourselfers is dumped down a storm drain, poured on the ground, or sent off to a landfill in the garbage.

WHAT ARE THE EFFECTS?

Dumping of used oil in storm drains and on the ground pollutes watersheds, Puget Sound, and underground water supplies.

Used oil contains toxic chemicals, carcinogenic hydrocarbons and heavy metals (lead, zinc, arsenic, chromium, cadmium) which are harmful to the environment and public health.

One pint of oil can produce a slick of approximately one acre on surface water.

Fish, waterfowl, insects and aquatic life are threatened by used oil in waterways. Floating plankton and algae (a basic food source) are killed on contact with oil.

Very small amounts of oil rinsed over shellfish beds can contaminate the flavor of clams and oysters.

Less than 300 parts per million can ruin the taste of fish.

Used oil placed in the garbage seeps through the landfill to contribute to leachate and contamination of groundwater supplies.

One quart of oil will foul the taste of 250,000 gallons of water.

Used oil should not be applied to roads for a dust suppressant, as new oil sometimes is.

Over 90 percent leaves the road surface on dust particles or is rinsed into the state's waterways with rain runoff, according to EPA study.

Used oil carries a load of heavy metals and toxics.

Burning unprocessed used oil can pollute the air we breathe with elements potentially harmful to human health.

WHAT CAN YOU DO? RECYCLE!

RECYCLE used oil from cars, boats, motorcycles, and lawn mowers.

HOW ?

Take it in a clean, sealed container (i.e., milk jug) to the nearest participating recycling center or service station accepting uncontaminated used oil. For locations, call the Department of Ecology toll-free recycling hotline, 1-800-RECYCLE.

Current market fluctuations have eliminated many of the financial incentives of the used oil recycling program, and the service station owners may have to pay to have oil removed from their tanks. However, most participating stations have chosen to remain in the program.

Used oil should never be mixed with antifreeze, engine degreasers, gasoline, paint thinner, solvents, cooking oil, etc., since these contaminants interfere with the reprocessing or refining process and are very expensive to remove.

Appendix C:
Sample Letter to Prospective Collection Center Operators

(Date)

(Name)
(Address)

Dear______________________

We would appreciate your help in a community used oil recycling project designed to conserve energy and protect our environment.

We are planning a broad-scale program aimed at capturing used oil from do-it-yourself oil changers. The residents of our town will be encouraged to participate. They will be informed of the energy potential and the value of recycled oil - that it need not be wasted but can be reprocessed and used again.

As you know, many of our citizens change their own oil and would be willing to cooperate with us in this endeavor, but they need a convenient place at which to deposit their drainings. We are in the process of setting up used oil collection centers at which do-it-yourselfers can deposit their used oil. This oil will then be picked up by reputable used oil collectors to be reprocessed and prepared for use once again.

Would you consider extending your service by establishing a collection center for our project? You would be assisting many people who are now disposing of their drained oil in ways that harm our environment and waste a valuable energy resource. The used oil brought to the collection center would be yours to sell. While rendering a significant service, you would also be playing an important role in a community project that benefits you, the car owner, and the nation.

It is our belief that such a program can and will be successful if we work at it **TOGETHER**. Sponsors of the program include (names).

We hope that you will join us and will place a "**Recycle Used Oil Here**" sign at your station.

Please let us know at your earliest convenience if we can count on you. Write us at the following address: or call (phone).

Thank you for giving the program your consideration.

Sincerely,

Sample Letter to Encourage Participation

Dear___________________

Can we count on you to help our program to recover a potential source of energy, while at the same time eliminating an environmental hazard?

We are in the process of establishing a public service used oil recycling program that we feel would benefit our community and the nation. We would appreciate your advice and assistance in its development.

Used oil is a neglected but valuable energy resource. It can be recycled and put back to work as a lubricant or fuel. If used oil is not recycled and is discarded improperly, it can present a serious hazard to our environment. Throughout our community and nation, used oil is being wasted in surprisingly large amounts. (The Environmental Protection Agency and the Department of Energy estimate that the amount of oil mishandled annually in the U.S. by do-it-yourselfers exceeds 180 million gallons.)

Part of the reason for this waste is that automobile owners who change their own oil do not have proper disposal facilities for their drainings. As a result, used oil ends up in garbage or trash cans, storm sewers, or vacant lots. Eventually, it reaches and pollutes our streams and rivers. A combined effort to end this pollution by saving and re-using oil, thus conserving energy, will benefit all.

Our theme: **PROTECT OUR ENVIRONMENT-CONSERVE ENERGY RESOURCES**

Our slogan: **RECYCLE USED OIL**

A key feature of our program will be the establishment of a network of convenient used oil collection centers in our community. We hope to enlist the voluntary participation of civic-minded service station managers and business persons who are equipped and would be willing to handle used oil. Collection facilities might also be set up on public properties such as municipal garages, fire stations, or the area landfill or transfer station. Each collection point can be identified by a sign or poster. The discarded oil can then be sold to a recycler, who will ultimately reprocess it and prepare it for future marketing.

We will publicize the program and the collection centers through literature (brochures, etc.) and the media.

Your interest in, and active support of, our endeavor can help to make this much-needed public service a success. We would welcome your endorsement of our effort. Would you, or someone you designate, meet with us to share additional ideas and discuss approaches aimed at creating an effective program?

We welcome a response at your earliest convenience. You may call us at (phone) or write us at the following address: Thank you for giving the program your consideration.

Sincerely,

Sample Kickoff Press Release

FROM: DATE:

FOR RELEASE ON:

USED OIL RECYCLING PROGRAM BEGINS IN (COMMUNITY, CITY, STATE)

(Date) marks the kickoff of (community) used oil recycling program.

"We only wish that every community in the nation could be kicking off its own recycling program today also," said (Name, Title) of (Organization).

The program, initiated on (date) by (identify and give desired specifics), will be the first effort of its kind staged in (community). "***The objectives are many. Of utmost importance will be our desire to impress upon the do-it-yourself oil changers of (community) the importance of keeping their oil drainings out of storm drains, garbage and trash receptacles, empty lots and the ground water***," said (name). (Name) also cited the need to educate new do-it-yourselfers about how to collect and recycle oil in an environmentally sound manner.

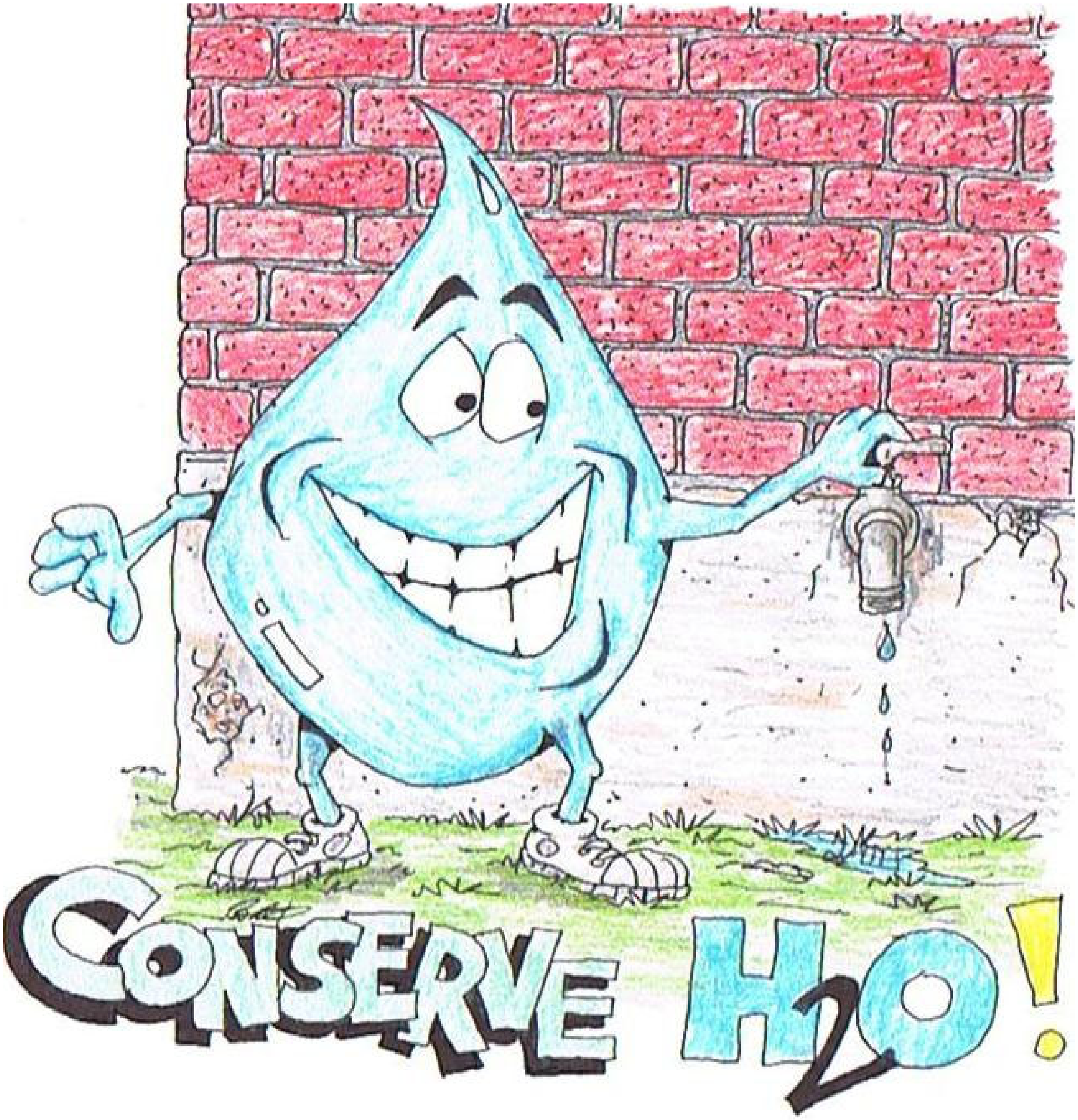
(Community's) desire to aid in doing its share to combat the harm done to the environment by improper disposal was yet another reason. Last, but by far not least, (name) said "***we want to take a giant step for energy conservation through re-use of this valuable energy resource***."

The U.S. Environmental Protection Agency and the Department of Energy estimate that in excess of 180 million gallons of used oil are mishandled annually by do-it-yourselfers.

The (community) program has established a network of collection centers for used oil. Service stations (and any other establishments participating) have agreed to serve as used oil collection centers. One of the incentives is that the collection centers will be able to sell the used oil to recycling conglomerates and use the proceeds as they wish (use statement only if applicable).

The collection points will be identified by posters and their locations will be publicized area wide. (Name) said, "***For our residents, the rest is easy. All they need is a suitable container and a cooperative frame of mind***." (Organization) will have brochures, pamphlets and other informational materials to place in circulation. The (organization) has received endorsements from a number of (civic groups, organizations, etc.) and officials in the area, including: (list)

(Name of person) anticipates excellent cooperation and participation on the part of collectors and community residents. Anyone interested in obtaining more information or helping with this campaign should contact (name) at (address) or call (phone number).


CONSERVE H2O!

State Contacts on Used Oil Recycling

The following list contains EPA's most recent directory of state used oil recycling contacts.

Alabama
Project ROSE Coordinador, Box 6373, Tuscaloosa, AL 35487-6373
205-348-4878

Chief of Land Division
Hazardous Waste Branch
Department of Environmental Management, 1751 Federal Drive, Montgomery, AL 36130
205-271-7746

Alaska
Department of Environmental Conservation, P.O. Box O, Juneau, AK 99811
907-465-2653

Arizona
Department of Environmental Quality, 2005 N. Central, Phoenix, AZ 85004
602-257-2317

Arkansas
Industrial Development Commission, One State Capitol Mall, Little Rock, AR 72201
501-371-1370

California
Solid Waste Management Board, 1020 9th Street, Suite 300, Sacramento, CA 95814
916-322-1446

Department of Health Services
Alternative Technology Section, P.O. Box 942732, Sacramento, CA 94234-7320
916-324-1807

Colorado
Solid and Hazardous Waste Section, Department of Health
4210 East 11th Avenue, Denver, CO 80220
303-331-4830

Connecticut
Department of Environmental Protection
State Office Building, 165 Capitol Avenue, Hartford, CT 06106
203-566-4633

Delaware
Division of Facilities Management/Energy Office, P.O. Box 1401, Dover, DE 19903
302-736-5644

District of Columbia
Department of Public Works, 6th floor, 2000 14th St. NW, Washington, DC 20009
202-939-8115

Florida
Department of Environmental Regulation
Twin Towers Office Building, 2600 Blair Stone Road, Room 238
Tallahassee, FL 32399-2400
904-488-0300

Georgia
Environmental Protection Division, Department of Natural Resources,
Floyd Towers East, 205 Butler Street, Room 1154, Atlanta, GA 30334
404-656-7802

Hawaii
Chief of Hazardous Waste Program
Department of Health, PO Box 3378, Honolulu, HI 96801
808-548-6410

Idaho
Department of Health and Welfare, 450 West State Street, 3rd Floor, Boise, ID 83720
208-334-5879

Illinois
Environmental Protection Agency, 2200 Churchill Road, P.O. Box 19276, Springfield, IL 62794-9276
217-785-4437

Indiana
Department of Environmental Management, 105 South Meridian Street , Indianapolis, IN 46206
317-232-4535

Iowa
Department of Natural Resources, 900 East Grand, Des Moines, IA 50319
515-281-8499

Kansas
Department of Health and Environment
Bureau of Waste Management, Bldg 730, Forbes Field, Topeka, KS 66620
913-296-1609

Kentucky
Department of Environmental Protection
Natural Resources and Environmental Protection Cabinet, 18 Reilly Road, Frankfort, KY 40601
502-564-6716

Louisiana
Department of Environmental Quality
Hazardous Waste Division, P.O. Box 44307, Baton Rouge, LA 70804
504-342-4677

Maine
Department of Environmental Protection, State House Station #17, Augusta, ME 04333
207-289-2651

Maryland
Maryland Environmental Services, 2020 Industrial Drive, Annapolis, MD 21401
301-974-3291

Massachusetts
Division of Hazardous Waste
Department of Environmental Quality Engineering, One Winter Street, 5th Floor, Boston, MA 02108
617-292-5848

Michigan
West Michigan Environmental Action Council, 1432 Wealthy, SE, Grand Rapids, MI 49506
616-451-3051

Department of Natural Resources
P.O. Box 30028, Lansing, MI 48909
517-373-0540

Minnesota
Waste Management Board, 1350 Energy Lane, St. Paul, MN 55108
612-649-5750

Minnesota Pollution Control Agency
520 Lafayette Road North, St. Paul, MN 55155
612-296-9395

Mississippi
Bureau of Pollution Control
Department of Natural Resources, P.O. Box 10385, Jackson, MS 39209
601-961-5171

Missouri
Department of Natural Resources
P.O. Box 176, Jefferson City, MO 65102
314-751-3176

Montana
Solid Waste Management Bureau
Department of Health and Environmental Sciences
Cogswell Building - Room B201, Helena, MT 59620
406-444-2821

Nebraska
Nebraska State Recycling Association, P.O. Box 60729, Lincoln, NE 68501
402-475-3637

Nevada
Office of Community Services, 1100 East William St., No. 117
Carson City, NV 89710
702-885-4908

New Hampshire
Waste Management, Department of Environmental Services
Health and Welfare Building, 6 Hazen Drive, Concord, NH 03301
603-271-2900

New Jersey
Office of Recycling, Department of Environmental Protection
401 E State Street, Trenton, NJ 08625
809-292-0331

New Jersey
Department of Environmental Protection, 32 East Hanover Street, Trenton, NJ 08625
609-292-8515

New Mexico
Hazardous Waste Section, Environmental Improvement Division
Health and Environmental Department
P.O. Box 968, Santa Fe, NM 87504-068
505-827-2924

New York
Department of Environmental Conservation
50 Wolf Road, Albany, NY 12233
718-482-4949

North Carolina
Department of Human Resources, P.O. Box 2091, Raleigh, NC 27602
919-733-2178

North Carolina
Southeast Waste Exchange
Univ. of NC at Charlotte, Charlotte, NC 28223
704-547-2307

North Dakota
Division of Waste Management and Special Studies
Department of Health, 1200 Missouri Avenue
P.O. Box 5520, Bismarck, ND 58502
701-224-2366

Ohio
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1800 Water-Mark Drive, Columbus, OH 43266-0149
614-481-7239

Oklahoma
Industrial Waste Division, Department of Health
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811 SW 6th Street, Portland, OR 97204
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P.O. Box 1760, Portland, OR 97207
503-229-6534

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Department of Environmental Resources
P.O. Box 2063, Harrisburg, PA 17120
717-787-7382

Rhode Island
Department of Environmental Management
83 Park St., Providence, RI 02903
401-277-3434

South Carolina
Department of Health and Environmental Control
2600 Bull Street , Columbia, SC 29201
803-734-5200

South Dakota
Department of Water and Natural Resources
Air Quality and Solid Waste Programs
Joe Foss Building, Pierre, SD 57501
605-773-3153

Tennessee
Department of Health & Environment
Customs House
701 Broadway, Nashville, TN 37219-5403
615-741-3424

Texas
Texas Commission of Environmental Quaility
P.O. Box 13087, Capitol Station, Austin, TX 78711
512-239-1000

Utah
Division of 011, Gas and Mining
355 West North Temple, 3 Triad Center
Suite 350, Salt Lake City, UT 84180-1203
801-538-5340

Vermont
Agency of Environmental Conservation
103 South Main Street, Waterbury, VT 05676
802-244-8702

Virginia
Division of Energy
2201 West Broad Street, Richmond, VA 23220
804-367-1310

Washington
Department of Ecology
Mail Stop PV-11, Olympia, WA 98504-8711
206-459-6356

West Virginia
Fuels and Energy Office
1204 Kanawha Blvd., 2nd Floor
Charleston, WV 25301
304-348-8860

Wisconsin
Department of Natural Resources
P.O. Box 7921, Madison, WI 53707
608-266-5741

Wyoming
Solid Waste Management Program
Department of Environmental Quality
Herschler Building
122 West 25th Street, Cheyenne, WY 82002
307-777-7752

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Acknowledgements

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2. California Oil Recyclers, Inc. and Evergreen Oil, Inc., Newark, California 94560
3. City of San Bernardino
4. Local Hazardous Waste Management Program in King County
voice: (206) 263-3051 | fax: (206) 263-3070
5. United States Environmental Protection Agency
6. City of Tempe, Arizona
7. State of Washington

Chapter 8 Used Motor Oil Exercise

Scenario: The City Manager is very popular after your development of the Tire Awareness Campaign and would like to have you develop a used motor oil collection project. He thinks the best method for this campaign is to get all the other cities involved and use the same message.

You are not sure that you have the authority to administer this program and question the City Manager about the events after the council recycling meeting. The City Manager just got back form a League of Cities meeting and has forgot to inform you that the City Council has asked for specifically for you to run this multi-agency project and that Councilman Fields has asked for a new job assignment and a special pay increase for you.

Councilman Fields would like for you to write your own ticket. He would like you to pick your new position title and start this assignment.

Assignment: He wants you to develop the used oil collection program, develop an inter-city or sub-regional group and name it, delegate assignments, find state or federal funding for this project, outline your mission and objectives.

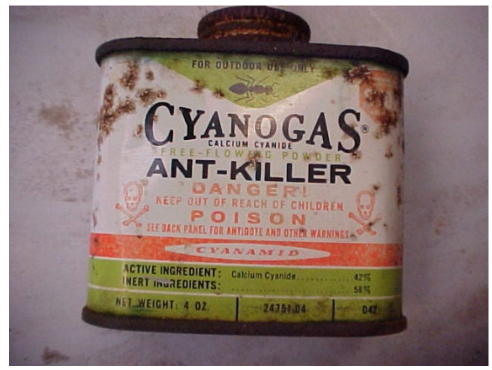
Chapter 9 Pesticides and Alternatives

Pesticides

Pesticide - Any substance used to kill, repel or otherwise control a pest. These include insecticides, herbicides, fungicides, rodenticides and disinfectants. Pesticides are designed to be toxic and can pose a risk to children, adults, pets and beneficial creatures and plants. Common pesticides include herbicides for weed control, indoor ant and roach sprays, outdoor foggers, insect repellents, flea collars and pet shampoos.

Types of Pesticides

- Acaricides - kill mites and spiders
- Algicides - kill algae
- Antibiotics - kill bacteria and viruses
- Avicides - kill birds
- Dessicants - dry up animals and plants
- Fungicides - kill fungi
- Herbicides - kill plants
- Insecticides - kill insects
- Molluscicides - kill mollusks
- Nematocides - kill nematodes
- Piscicides - kill fish
- Plant Regulators - alter the growth of plants
- Repellents - drive pests away
- Rodenticides - kill rodents
- Sterilants - stop reproduction



Cyanide Ant Poison

General Use

- U.S. pesticide user purchases account for one-third of the world market (dollars).
- 1.1 billion pounds of active ingredients of pesticides are used annually in U.S.
- There are 21,000 pesticide products containing 860 active ingredients
- 1993 annual U.S. pesticide user expenditures - $8.5 billion
- 56% herbicides
- 30% insecticides
- 7% fungicides
- 7% other

Household Use

- Pesticides are used in more than 69 million households out of 94 million total households in the U.S.
- In 1993, expenditures on insecticides for homes and gardens totaled $875 million, 32 million pounds or 13% of the total insecticide use by volume in the U.S.
- Herbicide use in home and garden accounted for $219 million, 27 million pounds, or 4% of the total herbicide use in the U.S.
- Fungicide use in the home and garden accounted for $16 million; 11 million pounds or 8% of the total fungicide use in the home and garden
- Other pesticides accounted for $108 million, three million pounds or 4% of the total other pesticide use in the home and garden.

Most Common Pesticides in the United States

General:

- Atrazine
- Metholachlor

Non-Agriculture:

- 2,4-D
- chlorpyrifos
- diazinon
- glyphosate
- malathion
- dicamba
- diuron naled
- MCPP
- carbaryl

A single use of head lice shampoo containing the pesticide lindane contaminates an estimated six million gallons of water (public health uses of lindane were recently banned in California)

Source: "Memorandum: Supplemental Information on Lindane," County Sanitation Districts of Los Angeles County, 27 March 2000.

The Effects on the Environment

Scientists cannot determine exactly what will happen to a particular pesticide once it enters the environment. They gather information which is used to make informed decisions about pesticide use and possible risks resulting from that particular use. PLEASE REMEMBER Pesticides are made to be toxic. Be an informed consumer and use environmental common sense when using pesticides in your home and garden. These chemicals may affect your health, the health of your neighbors and the health of smaller animals and plants in your community.

The fate of pesticides released into the environment is unknown. Releases may be followed by a very complex series of events which can transport the pesticide through the air or water, into the ground or even into living organisms. The medium for movement (air, water, soil, organisms) and the degree of movement (local or long distance distribution) will be different for each pesticide.

Pesticides which are sprayed move through the air and eventually end up in other parts of the environment, such as soil or water. Pesticides applied directly to the soil may be washed off the soil into nearby bodies of surface water, may evaporate into the air, or may percolate through the soil to lower soil layers and groundwater. Pesticides may enter surface waters when applied for weed control, or indirectly as a result of leaching from boat paint, runoff from soil or other routes.

Properties of Pesticides

- The properties of pesticides determine their fate and behavior in the environment. The important properties are persistence, volatility, and solubility in water.

- When pesticides are released into the environment, they are either: 1) broken down, or degraded, by the action of sunlight, water or other chemicals, or microorganisms, such as bacteria; or 2) resist degradation and thus remain unchanged in the environment for long periods of time.

- The persistence of a pesticide is its ability to remain unchanged. Persistence is measured by half-life. The half-life is the time it takes for half of the initial amount of a pesticide to breakdown. Thus, if a pesticide's half-life is 30 days, half will be left after 30 days, one-quarter after 60 days, one-eighth after 90 days and so on.

- When the pesticide is broken down, this usually leads to the formation of less harmful products. However, in some instances the products can be more toxic than the original pesticide.

- Pesticides that are easily broken down generally move the shortest distance and have the least adverse effects on people or other organisms. Persistent pesticides generally move the longest distances and have the greatest potential to accumulate in living organisms.

- The volatility of a pesticide is its ability to evaporate. Pesticides that are more volatile have the greatest potential to go into the atmosphere. If they are persistent, they can move long distances.

- The solubility of a pesticide is its ability to dissolve. If a pesticide is very soluble in water, it is more easily transported by rainwater as runoff, or through the soil as a potential groundwater contaminant. Water soluble pesticides are more likely to remain in the surface water where they may adversely affect fish and other organisms.

Properties of the Environment

The individual properties of soil, water and living organisms affect the fate and behavior of pesticides. Climate and topography also play a role. Soils vary in their ratios of sand, organic matter, metal content, acidity, porosity, permeability, etc. These soil characteristics influence the behavior of pesticides. Water characteristics also vary and influence pesticide behavior. Some of the characteristics are acidity, depth, temperature, clarity, flow rate, presence of biological organisms and general chemistry.

Living organisms accumulate certain pesticides. Through the process of bioaccumulation, pesticides accumulate in lower organisms and are passed to higher organisms in the food chain when eaten. The higher organism will accumulate the pesticides at higher levels than their food source. Pesticide levels in fish, for example, can be tens to hundreds of thousands of times greater than ambient water levels in which they live.

Humans are at the top of the food chain. They bioaccumulate the pesticides accumulated by the lower animals and plants that they eat. It is not only fish but also domestic farm animals and plant food which can accumulate pesticides. Care must be used in the use of pesticides in agricultural as well as home and garden scenarios.

Health Concerns

Pesticides are designed to kill living organisms and EPA prohibits claims that these chemicals are safe or nontoxic. Studies on animals have shown that of the 34 chemicals encompassing 95% of lawn pesticides, 10 are carcinogens, 12 caused birth defects, 20 are neurotoxic, seven alter the reproductive process, 13 cause liver and kidney damage, and 29 are sensitizers or irritants.

A study of indoor air quality by EPA in 1990 detected 26 pesticides. In animals, 19 of these pesticides are nerve poisons, 18 may cause cancer, 15 are mutagens, 15 could cause birth defects, and 19 can cause reproductive problems.

DEET, the active ingredient in many insect repellants, is responsible for more than 5,000 poisonings every year in the U.S. (National Capitol Poison Center, Georgetown University Hospital, Washington, D.C.). DEET can cause central nervous system disturbances, dermatitis, and skin irritation.

At EPA's current rate of testing, it will take more than a decade before 32 of the 34 most commonly used lawn chemicals can be fully tested for their effects on human health.

Inactive or inert ingredients are another problem with pesticides. Inert ingredients are designed to preserve the active ingredients, make them easier to apply or improve their killing ability. Information on inert ingredients is not required to be put on a product's label because this information is considered proprietary. These ingredients typically comprise between 80 - 90% of a pesticide, and in some cases be more toxic than the active ingredients.

Children and individuals with impaired immune systems are more vulnerable than adults to pesticide poisoning. Children have higher metabolic rates, and absorb higher concentrations of toxins from the environment than adults. In addition, children have not fully developed their body's defense systems against toxins. Their livers and kidneys, the organs that detoxify and excrete foreign substances, and act as barriers to absorption of toxic substances, have not fully developed.

Pesticide Handling and Disposal

Handling Pesticides

It is the intention of this book to dissuade you from excessive use of pesticides, but if you decide to use pesticides, they can be handled in a safe manner to avoid risking the health of you and your family, your environment and the wildlife around you. The following are some suggestions for safer use.

1. Choosing the pesticide
   - Do not use a pesticide unless you have a pest problem
   - Do not buy more pesticide than you can use in one season
   - Identify the pest before purchasing the pesticide
   - Choose the pesticide that is least toxic
   - Read the label to determine the proper application amount, requirements for protective equipment and the potential hazards associated with the pesticide.
   - Do not use a "***restricted use***" pesticide unless you are a formally trained, certified pesticide applicator. These products are too dangerous to be used without special training.
2. The label will tell you:
   - The pests that the product will control
   - How to mix and apply the product. Doubling the dose does not do twice the job. It is hazardous to you and the environment.
   - When to apply the product
   - How the pesticide will affect crops, animals, and people
   - How much and how often to apply
   - READ THE LABEL COMPLETELY EVERY TIME YOU USE THE PESTICIDE AND REMEMBER THAT YOU ARE HANDLING A TOXIC CHEMICAL. DO NOT USE THE CHEMICAL OTHER THAN ACCORDING TO THE LABEL
3. Other information to consider:
   - Mix the chemical outdoors or in a well-ventilated area. Mix only the amount you need.
   - Keep children and pets away from areas where you mix or apply pesticides.
   - Never mix different pesticides.
   - Never eat, drink or smoke when working with pesticides.
   - Wear rubber gloves, a long sleeved shirt, long pants, foot protection, goggles, a hat and preferable a mask when mixing and applying pesticides. Remember that pesticides can be absorbed into your body through the skin, as well as orally and through inhalation.
   - Always shower and shampoo after working with pesticides. Wash your work clothes separately from the family laundry.
   - Always keep the pesticides in the original container.
   - Store pesticides in a ventilated, dry and cool place, preferably locked and away from children.
   - Use all the pesticide in the container, do not pour unused pesticides down the drain.
   - Triple rinse empty pesticide containers and use the residue for application. If the pesticide is a solid, shake the bag to remove and use all product before you dispose of the container.
   - Do not store anything in an empty pesticide container and do not reuse the container.
   - Any unused product that can no longer be used should be taken to the local household hazardous waste collection for disposal. For additional information, contact the local Waste Management Household Hazardous Waste Disposal Hotline.
   - If a spill occurs, do not wash it away. Sprinkle with sawdust, or kitty litter, sweep into a plastic garbage bag, and dispose with the rest of the trash.
   - When treating indoor areas, remove pets (including birds and fish) from the area to be treated. Also, remove food, dishes, pots and pans before treating kitchen cabinets.
   - Allow adequate ventilation and go away from the areas for at least the length of time prescribed by the label.
   - When treating outdoor areas, close the windows. Never spray or dust outdoors on a windy day.
   - Evaluate the results of your pesticide use to determine whether future applications will be effective. Continue reading this manual to learn how to avoid pesticide use altogether.

Common Natural Enemies, Pesticide Alternatives

Biological control uses natural enemies to keep pests in check. Natural enemies are called "***beneficial***" because they assist us in controlling pests. Identification of beneficial insects is the first step of biological control. Natural enemies are placed in three major groups: Predators, Parasitoids and Pathogens.

A predator attacks, kills and eats its prey. Some predators are host-specific and some eat a wide variety of pests. A lady beetle is a common example of a predator that eats aphids. Praying mantis, spined soldier bugs, lacewings, flower bugs, and spiders are also predators.

Parasitoids lay eggs in or on a host. When the eggs hatch, they kill the host by consuming its organs or body fluids. A common example is the parasitic wasp, which lays its eggs on pest larva. Most parasitoids come from the fly and wasp family.

Pathogens are bacteria, fungi or viruses that invade pests, causing disease. The disease often weakens the pest and kills it.

Beneficial insects are important to you as a homeowner. Distinguishing pests from beneficials can prevent the killing of a beneficial (pest controlling insect). Avoid the use of broad-spectrum pesticides because they will kill both pests and beneficial insects. There are catalogs available which list suppliers of beneficial organisms in the United States.

Home Brewed Pest Control

There are many ways to reduce pesticide use in the home and garden. From home mixtures to introducing beneficial species, all is possible for the home gardener. This brochure will concentrate on non-toxic home remedies for insects and other pests. It will also provide pointers for those who wish to access more advanced information about species introduction or other forms of non-toxic pesticide control.

***Spray bottle cures**:* Non-toxic pesticide sprays that can be made from ingredients readily available in the home.

Recipe 1	All-purpose- Take an empty spray bottle and fill about 3/4 of the way with water, then add a few drops of Ivory liquid soap, some hot peppers or hot pepper sauce and some garlic. This works well, but needs to be reapplied after a storm and every couple of weeks.
Recipe 2	All-purpose- Grind together three hot peppers. three large onions and one whole bunch of garlic. Cover mash with water and place in a covered container. Let container stand overnight. Strain mixture through cheesecloth or a fine strainer and add enough water to make a gallon of spray.
Recipe 3	All-purpose- Mix 2 1/2 tablespoons of a mild dish washing detergent plus the same amount of a vegetable cooking oil with one gallon of water. This can be sprayed on all plants. Remember to spray both the top and the underside of the leaves.
Recipe 4	All-purpose- Finely chop 10 to 15 garlic cloves and soak in 1 pint of mineral oil for 24 hours. Strain and spray as is, or add a few drops of soap for extra stickiness.
Recipe 5	All-purpose- Blend 1/2 cup of hot peppers with 2 cups of water. Strain and spray.
Recipe 6	All-purpose- Combine 1 to 2 cups of rubbing alcohol with 1 quart of water. Test spray and let stand overnight to see if damage occurs to plant.
Recipe 7	Orange trees and rosebushes- Soak macerated tomato leaves in water and apply as spray onto leaves and branches.
Recipe 8	Red spider mites, spiders, cabbage worms and weeds- An ounce of table salt to a gallon of water has been shown to stop these pests. Use a tablespoon of salt to two gallons of water for the worms. Straight salt, especially in non-garden areas can stop weeds.
Recipe 9	Snails- Setting out a tray of beer or any other yeasty, fermented liquid will attract snails from all around your garden.
Recipe 10	Species specific- Collect 1/2 cup of a specific pest and mash well. Mix this with two cups of water and strain. Mix 1/4 cup of this "bug juice" with 2 cups of water and a

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Chapter 9 Exercise

Scenario: Because of untreated sewage accidentally bypassing the city's wastewater treatment process, the EPA has placed a Consent Decree order on your city. One of the mandates is for your city to begin a Toxic Minimization Program. The City Manager has assigned you to the Pesticide division and your associates to the Stormwater division.

1. Identify five common household toxic pesticides:

2. Identify five non-toxic alternatives for toxic pesticides.

3. Identify five beneficial insects:

4. Identify five plants that attract beneficial insects:

5. Develop a Home Brewed Pest Control method or spray:

6. Explain why the use of toxic pesticides is harmful to our environment:

Chapter 10 Air Pollution

What are Toxic Air Pollutants?

Toxic air pollutants, also known as hazardous air pollutants, are those pollutants that cause or may cause cancer or other serious health effects, such as reproductive effects or birth defects, or adverse environmental and ecological effects. Examples of toxic air pollutants include benzene, which is found in gasoline; perchlorethlyene, which is emitted from some dry cleaning facilities; and methylene chloride, which is used as a solvent and paint stripper by a number of industries. Examples of other listed air toxics include dioxin, asbestos, toluene, and metals such as cadmium, mercury, chromium, and lead compounds.

What are the health and environmental effects of toxic air pollutants?

People exposed to toxic air pollutants at sufficient concentrations and durations may have an increased chance of getting cancer or experiencing other serious health effects. These health effects can include damage to the immune system, as well as neurological, reproductive (e.g., reduced fertility), developmental, respiratory and other health problems. In addition to exposure from breathing air toxics, risks also are associated with the deposition of toxic pollutants onto soils or surface waters, where they are taken up by plants and ingested by animals and eventually magnified up through the food chain. Like humans, animals may experience health problems if exposed to sufficient quantities of air toxics over time.

Where do toxic air pollutants come from?

Most air toxics originate from human-made sources, including mobile sources (e.g., cars, trucks, buses) and stationary sources (e.g., factories, refineries, power plants), as well as indoor sources (e.g., building materials and activities such as cleaning). Some air toxics are also released from natural sources such as volcanic eruptions and forest fires.

How are people exposed to air toxics?

People are exposed to toxic air pollutants in many ways that can pose health risks, such as by:

- Breathing contaminated air.
- Ingesting contaminated food products, such as fish from contaminated waters; meat, milk or eggs from animals that fed on contaminated plants; and fruits and vegetables grown in contaminated soil on which air toxics have been deposited.
- Ingesting water contaminated by toxic air pollutants.
- Ingesting contaminated soil. Young children are especially vulnerable because they often ingest soil from their hands or from objects they place in their mouths.
- Touching (skin contact) contaminated soil, dust or water (for example, during recreational use of contaminated water bodies).

Once toxic air pollutants enter the body, some persistent toxic air pollutants accumulate in body tissues. Also, through a phenomenon called biomagnification, predators typically accumulate even greater pollutant concentrations than their contaminated prey.

As a result, people and other animals at the Atop@ of the food chain who eat contaminated fish or meat are exposed to concentrations that are much higher than the concentrations in the water, air or soil.

What is the approach EPA uses to develop standards to reduce air toxics?

Since 1970, the Clean Air Act has provided the primary framework for protecting people and the environment from the harmful effects of air pollution. A key component of the Clean Air Act is a requirement that the EPA significantly reduce daily, so-called A routine emissions of air toxics. In the 1990 Clean Air Act Amendments, Congress directed EPA to use a technology-based and performance- based approach to significantly reduce emissions of air toxics from major sources of air pollution, followed by a risk-based approach to address any remaining, or residual risks.

Under the technology-based approach, EPA develops standards for controlling the routine emissions of air toxics from each major type of facility within an industry group (or source category). These standards, known as maximum achievable control technology (**MACT**) standards are based on emissions levels that are already being achieved by the better-controlled and lower-emitting sources in an industry. Eight years after each MACT standard is issued, EPA must assess the remaining health risks from sources categories. If necessary, EPA may implement additional standards that address any significant remaining risk.

While the Air Toxics Website (**ATW**) focuses on EPA's efforts to reduce routine emissions from stationary sources, EPA also is working to reduce toxic emissions from:

- **Mobile sources**, such as cars and trucks. For example, EPA and state governments (e.g., California) have reduced emissions of benzene, toluene, and other toxic pollutants from mobile sources by requiring the use of reformulated gasoline and placing limits on tailpipe emissions. For more information, contact EPA's Office of Transportation and Air Quality
- **Accidental releases**, including leaks and spills. For example, EPA has established regulations under the Clean Air Act requiring certain facilities to implement risk management programs that will help prevent accidental releases of toxic chemicals. For more information, contact EPA's Office of Chemical Preparedness and Prevention

What progress has EPA made in reducing emissions?

The MACT standards EPA has issued over the past 7 years include standards covering over 80 categories of major industrial sources, such as chemical plants, oil refineries, aerospace manufacturers, and steel mills, as well as categories of smaller sources, such as dry cleaners, commercial sterilizers, secondary lead smelters, and chromium electroplating facilities.

When fully implemented, these standards are projected to reduce annual air toxics emissions by about 1.5 million tons B 15 times the reductions achieved prior to 1990. The agency has put into place important controls for fuels and vehicles that are expected to reduce inventories of selected motor vehicle air toxics from 1990 levels by more than 75% by 2020. EPA has also implemented programs that reduce indoor air toxics.

For example, through EPA's Tools for Schools program, which is designed to educate staff working in schools on methods to reduce children and school workers exposure to toxic air pollutants, at least 4,000 schools across the country have instituted some of the suggested measures.

More Health Effects Information

Toxic air pollutants are chemicals that are known to or suspected of causing cancer or other serious health effects, including damage to the respiratory or nervous systems, birth defects, and reproductive effects. Some can cause death or serious injury if accidentally released in large amounts. There are many methodologies to develop risk reference concentrations or doses that may be used as benchmarks.

The following items contain additional information about the health effects of air toxics.

Air Pollution and Health Risk

> How do we know when a risk from a hazardous substance is serious? How do researchers estimate risk, and how does the government use this information to develop regulations that limit our exposure to hazardous substances? This brochure from EPA's Air Risk Center discusses these questions.

Evaluating Exposures to Toxic Air Pollutants: A Citizen's Guide

> Toxic air pollutants can increase the chance of health problems and cause ecological impacts. This brochure from EPA's Air Risk Center discusses the process used to determine how much of a toxic air pollutant people are exposed to and how many people are exposed.

The Health Effects Notebook for Hazardous Air Pollutants

> Detailed information about the health effects of hazardous air pollutants is available in separate fact sheets from "***EPA Health Effects Notebook for Hazardous Air Pollutants-Draft***," EPA-452/D-95-00, PB95-503579, December 1994. There's also an explanation of topics and terms used in the fact sheets.

Risk Assessment for Toxic Air Pollutants: A Citizen's Guide

> Risk assessment is the process used to estimate the risk of illness from a specific human exposure to a toxic air pollutant. This brochure from EPA's Air Risk Center gives an overview of the 4-step assessment process.

Links to Other EPA Offices Concerned With Air Toxics

- Chemical Emergency Preparedness and Prevention Office (**CEPPO**)
- Indoor Air Information (**OIRA**)
- Mobile Source Information (**OTAQ**)
- National Center for Environmental Assessment (**NCEA**)
- Office of Enforcement and Compliance Assurance (**OECA**)
- Office of Prevention, Pesticides, and Toxic Substances (**OPPT**)

The Pollutants

Hazardous air pollutants, also known as toxic air pollutants or air toxics, are those pollutants that cause or may cause cancer or other serious health effects, such as reproductive effects or birth defects, or adverse environmental and ecological effects.

EPA is required to control 188 hazardous air pollutants. Examples of toxic air pollutants include benzene, which is found in gasoline; perchlorethlyene, which is emitted from some dry cleaning facilities; and methylene chloride, which is used as a solvent and paint stripper by a number of industries. Through appropriate rulemaking, the Clean Air Act list can be modified. A current list of modifications is available.

The Sources

Most air toxics originate from human-made sources, including mobile sources (e.g., cars, trucks, buses) and stationary sources (e.g., factories, refineries, power plants), as well as indoor sources (e.g., building materials and activities such as cleaning). There are two types of stationary sources that generate routine emissions of air toxics:

- "**Major**" sources are defined as sources that emit 10 tons per year of any of the listed toxic air pollutants, or 25 tons per year of a mixture of air toxics. These sources may release air toxics from equipment leaks, when materials are transferred from one location to another, or during discharge through emission stacks or vents
- "**Area**" sources consist of smaller-size facilities that release lesser quantities of toxic pollutants into the air. Area sources are defined as sources that emit less than 10 tons per year of a single air toxic, or less than 25 tons per year of a combination of air toxics. Though emissions from individual area sources are often relatively small, collectively their emissions can be of concern - particularly where large numbers of sources are located in heavily populated areas.

EPA published the initial list of "***source categories***" in 1992 (57FR31576 , July 16, 1992) and since that time has issued several revisions and updates to the list and promulgation schedule. For each listed source category, EPA indicates whether the sources are considered to be "**major**" sources or "**area**" sources. The 1990 Clean Air Act Amendments direct EPA to set standards for all major sources of air toxics (and some area sources that are of particular concern).

Mission

The mission of the Office of Radiation and Indoor Air (**ORIA**) is to protect the public and the environment from the risks of radiation and indoor air pollution. The Office develops protection criteria, standards, and policies; works with other programs within EPA and other agencies to control radiation and indoor air pollution exposures; provides technical assistance to states through EPA's regional offices, and to other agencies having radiation and indoor air protection programs; directs an environmental radiation monitoring program; responds to radiological emergencies; and evaluates and assesses the overall risk and impact of radiation and indoor air pollution.

The Office is EPA's lead office for intra- and inter-agency activities coordinated through the Committee for Indoor Air Quality. It coordinates with and assists the Office of Enforcement in enforcement activities where EPA has jurisdiction. The Office disseminates information and works with state and local governments, industry and professional groups, and citizens to promote actions to reduce exposures to harmful levels of radiation and indoor air pollutants, including radon.

What is Carbon Monoxide?

Carbon monoxide (**CO**) is a colorless, odorless, poisonous gas. A product of incomplete burning of hydrocarbon-based fuels, carbon monoxide consists of a carbon atom and an oxygen atom linked together.

Why is Carbon Monoxide a Public Health Problem?

Carbon monoxide enters the bloodstream through the lungs and forms carboxyhemoglobin, a compound that inhibits the blood's capacity to carry oxygen to organs and tissues. Persons with heart disease are especially sensitive to carbon monoxide poisoning and may experience chest pain if they breathe the gas while exercising. Infants, elderly persons, and individuals with respiratory diseases are also particularly sensitive. Carbon monoxide can affect healthy individuals, imparting exercise capacity, visual perception, manual dexterity, learning functions, and ability to perform complex tasks. In 1992, carbon monoxide levels exceeded the Federal air quality standard in 20 U.S. cities, home to more than 14 million people.

How is Carbon Monoxide Formed?

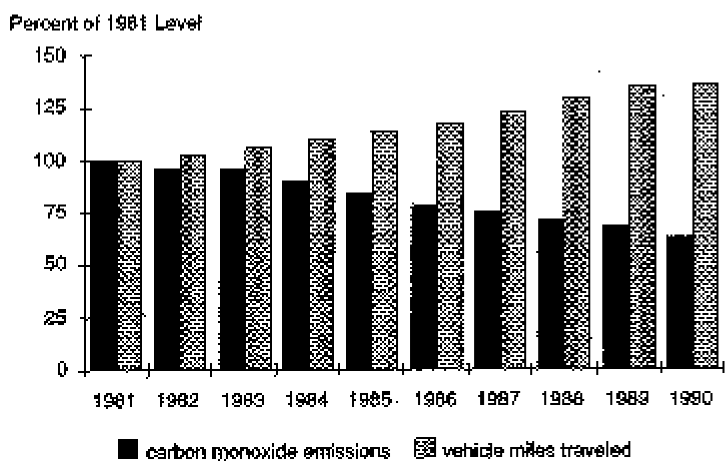
Carbon monoxide results from incomplete combustion of fuel and is emitted directly from vehicle tailpipes. Incomplete combustion is most likely to occur at low air-to-fuel ratios in the engine. These conditions are common during vehicle starting when air supply is restricted ("**choked**"), when cars are not tuned properly, and at altitude, where "**thin**" air effectively reduces the amount of oxygen available for combustion (except in cars that are designed or adjusted to compensate for altitude).

Nationwide, two-thirds of the carbon monoxide emissions come from transportation sources, with the largest contribution coming from highway motor vehicles. In urban areas, the motor vehicle contribution to carbon monoxide pollution can exceed 90 percent.

What's Been Done to Control Carbon Monoxide Levels?

The Clean Air Act gives state and local governments' primary responsibility for regulating pollution from power plants, factories, and other "**stationary sources**." The U.S. Environmental Protection Agency (**EPA**) has primary responsibility for "mobile source" pollution control.

The EPA motor vehicle program has achieved considerable success in reducing carbon monoxide emissions. EPA standards in the early 1970's prompted automakers to improve basic engine design. By 1975, most new cars were equipped with catalytic converters designed to convert carbon monoxide to carbon dioxide. Catalysts typically reduce carbon monoxide emissions upwards of 80 percent. In the early 1980's, automakers introduced more sophisticated converters, plus on-board computers and oxygen sensors to help optimize the efficiency of the catalytic converter.



Today's passenger cars are capable of emitting 90 percent less carbon monoxide over their lifetimes than their uncontrolled counterparts of the 1960's. As a result, ambient carbon monoxide levels have dropped, despite large increases in the number of vehicles on the road and the number of miles they travel. With continued increases in vehicle travel projected, however, carbon monoxide levels will begin to climb again unless even more effective emission controls are employed.

What Else Is Being Done?

Carbon monoxide emissions from automobiles increase dramatically in cold weather. This is because cars need more fuel to start at cold temperatures, and because some emission control devices (such as oxygen sensors and catalytic converters) operate less efficiently when they are cold.

Until 1994, vehicles were tested for carbon monoxide emissions only at 75¡ F. But recognizing the effect of cold weather, the 1990 Clean Air Act calls for 1994, and later, cars and light trucks to meet a carbon monoxide standard at 20¡ F as well.

The 1990 Clean Air Act also stipulates expanded requirements for Inspection and Maintenance programs. These routine emission system checks should help identify malfunctioning vehicles that emit excessive levels of carbon monoxide and other pollutants. The inspections will be complemented by requirements for on-board warning devices to alert drivers when their emission control systems are not working properly.

Another strategy to reduce carbon monoxide emissions from motor vehicles is to add oxygen-containing compounds to gasoline. This has the effect of "**leaning out**" the air-to-fuel ratio, thereby promoting complete fuel combustion. The most common oxygen additives are alcohols or their derivatives.

Several Western U.S. cities have successfully employed wintertime oxygenated gasolines for many years. The 1990 Clean Air Act expands this concept and requires that oxygenated gasolines be used during the winter months in certain metropolitan areas with high carbon monoxide levels.
EPA uses six "***criteria pollutants***" as indicators of air quality, and has established for each of them a maximum concentration above which adverse effects on human health may occur. These threshold concentrations are called National Ambient Air Quality Standards (**NAAQS**).

When an area does not meet the air quality standard for one of the criteria pollutants, it may be subject to the formal rule-making process which designates it as nonattainment. The Clean Air Act further classify ozone, carbon monoxide, and some particulate matter nonattainment areas based on the magnitude of an area's problem.

Nonattainment classifications may be used to specify what air pollution reduction measures an area must adopt, and when the area must reach attainment. The technical details underlying these classifications are discussed in the Code of Federal Regulations, Part 81 (40 CFR 81).

The following is a discussion of the standards, designations and classifications of these areas.

Ozone

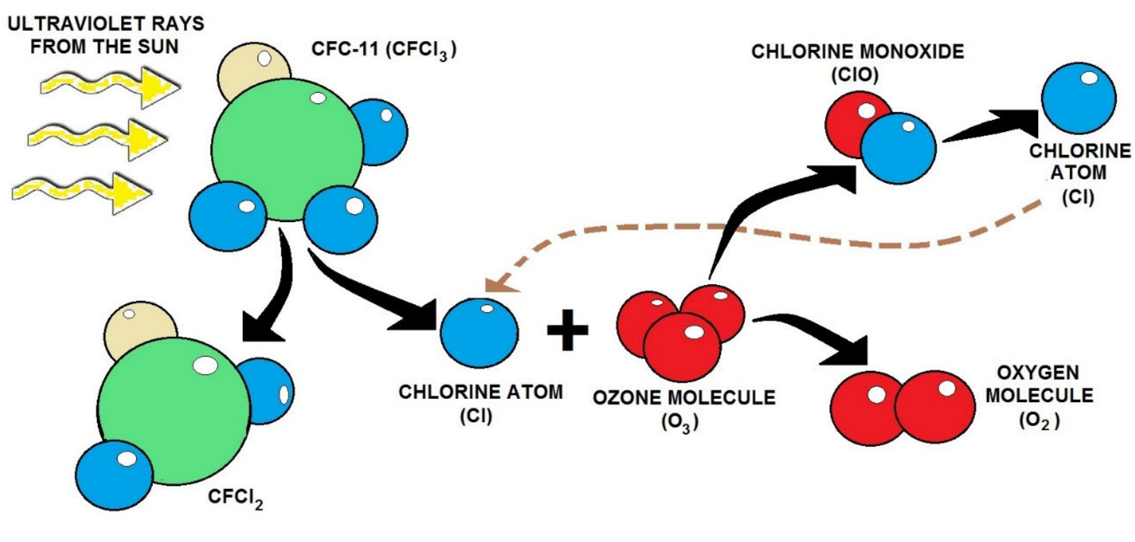
What is Ozone?

It is an allotropic form of oxygen having three atoms in each molecule, formula O_3. It is a pale blue, highly poisonous gas with a strong odor. Ozone boils at -111.9° C (-169.52° F), melts at -192.5° C (-314.5° F), and has a specific gravity of 2.144. Liquid ozone is a deep blue, strongly magnetic liquid. Ozone is formed when an electric spark is passed through oxygen. The presence of ozone causes a detectable odor near electrical machinery.

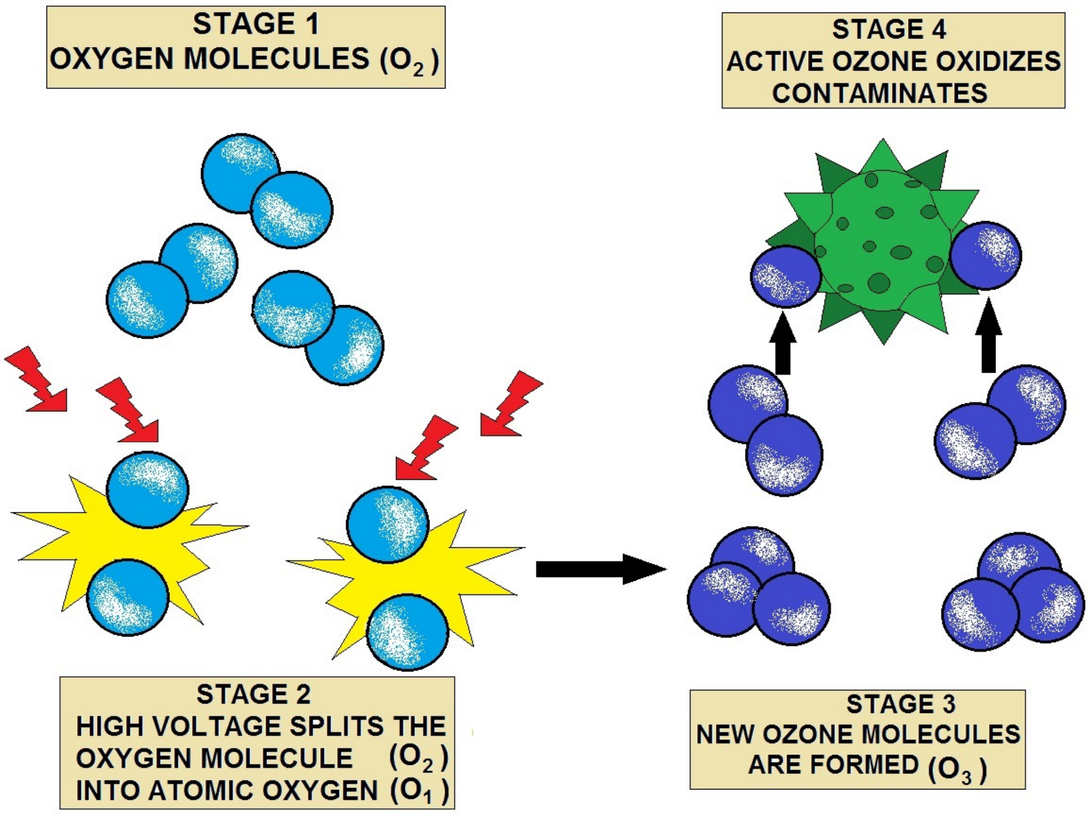
Nitrogen oxides combine with volatile organic compounds to form ozone, which is believed to cause respiratory ailments such as bronchitis and asthma.

Ozone (**O3**) is a photochemical oxidant and the major component of smog. While O3 in the upper atmosphere is beneficial to life by shielding the earth from harmful ultraviolet radiation from the sun, high concentrations of O3 at ground level are a major health and environmental concern. O3 is not emitted directly into the air but is formed through complex chemical reactions between precursor emissions of volatile organic compounds (**VOC**) and oxides of nitrogen (**NOx**) in the presence of sunlight. These reactions are stimulated by sunlight and temperature so that peak O3 levels occur typically during the warmer times of the year. Both VOCs and NOx are emitted by transportation and industrial sources. VOCs are emitted from sources as diverse as autos, chemical manufacturing, dry cleaners, paint shops and other sources using solvents.

The reactivity of O3 causes health problems because it damages lung tissue, reduces lung function and sensitizes the lungs to other irritants. Scientific evidence indicates that ambient levels of O3 not only affect people with impaired respiratory systems, such as asthmatics, but healthy adults and children as well. Exposure to O3 for several hours at relatively low concentrations has been found to significantly reduce lung function and induce respiratory inflammation in normal, healthy people during exercise. This decrease in lung function generally is accompanied by symptoms including chest pain, coughing, sneezing and pulmonary congestion.



OZONE DEPLETION



HOW OZONE IS PRODUCED

1-Hour Ozone Standard

The ozone threshold value is 0.12 parts per million (ppm), measured as 1-hour average concentration. An area meets the ozone NAAQS if there is no more than one day per year when the highest hourly value exceeds the threshold. (If monitoring did not take place every day because of equipment malfunction or other operational problems, actual measurements are prorated for the missing days. The estimated total number of above-threshold days must be 1.0 or less.) To be in attainment, an area must meet the ozone NAAQS for three consecutive years.

Air quality ozone value is estimated using EPA guidance for calculating design values (Laxton Memorandum, June 18, 1990). Generally, the fourth highest monitored value with 3 complete years of data is selected as the updated air quality value because the standard allows one exceedance for each year. It is important to note that the 1990 Clean Air Act Amendments required that ozone nonattainment areas be classified on the basis of the design value at the time the Amendments were passed, generally the 1987-89 period was used.

The strong seasonality of O3 levels makes it possible for areas to limit their O3 monitoring to a certain portion of the year, termed the O3 season. Peak O3 concentrations typically occur during hot, dry, stagnant summertime conditions, i.e., high temperature and strong solar insolation. The length of the O3 season varies from one area of the country to another. May through October is typical, but states in the south and southwest may monitor the entire year. Northern states have shorter O3 seasons, e.g., May through September for North Dakota. This analysis uses these O3 seasons to ensure that the data completeness requirements apply to the relevant portions of the year.

On November 6, 1991, most areas of the country were designated nonattainment or unclassifiable/attainment. These terms are defined as follows:

Nonattainment
any area that does not meet (or that contributes to ambient air quality in a nearby area that does not meet) the national primary or secondary ambient air quality standard for the pollutant.

Attainment
any area that meets the national primary or secondary ambient air quality standard for the pollutant.

Unclassifiable
any area that cannot be classified on the basis of available information as meeting or not meeting the national primary or secondary ambient air quality standard for the pollutant.

Those areas designated nonattainment were also classified as follows:

Extreme
Area has a design value of 0.280 ppm and above.
Severe 17
Area has a design value of 0.190 up to 0.280 ppm and has 17 years to attain.
Severe 15
Area has a design value of 0.180 up to 0.190 ppm and has 15 years to attain.
Serious
Area has a design value of 0.160 up to 0.180 ppm.
Moderate
Area has a design value of 0.138 up to 0.160 ppm.
Marginal
Area has a design value of 0.121 up to 0.138 ppm.

Carbon Monoxide
Carbon monoxide (**CO**) is a colorless, odorless and poisonous gas produced by incomplete burning of carbon in fuels. When CO enters the bloodstream, it reduces the delivery of oxygen to the body's organs and tissues. Health threats are most serious for those who suffer from cardiovascular disease, particularly those with angina or peripheral vascular disease. Exposure to elevated CO levels can cause impairment of visual perception, manual dexterity, learning ability and performance of complex tasks.

77% of the nationwide CO emissions are from transportation sources. The largest emissions contribution comes from highway motor vehicles. Thus, the focus of CO monitoring has been on traffic oriented sites in urban areas where the main source of CO is motor vehicle exhaust. Other major CO sources are wood-burning stoves, incinerators and industrial sources.

The National Ambient Air Quality Standard for carbon monoxide is 9 ppm 8-hour non-overlapping average not to be exceeded more than once per year. The rounding convention in the standard specifies that values of 9.5 ppm, or greater, are counted as exceeding the level of the standard. An area meets the carbon monoxide NAAQS if no more than one 8-hour value per year exceeds the threshold. (High values that occur within 8 hours of the first one are exempted. This is known as using "***non-overlapping averages.***") To be in attainment, an area must meet the NAAQS for two consecutive years and carry out air quality monitoring during the entire time. Air quality carbon monoxide value is estimated using EPA guidance for calculating design values (Laxton Memorandum, June 18, 1990).

Nitrogen Dioxide

Nitrogen dioxide (**NO2**) is a brownish, highly reactive gas that is present in all urban atmospheres. NO2 can irritate the lungs, cause bronchitis and pneumonia, and lower resistance to respiratory infections. Nitrogen oxides are an important precursor both to ozone (**O3**) and acid rain, and may affect both terrestrial and aquatic ecosystems. The major mechanism for the formation of NO2 in the atmosphere is the oxidation of the primary air pollutant nitric oxide (**NO**). NOx plays a major role, together with VOCs, in the atmospheric reactions that produce O3. NOx forms when fuel is burned at high temperatures. The two major emissions sources are transportation and stationary fuel combustion sources such as electric utility and industrial boilers.

Title 40, Part 50 of the Code of the Federal Regulations lists the ambient air quality standard for nitrogen dioxide.

Sulfur Dioxide

High concentrations of sulfur dioxide (**SO2**) affect breathing and may aggravate existing respiratory and cardiovascular disease. Sensitive populations include asthmatics, individuals with bronchitis or emphysema, children and the elderly. SO2 is also a primary contributor to acid deposition, or acid rain, which causes acidification of lakes and streams and can damage trees, crops, historic buildings and statues. In addition, sulfur compounds in the air contribute to visibility impairment in large parts of the country. This is especially noticeable in national parks.

Ambient SO2 results largely from stationary sources such as coal and oil combustion, steel mills, refineries, pulp and paper mills and from nonferrous smelters. There are three NAAQS for SO2:

. an annual arithmetic mean of 0.03 ppm (80 ug/m3);

. a 24-hour level of 0.14 ppm (365 ug/m3); and

. a 3-hour level of 0.50 ppm (1300 ug/m3).

The first two standards are primary (health-related) standards, while the 3-hour NAAQS is a secondary (welfare-related) standard. The annual mean standard is not to be exceeded, while the short-term standards are not to be exceeded more than once per year.

Title 40, Part 50 of the Code of the Federal Regulations lists the ambient air quality standard for sulfur dioxide.

Particulate Matter

Air pollutants called particulate matter include dust, dirt, soot, smoke and liquid droplets directly emitted into the air by sources such as factories, power plants, cars, construction activity, fires and natural windblown dust. Particles formed in the atmosphere by condensation or the transformation of emitted gases such as SO2 and VOCs are also considered particulate matter.

Based on studies of human populations exposed to high concentrations of particles (sometimes in the presence of SO2) and laboratory studies of animals and humans, there are major effects of concern for human health. These include effects on breathing and respiratory symptoms, aggravation of existing respiratory and cardiovascular disease, alterations in the body's defense systems against foreign materials, damage to lung tissue, carcinogenesis and premature death. The major subgroups of the population that appear to be most sensitive to the effects of particulate matter include individuals with chronic obstructive pulmonary or cardiovascular disease or influenza, asthmatics, the elderly and children. Particulate matter also soils and damages materials, and is a major cause of visibility impairment in the United States. Annual and 24-hour National Ambient Air Quality Standards (NAAQS) for particulate matter were first set in 1971.

Total suspended particulate (TSP) was the first indicator used to represent suspended particles in the ambient air. Since July 1, 1987, however, EPA has used the indicator PM-10, which includes only those particles with aerodynamic diameter smaller than 10 micrometers. These smaller particles are likely responsible for most of the adverse health effects of particulate matter because of their ability to reach the thoracic or lower regions of the respiratory tract. Title 40, Part 50 of the Code of the Federal Regulations lists the ambient air quality standard for particulate matter.

Lead

Exposure to lead (**Pb**) can occur through multiple pathways, including inhalation of air and ingestion of Pb in food, water, soil or dust. Excessive Pb exposure can cause seizures, mental retardation and/or behavioral disorders. A recent National Health and Nutrition Examination Survey reported a 78% decrease in blood lead levels from 12.8 to 2.8 ug/dL between 1976 and 1980 and from 1988 to 1991. This dramatic decline can be attributed to the reduction of leaded gasoline and to the removal of lead from soldered cans. Although this study shows great progress, infants and young children are especially susceptible to low doses of Pb, and this age group still shows the highest levels. Low doses of Pb can lead to central nervous system damage. Recent studies have also shown that Pb may be a factor in high blood pressure and in subsequent heart disease in middle-aged males.

Lead gasoline additives, non-ferrous smelters, and battery plants are the most significant contributors to atmospheric Pb emissions. In 1993 transportation sources contributed 33% of the annual emissions, down substantially from 81% in 1985. Total Pb emissions from all sources dropped from 20,100 tons in 1985 to 4,900 tons in 1993. The decrease in Pb emissions from highway vehicles accounts for essentially all of this decline. The reasons for the decrease are noted below.

Two air pollution control programs implemented by EPA before promulgation of the Pb standard in October 1978 have resulted in lower ambient Pb levels. First, regulations issued in the early 1970's required gradual reduction of the Pb content of all gasoline over a period of many years. The Pb content of the leaded gasoline pool was reduced from an average of 12.0 gram/gallon, to 0.5 gram/gallon on July 1, 1985, and still further to 0.1 gram/gallon on January 1, 1986. Second, as part of the EPA's overall automotive emission control program, unleaded gasoline was introduced in 1975 for automobiles equipped with catalytic control devices.

These devices reduce emissions of CO, VOCs and NOx. In 1993, unleaded gasoline sales accounted for 99% of the total gasoline market. In contrast, the unleaded share of the gasoline market in 1984 was approximately 60%. These programs have essentially eliminated violations of the Pb standard in urban areas except those areas with Pb point sources.

Programs are also in place to control Pb emissions from stationary point sources. Lead emissions from stationary sources have been substantially reduced by control programs oriented toward attainment of the PM-10 and Pb ambient standards. However, significant and ambient problems still remain around some Pb point sources, which are now the focus of new monitoring initiatives. Pb emissions in 1993 from industrial sources, e.g., primary and secondary Pb smelters, dropped by about 91% from levels reported in 1970.

Emissions of Pb from solid waste disposal are down about 76% since 1970. In 1993, emissions from solid waste disposal, industrial processes and transportation were: 500, 2,300 and 1,600 short tons, respectively. The overall effect of the control programs for these three categories has been a major reduction in the amount of Pb in the ambient air. Additional reduction in Pb are anticipated as a result of the Agency's Multimedia Lead Strategy issued in February 1991. The goal of the Lead Strategy is to reduce Pb exposures to the fullest extent practicable.

Chapter 10 Exercise

Scenario: Your efforts as the Pesticide guru have paid-off. The Director of the Environmental Protection Agency would like to see you and talk about air pollution. She thinks that because of your experience that it would be best to hire you as a consultant. This means that you will have to quit your city job after 15 years of experience.

You tell the City Manager about this opportunity and he is reluctant to lose you. He will let you go but will freeze your position for 6 months in case you decide to come back.

Assignment: The EPA Director would like the following from you:

1. You to write or design text that will be placed on a new website for public outreach and education about air pollution.

2. She wants the basic facts and information about the sources of air pollution and remedies to prevent air pollution.

Chapter 11 Wastewater Pollution Control

Recent newspaper article;
DETROIT — Michael J. Kuhn of Bay City, MI, was convicted 14 May 2001 of violating the Clean Water Act by ordering employees at a waste treatment plant to pump sewage sludge into an emergency outfall ditch that flowed into the Saginaw River and for falsifying records.

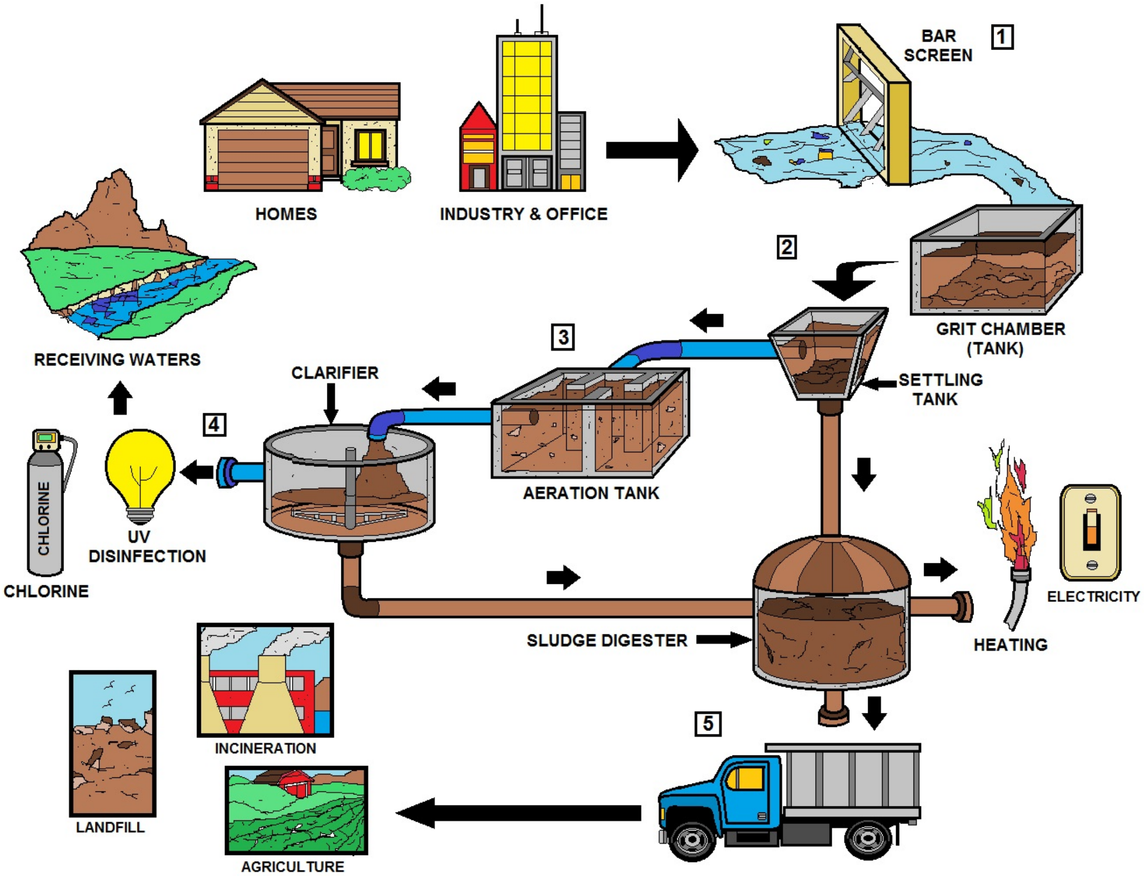
At the time of the violation, Kuhn was superintendent of the Bay City Wastewater Treatment Plant. In June 1997, Kuhn knowingly ordered an employee to falsify a data record related to the plant's influent, according to the US Environmental Protection Agency (**EPA**), which investigated the case.

Kuhn thereafter certified the accuracy of the false data in a monthly report submitted to the Michigan Department of Environmental Quality, according to the EPA.

Pumping sewage sludge into surface waters can present an infection risk to people who come into contact with the water, make the water unsuitable for drinking and recreational purposes and can harm fish and wildlife.

When sentenced, Kuhn faces a maximum sentence of up to 12 years in prison and/or fines of up to $1 million.

The case was investigated by the EPA's Criminal Investigation Division and the Michigan Department of Environmental Quality with the assistance of the EPA's National Enforcement Investigations Center and was prosecuted by the US Attorney's Office in Detroit.



WASTEWATER TREATMENT PROCESS

WASTEWATER CHARACTERISTICS & SPECIFIC SOURCES	
PHYSICAL	
SOLIDS	Domestic - Industrial Wastes / Soil Erosion / Inflow, etc.
COLOR	Industrial - Domestic Wastes / Natural Decaying of Organic Matter
ODOR	Industrial Wastes / Decomposition of Wastewater
CHEMICAL	
PHENOLS	Industrial Wastes
pH	Industrial Wastes
TOXIC COMPOUNDS	Industrial Wastes
HEAVY METALS	Industrial Wastes
PESTICIDES	Run-Off From Agriculture
BIOLOGICAL	/ Open Water Courses / Treatment Units, etc

CHART IDENTIFYING BASIC SOURCES AND CHARACTERISTICS OF WASTEWATER

List of Pretreatment Acronyms used in this Course

Acronym	**Full Phrase**
AA	Approval Authority
AO	Administrative Order
BAT	Best Available Technology Economically Achievable
BCT	Best Conventional Pollutant Control Technology
BMP	Best Management Practices
BMR	Baseline Monitoring Report
BOD5	5-day Biochemical Oxygen Demand
BPJ	Best Professional Judgment
BPT	Best Practicable Control Technology Currently Available
CA	Control Authority
CFR	Code of Federal Regulations
CIU	Categorical Industrial User
CSO	Combined Sewer Overflow
CWA	Clean Water Act (formerly referred to as the Federal Water Pollution Control Act or Federal Water Pollution Control Act Amendments of 1972) Pub. L. 92-500, as amended by Pub. L. 95-217, Pub. L. 95-576, Pub. L. 96-483, Pub. L. 97-117, and Pub. L. 100-4, 33 U.S.C. 1251 et seq.
CWF	Combined Wastestream Formula
CWT	Centralized Waste Treater
DMR	Discharge Monitoring Report
DSE	Domestic Sewage Exclusion
DSS	Domestic Sewage Study
ELG	Effluent Limitations Guideline
EPA	Environmental Protection Agency
EPCRA	Emergency Preparedness and Community Right to Know Act
ERP	Enforcement Response Plan
FDF	Fundamentally Different Factors
FR	Federal Register
FWA	Flow Weighted Average
GPD	Gallons per Day
IU	Industrial User
LEL	Lower Explosive Limit
MAHL	Maximum Allowable Headworks Loading
MAIL	Maximum Allowable Industrial Loading
MGD	Million Gallons per Day
MSDS	Material Safety Data Sheet
NAICS	North American Industry Classification System (replaces SIC coding in 1998)
NOV	Notice of Violation
NPDES	National Pollutant Discharge Elimination System
NRDC	Natural Resources Defense Council

NSPS	New Source Performance Standard
O&G	Oil and Grease
O&M	Operations and Maintenance
OCPSF	Organic Chemicals, Plastics, and Synthetic Fibers
P2	Pollution Prevention
PCI	Pretreatment Compliance Inspection
PCS	Permit Compliance System
PIRT	Pretreatment Implementation Review Task Force
POTW	Publicly Owned Treatment Works
PSES	Pretreatment Standards for Existing Sources
PSNS	Pretreatment Standards for New Sources
QA/QC	Quality Assurance/Quality Control
RCRA	Resource Conservation and Recovery Act
SIC	Standard Industrial Classification
SIU	Significant Industrial User
SPCC	Spill Prevention Control and Countermeasures
SNC	Significant Noncompliance
SSO	Sanitary Sewer Overflow
SUO	Sewer Use Ordinance
TCLP	Toxicity Characteristic Leaching Procedure
TIE	Toxicity Identification Evaluation
TOMP	Toxic Organic Management Program
TRE	Toxicity Reduction Evaluation
TRI	Toxic Release Inventory
TSS	Total Suspended Solids
TTO	Total Toxic Organics
USC	United States Code
UST	Underground Storage Tank
WET	Whole Effluent Toxicity
WWTP	Wastewater Treatment Plant

Glossary of Terms
This glossary includes a collection of terms used in this course and an explanation of each term.

Act or "the Act" *[40 CFR §403.3(b)]*
The Federal Water Pollution Control Act, also known as the Clean Water Act, as amended, 33 USC 1251*et.seq.*

Approval Authority *[40 CFR §403.3(c)]*
The Director in an NPDES State with an approved State Pretreatment Program and the appropriate EPA Regional Administrator in a non-NPDES State or State without an approved pretreatment program.

Approved POTW Pretreatment Program or Program *[40 CFR §403.3(d)]*
A program administered by a POTW that meets the criteria established in 40 CFR Part 403 and which has been approved by a Regional Administrator or State Director.

Approved State Pretreatment Program
A program administered by a State that meets the criteria established in 40 CFR §403.10 and which has been approved by a Regional Administrator

Approved/Authorized State
A State with an NPDES permit program approved pursuant to section 402(b) of the Act and an approved State Pretreatment Program.

Baseline Monitoring Report (BMR) *[paraphrased from 40 CFR §403.12(b)]*
A report submitted by categorical industrial users (CIUs) within 180 days after the effective date of an applicable categorical standard, or at least 90 days prior to commencement of discharge for new sources, which contains specific facility information, including flow and pollutant concentration data. For existing sources, the report must also certify as to the compliance status of the facility with respect to the categorical standards.

Best Available Technology Economically Achievable (BAT)
A level of technology based on the best existing control and treatment measures that are economically achievable within the given industrial category or subcategory.

Best Management Practices (BMPs)
Schedules of activities, prohibitions of practices, maintenance procedures, and other management practices to prevent or reduce the pollution of waters of the U.S. BMPs also include treatment requirements, operating procedures and practices to control plant site runoff, spillage or leaks, sludge or waste disposal, or drainage from raw material storage.

Best Practicable Control Technology Currently Available (BPT)
A level of technology represented by the average of the best existing wastewater treatment performance levels within an industrial category or subcategory.

Best Professional Judgment (BPJ)
The method used by a permit writer to develop technology-based limitations on a case-by-case basis using all reasonably available and relevant data.

Blowdown
The discharge of water with high concentrations of accumulated solids from boilers to prevent plugging of the boiler tubes and/or steam lines. In cooling towers, blowdown is discharged to reduce the concentration of dissolved salts in the recirculating cooling water.

Bypass *[40 CFR §403.17(a)]*
The intentional diversion of wastestreams from any portion of an Industrial User's treatment facility.

Categorical Industrial User (CIU)
An industrial user subject to National categorical pretreatment standards.

Categorical Pretreatment Standards *[40 CFR § 403.6 and 40 CFR Parts 405-471*]
Limitations on pollutant discharges to POTWs promulgated by the EPA in accordance with Section 307 of the Clean Water Act, that apply to specific process wastewater discharges of particular industrial categories.

Chain of Custody (COC)
A record of each person involved in the possession of a sample from the person who collects the sample to the person who analyzes the sample in the laboratory.

Chronic
A stimulus that lingers or continues for a relatively long period of time, often one-tenth of the life span or more. Chronic should be considered a relative term depending on the life span of an organism. The measurement of chronic effect can be reduced growth, reduced reproduction, etc., in addition to lethality.

Clean Water Act (CWA)
The common name for the Federal Water Pollution Control Act. Public law 92-500; 33 U.S.C. 1251 et seq.; legislation which provides statutory authority for both NPDES and Pretreatment Programs.

Code of Federal Regulations (CFR)
A codification of Federal rules published annually by the Office of the Federal Register National Archives and Records Administration. Title 40 of the CFR contains the regulations for *Protection of the Environmen*t.

Combined Sewer Overflow (CSO)
A discharge of untreated wastewater from a combined sewer system at a point prior to the headworks of a publicly owned treatment works. CSOs generally occur during wet weather (rainfall or snowfall). During periods of wet weather, these systems become overloaded, bypass treatment works, and discharge directly to receiving waters.

Combined Wastestream Formula (CWF) *[paraphrased from 40 CFR §403.6(e)]*
Procedure for calculating alternative discharge limits at industrial facilities where a regulated wastestream from a categorical industrial user is combined with other wastestreams prior to treatment.

Compliance Schedule
A schedule of remedial measures included in a permit or an enforcement order, including a sequence of interim requirements (for example, actions, operations, or milestone events) that lead to compliance with the CWA and regulations.

Composite Sample
Sample composed of two or more discrete samples. The aggregate sample will reflect the average water quality covering the compositing or sample period.

Concentration-based Limit
A limit based upon the relative strength of a pollutant in a wastestream, usually expressed in mg/l.

Continuous Discharge
A discharge that occurs without interruption during the operating hours of a facility, except for infrequent shutdowns for maintenance, process changes or similar activities.

Control Authority *[paraphrased from 40 CFR § 403.12(a)]*
A POTW with an approved pretreatment program or the approval authority in the absence of a POTW pretreatment program.

Conventional Pollutants
BOD, TSS, fecal coliform, oil and grease, and pH

Daily Maximum Limitations
The maximum allowable discharge of pollutants during a 24-hour period. Where daily maximum limitations are expressed in units of mass, the daily discharge is the total mass discharged over the course of the day. Where daily maximum limitations are expressed in terms of a concentration, the daily discharge is the arithmetic average measurement of the pollutant concentration derived from all measurements taken that day.

Detection Limit
The minimum concentration of an analyte (substance) that can be measured and reported with a 99% confidence that the analyte concentration is greater than zero as determined by the procedure set forth in 40 CFR Part 136, Appendix B.

Development Document
Detailed report of studies conducted by the U.S. EPA for the purpose of establishing effluent guidelines and categorical pretreatment standards.

Dilute Wastestream *[paraphrased from 40 CFR §403.6(e)(1)(i)]*
For purposes of the combined wastestream formula, the average daily flow (at least a 30-day average) from : (a) boiler blowdown streams, non-contact cooling streams, storm water streams, and demineralized backwash streams; provided, however, that where such streams contain a significant amount of a pollutant, and the combination of such streams, prior to treatment, with an industrial user's regulated process wastestream(s) will result in a substantial reduction of that pollutant, the Control Authority, upon application of the industrial user, may exercise its discretion to determine whether such stream(s) should be classified as diluted or unregulated. In its application to the Control Authority, the industrial user must provide engineering, production, sampling and analysis, and such other information so the control authority can make its determination; or (b) sanitary wastestreams where such streams are not regulated by a categorical pretreatment standard; or (c) from any process wastestreams which were, or could have been, entirely exempted from categorical pretreatment standards pursuant to paragraph 8 of the NRDC v. Costle Consent Decree (12 ERC 1833) for one more of the following reasons (see Appendix D of 40 CFR Part 403):
a. the pollutants of concern are not detectable in the effluent from the industrial user (paragraph(8)(a)(iii));
b. the pollutants of concern are present only in trace amounts and are neither causing nor likely to cause toxic effects (paragraph (8)(a)(iii));
c. the pollutants of concern are present in amounts too small to be effectively deduced by technologies known to the Administrator (paragraph (8)(a)(iii)); or
d. the wastestream contains only pollutants which are compatible with the POTW (paragraph (8)(b)(I)).

Effluent Limitations Guideline
Any effluent limitations guidelines issued by the EPA pursuant to Section 304(b) of the CWA. These regulations are published to adopt or revise a national standard prescribing restrictions on quantities, rates, and concentrations of chemical, physical, biological, and other constituents which are discharged from point sources, in specific industrial categories (e.g., metal finishing, metal molding and casting, etc.).

Enforcement Response Plan *[paraphrased from 40 CFR §403.8(f)(5)]*
Step-by-step enforcement procedures followed by Control Authority staff to identify, document, and respond to violations.

Existing Source
Any source of discharge, the construction or operation of which commenced prior to the publication by the EPA of proposed categorical pretreatment standards, which will be applicable to such source if the standard is thereafter promulgated in accordance with Section 307 of the Act.

Federal Water Pollution Control Act (FWPCA)
The title of Public law 92-500; 33 U.S.C. 1251 et seq., also known as the Clean Water Act (CWA),enacted October 18, 1972.

Flow Weighted Average Formula (FWA) *[paraphrased from 40 CFR §403.6(e)]*
A procedure used to calculate alternative limits where wastestreams regulated by a categorical pretreatment standard and nonregulated wastestreams combine after treatment but prior to the monitoring point.

Flow Proportional Composite Sample
Combination of individual samples proportional to the flow of the wastestream at the time of sampling.

Fundamentally Different Factors *[paraphrased from 40 CFR §403.13]*
Case-by-case variance from categorical pretreatment standards based on the factors considered by the EPA in developing the applicable category/subcategory being fundamentally different than factors relating to a specific industrial user.

General Prohibitions *[40 CFR §403.5(a)(1)]*
No user shall introduce into a POTW any pollutant(s) which cause pass through or interference.

Grab Sample
A sample which is taken from a wastestream on a one-time basis with no regard to the flow of the wastestream and without consideration of time. A single grab sample should be taken over a period of time not to exceed 15 minutes.

Indirect Discharge or Discharge *[40 CFR §403.3(g)]*
The introduction of pollutants into a POTW from any non-domestic source regulated under section 307(b), (c), or (d) of the Act.

Industrial User (IU) or User *[40 CFR §403.3(h)]*
A source of indirect discharge.

Industrial Waste Survey
The process of identifying and locating industrial users and characterizing their industrial discharge.

Inhibition Concentration
Estimate of the toxicant concentration that would cause a given percent reduction (e.g., IC25) in a nonlethal biological measurement of the test organisms, such as reproduction or growth.

Interference *[paraphrased from 40 CFR §403.3(i)]*
A discharge which, alone or in conjunction with a discharge or discharges from other sources, both: (1)inhibits or disrupts the POTW, its treatment processes or operations, or its sludge processes, use or disposal; and (2) therefore is a cause of a violation of any requirement of the POTW's NPDES permit (including an increase in the magnitude or duration of a violation) or of the prevention of sewage sludge use or disposal in compliance with ... [applicable] statutory provisions and regulations or permits issued there under (or more stringent State or local regulations)

Local Limits *[paraphrased 40 CFR § 403.5(c)]*
Specific discharge limits developed and enforced by POTWs upon industrial or commercial facilities to implement the general and specific discharge prohibitions listed in 40 CFR §§403.5(a)(1) and (b).

Monthly Average
The arithmetic average value of all samples taken in a calendar month for an individual pollutant parameter. The monthly average may be the average of all grab samples taken in a given calendar month, or the average of all composite samples taken in a given calendar month.

National Pollutant Discharge Elimination System (NPDES)
The national program for issuing, modifying, revoking and reissuing, terminating, monitoring and enforcing discharge permits from point sources to waters of the United States, and imposing and enforcing pretreatment requirements, under sections 307, 402, 318, and 405 of the CWA.

National Pretreatment Standard or Pretreatment Standard or Standard
[40 CFR §403.3(j)] Any regulation containing pollutant discharge limits promulgated by the EPA in accordance with section 307(b) and (c) of the Act, which applies to Industrial Users. This term includes prohibitive discharge limits established pursuant to §403.5.

New Source *[40 CFR §403.3(k)]*
Any building, structure, facility or installation from which there is or may be a discharge of pollutants, the construction of which commenced after the publication of proposed Pretreatment Standards under section 307(c) of the Act which will be applicable to such source if such standards are thereafter promulgated in accordance with that section *provided that*:
(a) The building, structure, facility or installation is constructed at a site at which no other discharge source is located; or
(b) The building, structure, facility or installation totally replaces the process or production equipment that causes the discharge of pollutants at an existing source; or
(c) The production or wastewater generating processes of the building, structure, facility, or installation are substantially independent of an existing source at the same site. In determining whether these are substantially independent, factors such as the extent to which the new facility is integrated with the existing plant, and the

extent to which the new facility is engaged in the same general type of activity as the existing source, should be considered.
Construction on a site at which an existing source is located results in a modification rather than a new source if the construction does not create a new building, structure, facility, or installation meeting the criteria of paragraphs (k)(1)(ii), or (k)(1)(iii) of this section but otherwise alters, replaces, or adds to existing processor production equipment.
Construction of a new source, as defined under this paragraph has commenced if the owner or operator has:
(i) Begun, or caused to begin as part of a continuous onsite construction program:
(A) Any placement, assembly, or installation of facilities or equipment; or
(B) Significant site preparation work including clearing, excavation, or removal of existing buildings, structures, or facilities which is necessary for the placement, assembly, or installation of new source facilities or equipment, or
(C) Entered into a binding contractual obligation for the purchase of facilities or equipment which are intended to be used in its operation within a reasonable time. Options to purchase or contracts which can be terminated or modified without substantial loss, and contracts for feasibility, engineering, and design studies do not constitute a contractual obligation under this paragraph.

90-Day Final Compliance Report *[40 CFR §403.12(d)]*
A report submitted by categorical industrial users within 90 days following the date for final compliance with the standards. This report must contain flow measurement (of regulated process streams and other streams), measurement of pollutants, and a certification as to whether the categorical standards are being met.

Nonconventional Pollutants
Any pollutant that is neither a toxic pollutant nor a conventional pollutant (e.g., manganese, ammonia, etc.)

Non-Contact Cooling Water
Water used for cooling which does not come into direct contact with any raw material, intermediate product, waste product, or finished product. The only pollutant contributed from the discharge is heat.

Non-Regulated Wastestream
Unregulated and dilute wastestreams (not regulated by categorical standards).

Pass Through *[40 CFR §403.3(n)]*
A discharge which exits the POTW into waters of the United States in quantities or concentrations which, alone or in conjunction with a discharge or discharges from other sources, is a cause of a violation of any requirement of the POTW's NPDES permit (including an increase in the magnitude or duration of a violation).

Periodic Compliance Report *[paraphrased from 40 CFR §403.12(e) & (h)]*
A report on compliance status submitted by categorical industrial users and significant noncategorical industrial users to the control authority at least semiannually (once every six months).

Point Source *[40 CFR 122.2]*
Any discernible, confined, and discrete conveyance, including but not limited to any pipe, ditch, channel, tunnel, conduit, well, discrete fixture, container, rolling stock concentrated animal feeding operation vessel, or other floating craft from which pollutants are or may be discharged.

Pollutant *[40 CFR 122.2]*
Dredged spoil, solid waste, incinerator residue, filter backwash, sewage, garbage, sewage sludge, munitions, chemical wastes, biological materials, radioactive materials (except those regulated under the Atomic Energy Act of 1954, as amended (42 U.S.C. 2011 et seq.)), heat, wrecked or discarded equipment, rock, sand, cellar dirt, and industrial, municipal and agricultural waste discharged into water.

Pretreatment *[paraphrased from 40 CFR §403.3(q)]*
The reduction of the amount of pollutants, the elimination of pollutants, or the alteration of the nature of pollutant properties in wastewater prior to or in lieu of discharging or otherwise introducing such pollutants into a POTW.

Pretreatment Requirements *[40 CFR §403.3(r)]*
Any substantive or procedural requirement related to Pretreatment, other than a National Pretreatment Standard, imposed on an Industrial User.

Pretreatment Standards for Existing Sources (PSES)
Categorical Standards and requirements applicable to industrial sources that began construction prior to the publication of the proposed pretreatment standards for that industrial category. (see individual standards at 40 CFR Parts 405-471.)

Pretreatment Standards for New Sources (PSNS)
Categorical Standards and requirements applicable to industrial sources that began construction after the publication of the proposed pretreatment standards for that industrial category. (see individual standards at 40 CFR Parts 405-471.)

Priority Pollutant
Pollutant listed by the Administrator of the EPA under Clean Water Act section 307(a). The list of the current 126 Priority Pollutants can be found in 40 CFR Part 423 Appendix A.

Process Wastewater
Any water which, during manufacturing or processing, comes into contact with or results from the production or use of any raw material, intermediate product, finished product, byproduct, or waste product.

Production-Based Standards
A discharge standard expressed in terms of pollutant mass allowed in a discharge per unit of product manufactured.

Publicly Owned Treatment Works (POTW) *[40 CFR §403.3(o)]*
A treatment works as defined by section 212 of the Act, which is owned by a State or municipality (as defined by section 502(4) of the Act). This definition includes any devices or systems used in the storage, treatment, recycling, and reclamation of municipal sewage or industrial wastes of a liquid nature. It also includes sewers, pipes or other conveyances only if they convey wastewater to a POTW Treatment Plant.

The term also means the municipality as defined in section 502(4) of the Act, which has jurisdiction over the Indirect Discharges to and the discharges from such a treatment works.

Regulated Wastestream
For purposes of applying the combined wastestream formula, a wastestream from an industrial process that is regulated by a categorical standard.

Removal Credit *[paraphrased from 40 CFR §403.7]*
Variance from a pollutant limit specified in a categorical pretreatment standard to reflect removal by the POTW of said pollutant.

Representative Sample
A sample from a wastestream that is as nearly identical as possible in composition to that in the larger volume of wastewater being discharged and typical of the discharge from the facility on a normal operating day.

Sanitary Sewer Overflow (SSO)
Untreated or partially treated sewage overflows from a sanitary sewer collection system.

Self-Monitoring
Sampling and analyses performed by a facility to ensure compliance with a permit or other regulatory requirements.

Sewer Use Ordinance (SUO)
A legal mechanism implemented by a local government entity which sets out, among others, requirements for the discharge of pollutants into a publicly owned treatment works.

Significant Industrial User (SIU) *[paraphrased from 40 CFR §403.3(t)]*
(1) All users subject to Categorical Pretreatment Standards under 40 CFR 403.6 and 40 CFR chapter I, subchapter N; and (2) Any other industrial user that: discharges an average of 25,000 gallons per day or more of process wastewater to the POTW (excluding sanitary, noncontact cooling and boiler blowdown wastewater); contributes a process wastestream which makes up 5 percent or more of the average dry weather hydraulic or organic capacity of the POTW treatment plant; or is designated as such by the Control Authority as defined in 40 CFR 403.12(a) on the basis that the industrial user has a reasonable potential for adversely affecting the POTW's operation or for violating any pretreatment standard or requirement (in accordance with 40 CFR 403.8(f)(6)].

Significant Noncompliance (SNC) *[40 CFR §403.8(f)(2)(vii)]*
Industrial user violations meeting one or more of the following criteria:
1) Chronic violations of wastewater discharge limits, defined here as those in which sixty-six percent or more of all of the measurements taken during a six month period exceed (by any magnitude) the daily maximum limit or the average limit for the same pollutant parameter;
2) Technical Review Criteria (TRC) violations, defined here as those in which thirty-three percent or more of all of the measurements for each pollutants parameter taken during a six-month period equal or exceed the product of the daily maximum limit or the average limit multiplied by the applicable TRC (TRC=1.4 for BOD, TSS, fats, oil, and grease, and 1.2 for all other pollutants except pH);
3) Any other violation of a pretreatment effluent limit (daily maximum or longer-term average) that the Control Authority determines has caused, alone or in combination with other dischargers, interference or pass through (including endangering the health of POTW personnel or the general public);
4) Any discharge of a pollutant that has caused imminent endangerment to human health, welfare or to the environment or has resulted in the POTW's exercise of its emergency authority under paragraph (f)(1)(vi)(B) of this section to halt or prevent such a discharge;
5) Failure to meet, within 90 days after the schedule date, a compliance schedule milestone contained in a local control mechanism or enforcement order for starting construction, completing construction, or attaining final compliance;
6) Failure to provide, within 30 days after the due date, required reports such as baseline monitoring reports, 90-day compliance reports, periodic self-monitoring reports, and reports on compliance with compliance schedules;
7) Failure to accurately report noncompliance;
8) Any other violation or group of violations which the Control Authority determines will adversely affect the operation or implementation of the local pretreatment program.

Slug Discharge *[40 CFR §403.8(f)(2)(v)]*
Any discharge of a non-routine, episodic nature, including but not limited to, an accidental spill or a noncustomary batch discharge.

Specific Prohibitions *[40 CFR §403.5(b)]*
The following pollutants shall not be introduced into a POTW:
1) Pollutants which create a fire or explosion hazard in the POTW, including but not limited to, wastestreams with a closed cup flashpoint of less than 140 degrees Fahrenheit or 60 degrees Centigrade using the test methods specified in 40 CFR Part 261.21;
2) Pollutants which will cause corrosive structural damage to the POTW, but in no case discharges with pH lower than 5.0, unless the works is specifically designed to accommodate such discharges;
3) Solid or viscous pollutants in amounts which will cause obstruction to the flow in the POTW resulting in interference;
4) Any pollutant, including oxygen-demanding pollutants (BOD, etc.) Released in a discharge at a flow rate and/or concentration which will cause interference with the POTW;
5) Heat in amounts which will inhibit biological activity in the POTW resulting in interference, but in no case heat in such quantities that the temperature at the POTW treatment plant exceeds 40°C (104°F) unless the Approval Authority, upon request of the POTW, approves alternative temperature limits;
6) Petroleum oil, nonbiodegradable cutting oil, or products of mineral oil origin in amounts that will cause interference or pass through;
7) Pollutants which result in the presence of toxic gases, vapors, or fumes within the POTW in a quantity that may cause acute worker health and safety problems;
8) Any trucked or hauled pollutants, except at discharge points designated by the POTW.

Standard Industrial Classification (SIC)
A system developed by the U.S. Office of Management and Budget that is used to classify various types of business entities. Effective in 1998, the SIC scheme is replace by the North American Industry Classification System (**NAICS**), although the EPA has not yet implemented this change.

Storm Water
Rain water, snowmelt, and surface runoff and drainage.

Time Proportional Composite Sample
A sample consisting of a series of aliquots collected from a representative point in the discharge stream at equal time intervals over the entire discharge period on the sampling day.

Toxic Pollutant
Any pollutant listed as toxic under section 307(a)(1) of the CWA, or in the case of sludge use or disposal practices, any pollutant identified in regulations implementing section 405(d) of the CWA.

Toxicity Reduction Evaluation
A site-specific study conducted in a stepwise process designed to identify the causative agent(s) of effluent toxicity, isolate the sources of toxicity, evaluate the effectiveness of toxicity control options, and then confirm the reduction in effluent toxicity.

Toxicity Test
A procedure to determine the toxicity of a chemical or an effluent using living organisms. A toxicity test measures the degree of effect on exposed test organisms of a specific chemical or effluent.

Toxicity Identification Evaluation
Set of procedures to identify the specific chemicals responsible for effluent toxicity.

Unregulated Wastestream
For purposes of applying the combined wastestream formula, a wastestream not regulated by a categorical standard nor considered a dilute wastestream.

Upset *[paraphrased from 40 CFR §403.16(a)]*
An exceptional incident in which there is unintentional and temporary noncompliance with categorical Pretreatment Standards because of factors beyond the reasonable control of the Industrial User. An Upset does not include noncompliance to the extent caused by operational error, improperly designed treatment facilities, inadequate treatment facilities, lack of preventative maintenance, or careless or improper operation.

Water Quality Criteria
Comprised of both numeric and narrative criteria. Numeric criteria are scientifically derived ambient concentrations developed by EPA or States for various pollutants of concern to protect human health and aquatic life. Narrative criteria are statements that describe the desired water quality goal.

Water Quality Standard
A statute or regulation that consists of the beneficial designated use or uses of a waterbody, the numeric and narrative water quality criteria that are necessary to protect the use or uses of that particular waterbody, and an antidegradation statement.

Clean Water Act Summary

33 U.S.C. s/s 1251 et seq. (1977)

The Clean Water Act is a 1977 amendment to the Federal Water Pollution Control Act of 1972, which set the basic structure for regulating discharges of pollutants to waters of the United States.

The law gave the EPA the authority to set effluent standards on an industry basis (technology-based) and continued the requirements to set water quality standards for all contaminants in surface waters. The CWA makes it unlawful for any person to discharge any pollutant from a point source into navigable waters unless a permit (**NPDES**) is obtained under the act.

The 1977 amendments focused on toxic pollutants. In 1987, the PCA was reauthorized and again focused on toxic substances, authorized citizen suit provisions, and funded sewage treatment plants (**POTW's**) under the Construction Grants Program.

The CWA made provisions for the delegation by the EPA of many permitting, administrative, and enforcement aspects of the law to state governments. In states with the authority to implement CWA programs, the EPA still retains oversight responsibilities.

In 1972, Congress enacted the first comprehensive national clean water legislation in response to growing public concern for serious and widespread water pollution. The Clean Water Act is the primary federal law that protects our nation's waters, including lakes, rivers, aquifers and coastal areas.

Lake Erie was dying. The Potomac River was clogged with blue-green algae blooms that were a nuisance and a threat to public health. Many of the nation's rivers were little more than open sewers and sewage frequently washed up on shore. Fish kills were a common sight. Wetlands were disappearing at a rapid rate.

Today, the quality of our waters has improved dramatically as a result of a cooperative effort by federal, state, tribal and local governments to implement the pollution control programs established in 1972 by the Clean Water Act.

The Clean Water Act's primary objective is to restore and maintain the integrity of the nation's waters. This objective translates into two fundamental national goals:

- eliminate the discharge of pollutants into the nation's waters, and
- achieve water quality levels that are fishable and swimmable.

The Clean Water Act focuses on improving the quality of the nation's waters. It provides a comprehensive framework of standards, technical tools and financial assistance to address the many causes of pollution and poor water quality.

It includes municipal and industrial wastewater discharges, polluted runoff from urban and rural areas, and habitat destruction. For example, the Clean Water Act requires major industries to meet performance standards to ensure pollution control; charges states and tribes with setting specific water quality criteria appropriate for their waters and developing pollution control programs to meet them; provides funding to states and communities to help them meet their clean water infrastructure needs; protects valuable wetlands and other aquatic habitats through a permitting process that ensures development and other activities are conducted in an environmentally sound manner.

After 25 years, the Act continues to provide a clear path for clean water and a solid foundation for an effective national water program.

In 1972:
Only a third of the nation's waters were safe for fishing and swimming. Wetlands losses were estimated at about 460,000 acres annually.

Agricultural runoff resulted in the erosion of 2.25 billion tons of soil and the deposit of large amounts of phosphorus and nitrogen into many waters. Sewage treatment plants served only 85 million people.

Today:
Two-thirds of the nation's waters are safe for fishing and swimming.

The rate of annual wetlands losses is estimated at about 70,000-90,000 acres according to recent studies. The amount of soil lost due to agricultural runoff has been cut by one billion tons annually, and phosphorus and nitrogen levels in water sources are down. Modern wastewater treatment facilities serve 173 million people.

The Future:
All Americans will enjoy clean water safe for fishing and swimming. We will achieve a net gain of wetlands by preventing additional losses and restoring hundreds of thousands of acres of wetlands. Soil erosion and runoff of phosphorus and nitrogen into watersheds will be minimized, helping to sustain the nation's farming economy and aquatic systems. The nation's waters will be free of effects of sewage discharges.

What is a Pretreatment Program?

The term "**pretreatment**" refers to the requirement that non-domestic sources discharging wastewater to POTWs control their discharges, and meet limits established by the EPA, and/or your state or the local municipality (**Control Authority**) on the amount of pollutants allowed to be discharged. The control of the pollutants may necessitate treatment prior to discharge to the POTW (therefore the term "**pretreatment**").

Limits may often be met by the non-domestic source through pollution prevention techniques (product substitution, recycle and reuse of materials, more efficient production practices, improved environmental management systems, etc.), pretreatment of wastewater, or implementation of best management practices.

The National Pretreatment Program is a cooperative effort of federal, state, and local regulatory environmental agencies established to protect water quality. The program is designed to reduce the level of pollutants discharged by industry and other non-domestic wastewater sources into municipal sewer systems, and thereby, reduce the amount of pollutants released into the environment from these sources.

The national pretreatment program was established by Congress under authority of the Federal Water Pollution Control Act of 1972 (Pub. L. 92-500) as amended by the Clean Water Act of 1977 (Pub. L. 95-217). Implementation requirements of the pretreatment portions of these laws were first codified into 40 Code of Federal Regulations (**CFR**) Part 403 in 1978.

Objectives of the pretreatment program:

1. Protect publicly owned treatment works (**POTW**) from pollutants that may cause interference with sewage treatment plant operations.
2. Prevent introducing pollutants into a POTW that could cause pass through of untreated pollutants to receiving waters.
3. Manage pollutant discharges into a POTW to improve opportunities for reuse of POTW wastewater and residuals (sewage sludge).
4. Prevent introducing pollutants into a POTW that could cause worker health or safety concerns, or that could pose a potential endangerment to the public or to the environment.

POTWs

Publicly owned treatment works (**POTWs**) collect wastewater from homes, commercial buildings, and industrial facilities and transport it via a series of pipes, known as a collection system, to the treatment plant. Here, the POTW removes harmful organisms and other contaminants from the sewage so it can be discharged safely into the receiving stream. Generally, POTWs are designed to treat domestic sewage only.

However, POTWs also receive wastewater from industrial (non-domestic) users. The General Pretreatment Regulations establish responsibilities of Federal, State, and local government, industry and the public to implement Pretreatment Standards to control pollutants from the industrial users which may pass through or interfere with POTW treatment processes or which may contaminate sewage sludge.

National Pretreatment Program

The National Pretreatment Program identifies specific requirements that apply to all IUs, additional requirements that apply to all SIUs, and certain requirements that only apply to CIUs. The objectives of the National Pretreatment Program are achieved by applying and enforcing three types of discharge standards:

- **prohibited discharge standards**
- **categorical Pretreatment standards**
- **local limits**

Prohibited Discharge Standards

Prohibited discharge standards are somewhat general, national standards are applicable to all industrial users to a POTW, regardless of whether or not the POTW has an approved pretreatment program or the industrial user has been issued a permit.

These standards are designed to protect against pass through and interference, protect the POTW collection system, and to promote worker safety and beneficial biosolids use. These standards are listed in 40 CFR 403.5 For Final Regulations pertaining to the Pretreatment Program, refer to 40 CFR Part 403 general pretreatment regulations (Located in the rear of this course).

Categorical Pretreatment Standards

Categorical Pretreatment Standards are limitations on pollutant discharges to publicly owned treatment works (POTWs), promulgated by the EPA in accordance with Section 307 of the Clean Water Act that apply to specific process wastewaters of particular industrial categories.

These are national, technology-based standards that apply regardless of whether or not the POTW has an approved pretreatment program or the industrial user has been issued a permit. Such industries are called Categorical Industrial Users. The standards applicable to industrial discharges to a POTW collection system are designated in the Effluent Guidelines & Limitations [Parts 405-471] by the terms "**Pretreatment Standards for Existing Sources**" (or "**PSES**") and "**Pretreatment Standards for New Sources**" (or "**PSNS**").

Note: The Effluent Guidelines & Limitations designated by the terms **"Best Practicable Control Technology Currently Available (BPT)"**, "**Best Available Technology Economically Achievable (BAT)", "Best Conventional Pollutant Control Technology (BCT)", and "New Source Performance Standards (NSPS)"** apply to industries that discharge process wastewater to waters of the U.S. and should have a National Pollutant Discharge Elimination System (**NPDES**) Permit.

Local Limits

Local limits are developed to reflect specific needs and capabilities at individual POTWs and designed to protect the POTW receiving waters. Regulations at 40 CFR 403.8(f)(4) state that POTW Pretreatment Programs must develop local limits or demonstrate that they are unnecessary; 40 CFR 403.5(c) states that local limits are needed when pollutants are received that could result in pass through or interference at the POTW. Essentially, local limits translate the general prohibited discharge standards of 40 CFR 403.5 to site-specific needs.

Assistance on how to develop local limits may be found in the Guidance Manual for the Development and Implementation of Local Discharge Limitations Under the Pretreatment Program, December 1987 (EPA#833-B-87-202, ERIC#W107, NTIS#PB92-129188). Information related to ordering this publication from the Office of Wastewater Management is located at: http://www.epa.gov/owm/inpub.htm.

The EPA Supplemental Manual on the Development And Implementation of Local Discharge Limitations Under the Pretreatment Program: Residential and Commercial Toxic Pollutant Loadings and POTW Removal published May 1, 1991 provides information related to residential and commercial sources of toxic pollutants and estimated removal efficiencies of municipal treatment processes.

Two automatic wastewater samplers, one for Local Limits or compliance and the other for the wastewater plant operator to determine plant efficiency.

An automatic WWT sampler.

Water Quality Standard
A statute or regulation that consists of the beneficial designated use or uses of a waterbody, the numeric and narrative water quality criteria that are necessary to protect the use or uses of that particular waterbody, and an antidegradation statement.

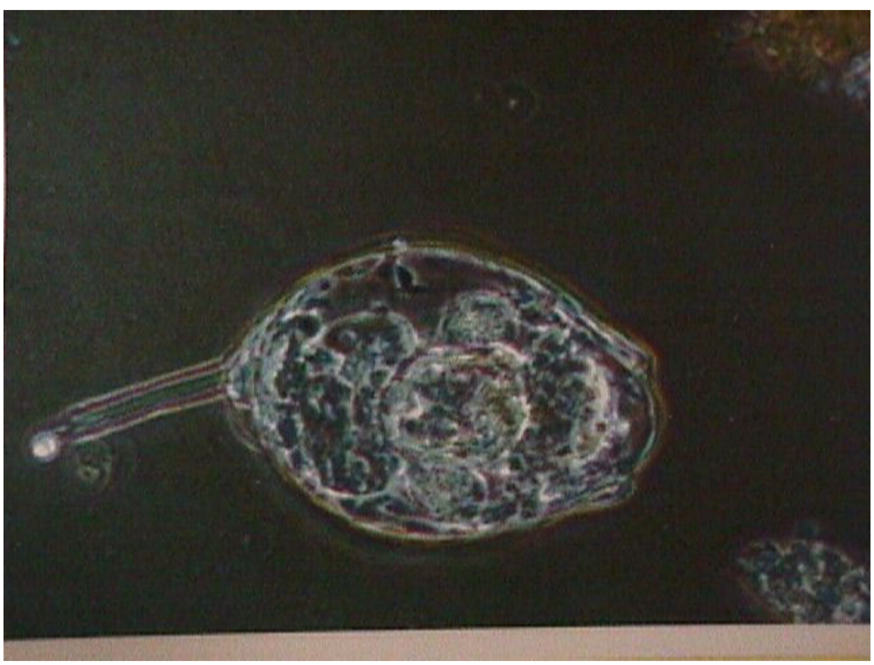
The Need for the Pretreatment Program

The average American uses roughly 100 to 200 gallons of water a day, with less than one percent of that water actually being consumed. The rest is used for activities such as washing, preparing food, watering lawns, heating and cooling, transporting wastes, and fire protection. The public is very conscious about the quality of water that comes out of their tap each day, quickly notifying authorities of changes in appearance, odor, and taste.

These same Americans, on average, discharge about the same amount of wastewater to local sewage treatment plants daily. This wastewater (commonly referred to as "**domestic sewage**") receives much less attention than drinking water, likely the result of an "out of sight, out of mind" attitude.

Most people take it for granted that once down the drain, wastes will be handled appropriately. In fact, this attitude has carried over to industry as well, as can be seen by reading the labels of many household products. These labels often recommend that waste or excess product be disposed of down the drain. Other toxic or hazardous products are actually designed to be disposed of down the drain (e.g., drain clog remover).

Recall the phosphate detergent problems of the late 1960s and early 70s; large doses of phosphate, found in most detergents at the time, were passing through municipal treatment plants and overloading lakes, causing large algal blooms to form and subsequently reducing available light, food and oxygen for fish and other aquatic organisms. While great strides have been taken to address the phosphate problem, it is possible that other problematic pollutants are being dumped down the drain at the expense of human health and the environment.



Rotifer

Sewage Collection System

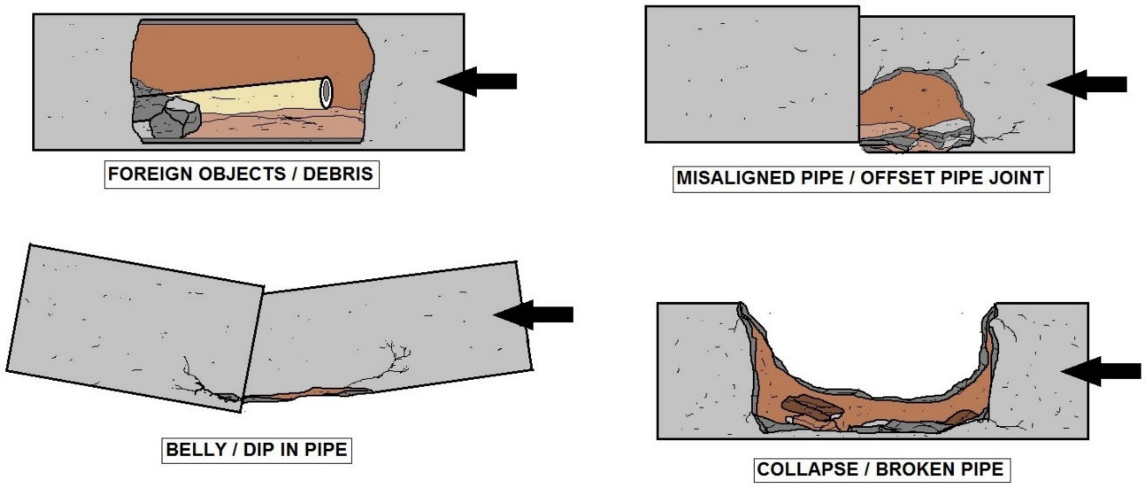
Publicly owned treatment works (**POTWs**) collect wastewater from homes, commercial buildings, and industrial facilities and transport it via a series of pipes, known as a collection system, to the treatment plant.

Collection systems may flow entirely by gravity, or may include lift stations that pump the wastewater via a force main to a higher elevation where the wastewater can then continue on via gravity. Ultimately, the collection system delivers this sewage to the treatment plant facility. Here, the POTW removes harmful organisms and other contaminants from the sewage so it can be discharged safely into the receiving stream.

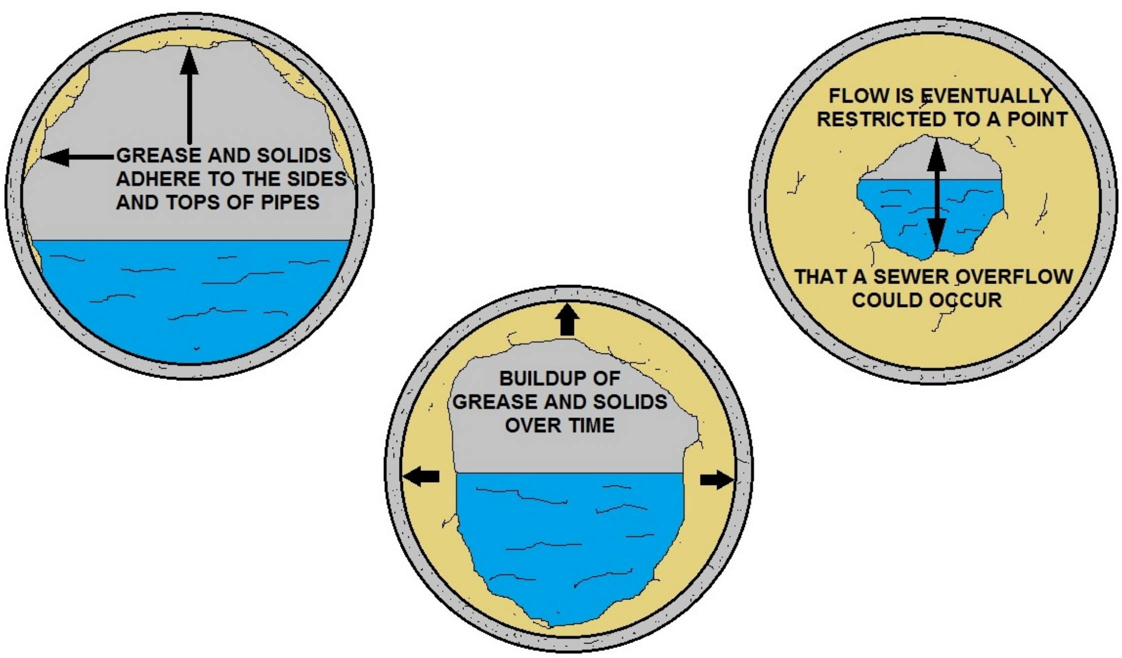
New sewer manhole with sewer mains before final burial.

Without treatment, sewage creates bad odors, contaminates water supplies, and spreads disease. Today, more than 16,000 sewage treatment plants exist in the U.S. treating more than 32 billion gallons per day of wastewater.

Modern sewer vactor or Camel. It is wise to make friends with the collection crews. The collection crews can greatly assist you in your enforcement efforts and can tell you lots of information, only if you develop a relationship with them.



COMMON CAUSES OF SEWER LATERAL BLOCKAGES



EFFECTS OF GREASE AND SOLIDS ON SEWER FLOW

POTWS

Generally, POTWs are designed to treat domestic sewage only. Simply defined, the typical POTW treatment process consists of primary and secondary treatment, along with some form of solids handling. Primary treatment is designed to remove large solids (e.g., rags and debris) and smaller inorganic grit. Typical primary treatment operations include screening and settling. Secondary treatment removes organic contaminants using microorganisms to consume biodegradable organics.

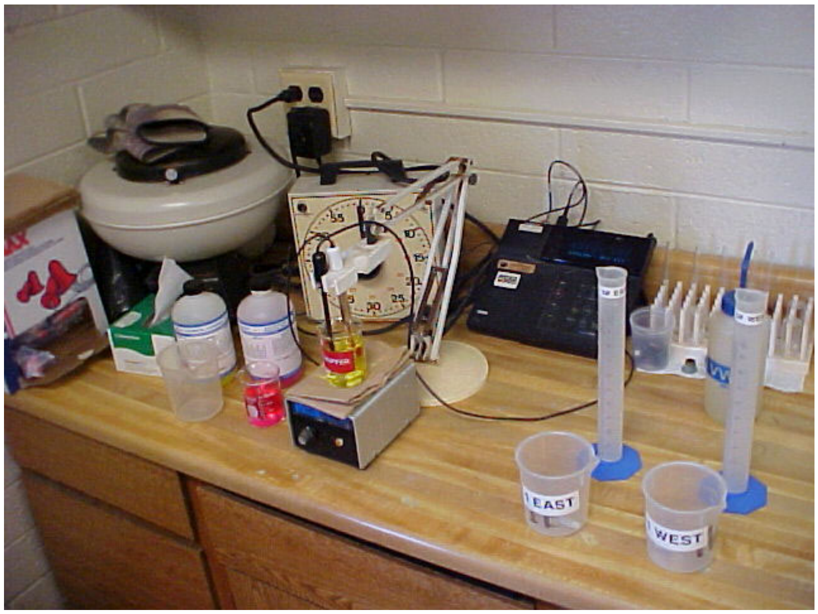
Odor control facility at a modern wastewater treatment plant--the picture on the right is of an enclosed *“headworks”* to help lower odor complaints.

Activated sludge, trickling filters, and rotating biological contactors are examples of common secondary treatment operations. Depending on effluent discharge requirements, POTWs may perform other “**advanced treatment**” operations such as nitrification (to convert ammonia and nitrite to the less toxic nitrate), denitrification (to convert nitrate to molecular nitrogen).

Aerated Wastewater

Conventional Pollutants *Figure 1*

- **Biochemical Oxygen Demand (BOD)**
- **Total Suspended Solids (TSS)**
- **Fecal Coliform**
- **pH**
- **Oil and Grease (O&G)**



A small wastewater treatment operator's lab.

Physical-Chemical Treatment
Physical-chemical treatment (to remove dissolved metals and organics), and disinfection (to kill any remaining pathogens). After treatment is complete, effluent is discharged to the receiving stream, typically a creek, river, lake, estuary or ocean. Some POTWs may apply treated effluent directly to golf courses, parkland, or croplands.

Both primary and secondary treatment processes generate waste solids, known as sewage sludge or biosolids. Sludges from the treatment process may be used productively (i.e., as fertilizer or soil conditioner), disposed of in a landfill or incinerated in a dedicated sewage sludge incinerator with the ash also disposed of in a landfill.

As described above, POTWs are designed to treat typical household wastes and biodegradable commercial and biodegradable industrial wastes. The Clean Water Act (**CWA**) and the EPA define the contaminants from these sources as conventional pollutants.
Conventional pollutants are identified in Figure 1 above and include those specific pollutants that are expected to be present in domestic discharges to POTWs.

Commercial and industrial facilities may, however, discharge toxic pollutants that the treatment plant is neither designed for nor able to remove.

What is in Wastewater?

Wastewater is mostly water by weight. Other materials make up only a small portion of wastewater, but can be present in large enough quantities to endanger public health and the environment. Because practically anything that can be flushed down a toilet, drain, or sewer can be found in wastewater, even household sewage contains many potential pollutants. The wastewater components that should be of most concern to homeowners and communities are those that have the potential to cause disease or detrimental environmental effects.

Organisms
Many different types of organisms live in wastewater and some are essential contributors to treatment. A variety of bacteria, protozoa, and worms work to break down certain carbon-based (organic) pollutants in wastewater by consuming them. Through this process, organisms turn wastes into carbon dioxide, water, or new cell growth.

Bacteria and other microorganisms are particularly plentiful in wastewater and accomplish most of the treatment. Most wastewater treatment systems are designed to rely in large part on biological processes.

Pathogens
Many disease-causing viruses, parasites, and bacteria are also present in wastewater and enter from almost anywhere in the community. These pathogens often originate from people and animals that are infected with or are carriers of a disease. Graywater and blackwater from typical homes contain enough pathogens to pose a risk to public health. Other likely sources in communities include hospitals, schools, farms, and food processing plants.

Some illnesses from wastewater-related sources are relatively common. Gastroenteritis can result from a variety of pathogens in wastewater, and cases of illnesses caused by the parasitic protozoa Giardia lambia and Cryptosporidium are not unusual in the U.S. Other important wastewater-related diseases include hepatitis A, typhoid, polio, cholera, and dysentery.

Outbreaks of these diseases can occur as a result of drinking water from wells polluted by wastewater, eating contaminated fish, or recreational activities in polluted waters. Some illnesses can be spread by animals and insects that come in contact with wastewater.

Even municipal drinking water sources are not completely immune to health risks from wastewater pathogens. Drinking water treatment efforts can become overwhelmed when water resources are heavily polluted by wastewater. For this reason, wastewater treatment is as important to public health as drinking water treatment.

Organic Matter
Organic materials are found everywhere in the environment. They are composed of the carbon-based chemicals that are the building blocks of most living things. Organic materials in wastewater originate from plants, animals, or synthetic organic compounds, and enter wastewater in human wastes, paper products, detergents, cosmetics, foods, and from agricultural, commercial, and industrial sources.

Organic compounds normally are some combination of carbon, hydrogen, oxygen, nitrogen, and other elements. Many organics are proteins, carbohydrates, or fats and are biodegradable, which means they can be consumed and broken down by organisms. However, even biodegradable materials can cause pollution. In fact, too much organic matter in wastewater can be devastating to receiving waters.

Large amounts of biodegradable materials are dangerous to lakes, streams, and oceans, because organisms use dissolved oxygen in the water to break down the wastes. This can reduce or deplete the supply of oxygen in the water needed by aquatic life, resulting in fish kills, odors, and overall degradation of water quality. The amount of oxygen organisms need to break down wastes in wastewater is referred to as the biochemical oxygen demand (BOD) and is one of the measurements used to assess overall wastewater strength.

Some organic compounds are more stable than others and cannot be quickly broken down by organisms, posing an additional challenge for treatment. This is true of many synthetic organic compounds developed for agriculture and industry.

In addition, certain synthetic organics are highly toxic. Pesticides and herbicides are toxic to humans, fish, and aquatic plants and often are disposed of improperly in drains or carried in stormwater. In receiving waters, they kill or contaminate fish, making them unfit to eat. They can also damage processes in treatment plants. Benzene and toluene are two toxic organic compounds found in some solvents, pesticides, and other products. New synthetic organic compounds are being developed all the time, which can complicate treatment efforts.

Oil and Grease

Fatty organic materials from animals, vegetables, and petroleum also are not quickly broken down by bacteria and can cause pollution in receiving environments. When large amounts of oils and greases are discharged to receiving waters from community systems, they increase BOD and they may float to the surface and harden, causing aesthetically unpleasing conditions. They also can trap trash, plants, and other materials, causing foul odors, attracting flies, mosquitoes and other disease vectors. In some cases, too much oil and grease causes septic conditions in ponds and lakes by preventing oxygen from the atmosphere from reaching the water.

Onsite systems also can be harmed by too much oil and grease, which can clog onsite system drainfield pipes and soils, adding to the risk of system failure. Excessive grease also adds to the septic tank scum layer, requiring more frequent tank pumping. Both possibilities can result in significant costs to homeowners. Petroleum-based waste oils used for motors and industry are considered hazardous waste and should be collected and disposed of separately from wastewater.

Inorganics

Inorganic minerals, metals, and compounds, such as sodium, potassium, calcium, magnesium, cadmium, copper, lead, nickel, and zinc are common in wastewater from both residential and nonresidential sources. They can originate from a variety of sources in the community including industrial and commercial sources, stormwater, inflow and infiltration from cracked pipes and leaky manhole covers. Most inorganic substances are relatively stable, and cannot be broken down easily by organisms in wastewater.

Large amounts of many inorganic substances can contaminate soil and water. Some are toxic to animals and humans and may accumulate in the environment. For this reason, extra treatment steps are often required to remove inorganic materials from industrial wastewater sources. For example, heavy metals which are discharged with many types of industrial wastewaters are difficult to remove by conventional treatment methods. Although acute poisonings from heavy metals in drinking water are rare in the U.S., potential long-term health effects from ingesting small amounts of some inorganic substances over an extended period of time are possible.

Nutrients

Wastewater often contains large amounts of the nutrients nitrogen and phosphorus in the form of nitrate and phosphate, which promote plant growth. Organisms only require small amounts of nutrients in biological treatment, so there is normally an excess available in treated wastewater. In severe cases, excessive nutrients in receiving waters cause algae and other plants to grow quickly depleting oxygen in the water. Deprived of oxygen, fish and other aquatic life die, emitting foul odors.

Nutrients from wastewater have also been linked to ocean "red tides" that poison fish and cause illness in humans. Nitrogen in drinking water may contribute to miscarriages in pregnant women and is the cause of a serious illness in infants called methemoglobinemia or "blue baby syndrome."

Solids

Solid materials in wastewater can consist of organic and/or inorganic materials and organisms. The solids must be significantly reduced by treatment or they can increase BOD when discharged to receiving waters and provide places for microorganisms to escape disinfection. They also can clog soil absorption fields in onsite systems. Listed are the characteristics of solids.

* Settleable solids-Certain substances, such as sand, grit, and heavier organic and inorganic materials settle out from the rest of the wastewater stream during the preliminary stages of treatment. On the bottom of settling tanks and ponds, organic material makes up a biologically active layer of sludge that aids in treatment.
* Suspended solids-Materials that resist settling may remain suspended in wastewater. Suspended solids in wastewater must be treated, or they will clog soil absorption systems or reduce the effectiveness of disinfection systems.
* Dissolved solids-Small particles of certain wastewater materials can dissolve like salt in water. Some dissolved materials are consumed by microorganisms in wastewater, but others, such as heavy metals, are difficult to remove by conventional treatment. Excessive amounts of dissolved solids in wastewater can have adverse effects on the environment.

Gases

Certain gases in wastewater can cause odors, affect treatment, or are potentially dangerous. Methane gas, for example, is a byproduct of anaerobic biological treatment and is highly combustible. Special precautions need to be taken near septic tanks, manholes, treatment plants, and other areas where wastewater gases can collect.

The gases hydrogen sulfide and ammonia can be toxic and pose asphyxiation hazards. Ammonia as a dissolved gas in wastewater also is dangerous to fish. Both gases emit odors, which can be a serious nuisance.

Unless effectively contained or minimized by design and location, wastewater odors can affect the mental well-being and quality of life of residents. In some cases, odors can even lower property values and affect the local economy.

Dispose of Household Hazardous Wastes Safely

Many household products are potentially hazardous to people and the environment and never should be flushed down drains, toilets, or storm sewers. Treatment plant workers can be injured and wastewater systems can be damaged as a result of improper disposal of hazardous materials.

Other hazardous chemicals cannot be treated effectively by municipal wastewater systems and may reach local drinking water sources. When flushed into septic systems and other onsite systems, they can temporarily disrupt the biological processes in the tank and soil absorption field, allowing hazardous chemicals and untreated wastewater to reach groundwater.

Some examples of hazardous household materials include motor oil, transmission fluid, antifreeze, paint, paint thinner, varnish, polish, wax, solvents, pesticides, rat poison, oven cleaner, and battery fluid. Many of these materials can be recycled or safely disposed of at community recycling centers.

Other Important Wastewater Characteristics

In addition to the many substances found in wastewater, there are other characteristics system designers and operators use to evaluate wastewater. For example, the color, odor, and turbidity of wastewater give clues about the amount and type of pollutants present and treatment necessary. The following are some other important wastewater characteristics that can affect public health and the environment, as well as the design, cost, and effectiveness of treatment.

Temperature

The best temperatures for wastewater treatment probably range from 77 to 95 degrees Fahrenheit. In general, biological treatment activity accelerates in warm temperatures and slows in cool temperatures, but extreme hot or cold can stop treatment processes altogether. Therefore, some systems are less effective during cold weather and some may not be appropriate for very cold climates.

Wastewater temperature also affects receiving waters. Hot water, for example, which is a byproduct of many manufacturing processes, can be a pollutant. When discharged in large quantities, it can raise the temperature of receiving streams locally and disrupt the natural balance of aquatic life.

pH

The acidity or alkalinity of wastewater affects both treatment and the environment. Low pH indicates increasing acidity; while a high pH indicates increasing alkalinity (a pH of 7 is neutral). The pH of wastewater needs to remain between 6 and 9 to protect organisms. Acids and other substances that alter pH can inactivate treatment processes when they enter wastewater from industrial or commercial sources.

Flow
Whether a system serves a single home or an entire community, it must be able to handle fluctuations in the quantity and quality of wastewater it receives to ensure proper treatment is provided at all times. Systems that are inadequately designed or hydraulically overloaded may fail to provide treatment and allow the release of pollutants to the environment.

To design systems are as safe and as cost-effective as possible, engineers must estimate the average and maximum (peak) amount of flows generated by various sources. Because extreme fluctuations in flow can occur during different times of the day and on different days of the week, estimates are based on observations of the minimum and maximum amounts of water used on an hourly, daily, weekly, and seasonal basis. The possibility of instantaneous peak flow events that result from several or all water-using appliances or fixtures being used at once is also taken into account.

The number, type, and efficiency of all water-using fixtures and appliances at the source is factored into the estimate (for example, the number and amount of water normally used by faucets, toilets, and washing machines), as is the number of possible users or units that can affect the amount of water used (for example, the number of residents, bedrooms, customers, students, patients, seats, or meals served). According to studies, water use in many homes is lowest from about midnight to 5 a.m., averaging less than one gallon per person per hour, but then rises sharply in the morning around 6 a.m. to a little over 3 gallons per person per hour. During the day, water use drops off moderately and rises again in the early evening hours.

Weekly peak flows may occur in some homes on weekends, especially when all adults work during the week. In U.S. homes, average water use is approximately 45 gallons per person per day, but may range from 35 to 60 gallons or more.

Peak flows at stores and other businesses typically occur during business hours and during meal times at restaurants. Rental properties, resorts, and commercial establishments in tourist areas may have extreme flow variations seasonally.

Estimating flow volumes for centralized treatment systems is a complicated task, especially when designing a new treatment plant in a community where one has never existed previously.

Engineers must allow for additional flows during wet weather due to inflow and infiltration of extra water into sewers. Excess water can enter sewers through leaky manhole covers and cracked pipes and pipe joints, diluting wastewater, which affects its overall characteristics. This can increase flows to treatment plants sometimes by as much as three or four times the original design load.

The main focus of wastewater treatment plants is to reduce the BOD and COD in the effluent discharged to natural waters, meeting state and federal discharge criteria. Wastewater treatment plants are designed to function as "microbiology farms," where bacteria and other microorganisms are fed oxygen and organic waste.

Treatment of wastewater usually involves biological processes such as the activated sludge system in the secondary stage after preliminary screening to remove coarse particles and primary sedimentation that settles out suspended solids.

These secondary treatment steps are generally considered environmental biotechnologies that harness natural self-purification processes contained in bioreactors for the biodegradation of organic matter and bioconversion of soluble nutrients in the wastewater.

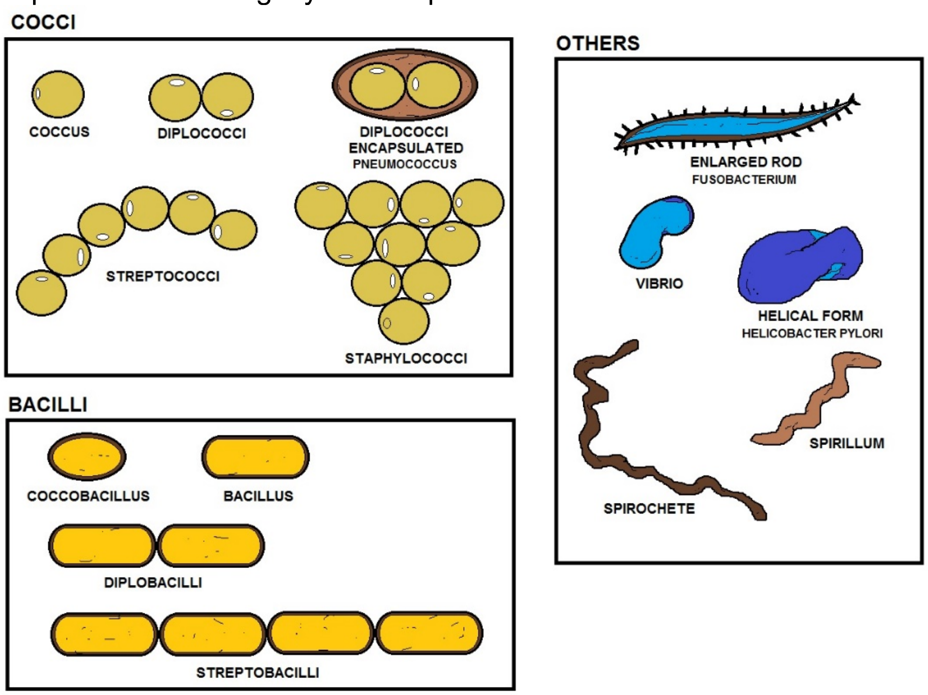
Application Specific Microbiology

Each wastewater stream is unique, and so too are the community of microorganisms that process it. This "application-specific microbiology" is the preferred methodology in wastewater treatment affecting the efficiency of biological nutrient removal. The right laboratory prepared bugs are more efficient in organics removal if they have the right growth environment. This efficiency is multiplied if microorganisms are allowed to grow as a layer of biofilm on specifically designed support media. In this way, optimized biological processing of a waste stream can occur. To reduce the start-up phase for growing a mature biofilm one can also purchase "application-specific bacterial cultures" from appropriate microbiology vendors.

Bacteria

Bacteria are one of the most ancient of living things and some scientists believe they have been on this planet for nearly 4,000 million years. During this time they have acquired lots of fascinating and different ways of living. They also come in a variety of shapes.

The simplest shape is a round sphere or ball. Bacteria formed like this are called cocci (singular coccus). The next simplest shape is cylindrical. Cylindrical bacteria are called rods (singular rod). Some bacteria are basically rods but instead of being straight they are twisted or bent or curved, sometimes in a spiral. These bacteria are called spirilla (singular spirillum). Spirochaetes are tightly coiled up bacteria.

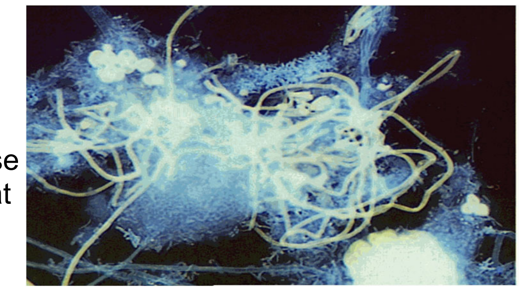


THE DIFFERENT SHAPES OF BACTERIA

Bacteria are friendly creatures; you never find one bacteria on its own. They tend to live together in clumps, chains or planes. When they live in chains, one after the other, they are called filamentous bacteria that often have long thin cells. When they tend to collect in a plane or a thin layer over the surface of an object they are called a biofilm. Many bacteria exist as a biofilm and the study of biofilms is very important. Biofilm bacteria secrete sticky substances that form a sort of gel in which they live. The plaque on your teeth that causes tooth decay is a biofilm.

Filamentous Bacteria

Filamentous Bacteria are a type of bacteria that can be found in a wastewater treatment system. They function similar to floc forming bacteria in that they degrade BOD quite well. In small amounts, they are quite good to a biomass.



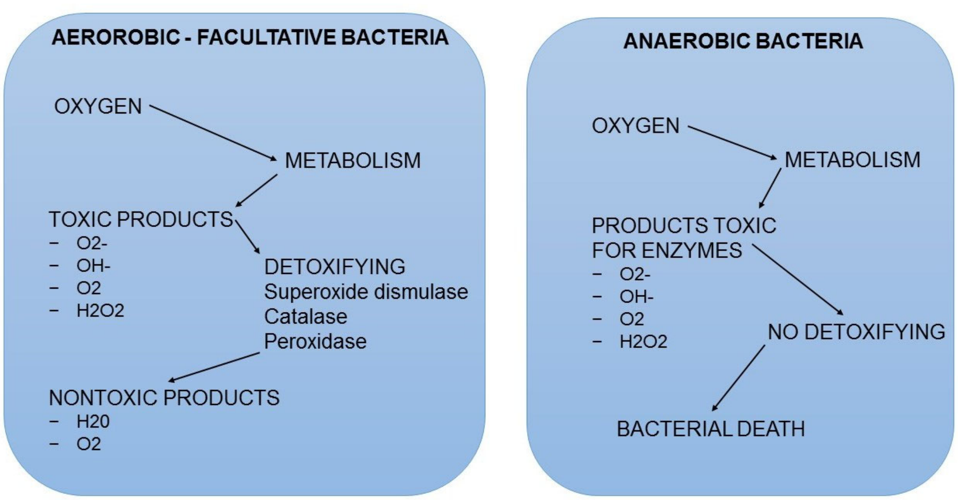
They can add stability and a backbone to the floc structure that keeps the floc from breaking up or shearing due to turbulence from pumps, aeration or transfer of the water. In large amounts they can cause many problems. Filaments are bacteria and fungi that grow in long thread-like strands or colonies.

Site Specific Bacteria

Aeration and biofilm building are the key operational parameters that contribute to the efficient degradation of organic matter (BOD/COD removal). Over time the application-specific bacteria become site specific as the biofilm develops and matures and is even more efficient in treating that site-specific waste stream.

Facultative Bacteria

Most of the bacteria absorbing the organic material in a wastewater treatment system are facultative in nature. This means they are adaptable to survive and multiply in either anaerobic or aerobic conditions. The nature of individual bacteria is dependent upon the environment in which they live. Usually, facultative bacteria will be anaerobic unless there is some type of mechanical or biochemical process used to add oxygen to the wastewater. When bacteria are in the process of being transferred from one environment to another, the metamorphosis from anaerobic to aerobic state (and vice versa) takes place within a couple of hours.



ANAEROBIC OXYGEN REQUIREMENTS

Anaerobic Bacteria
Anaerobic bacteria live and reproduce in the absence of free oxygen. They utilize compounds such as sulfates and nitrates for energy and their metabolism is substantially reduced. In order to remove a given amount of organic material in an anaerobic treatment system, the organic material must be exposed to a significantly higher quantity of bacteria and/or detained for a much longer period of time. A typical use for anaerobic bacteria would be in a septic tank. The slower metabolism of the anaerobic bacteria dictates the wastewater be held several days in order to achieve even a nominal 50% reduction in organic material. That is why septic tanks are always followed by some type of effluent treatment and disposal process. The advantage of using the anaerobic process is that electromechanical equipment is not required. Anaerobic bacteria release hydrogen sulfide as well as methane gas, both of which can create hazardous conditions. Even as the anaerobic action begins in the collection lines of a sewer system, deadly hydrogen sulfide or explosive methane gas can accumulate and be life threatening.

Aerobic Bacteria
Aerobic bacteria live and multiply in the presence of free oxygen. Facultative bacteria always achieve an aerobic state when oxygen is present. While the name "aerobic" implies breathing air, dissolved oxygen is the primary source of energy for aerobic bacteria. The metabolism of aerobes is much higher than for anaerobes. This increase means that 90% fewer organisms are needed compared to the anaerobic process, or that treatment is accomplished in 90% less time. This provides a number of advantages including a higher percentage of organic removal. The by-products of aerobic bacteria are carbon dioxide and water. Aerobic bacteria live in colonial structures called floc and are kept in suspension by the mechanical action used to introduce oxygen into the wastewater. This mechanical action exposes the floc to the organic material while treatment takes place. Following digestion, a gravity clarifier separates and settles out the floc. Because of the mechanical nature of the aerobic digestion process, maintenance and operator oversight are required.

Activated Sludge
Aerobic floc in a healthy state are referred to as activated sludge. While aerobic floc has a metabolic rate approximately ten times higher than anaerobic sludge, it can be increased even further by exposing the bacteria to an abundance of oxygen. Compared to a septic tank, which takes several days to reduce the organic material, an activated sludge tank can reduce the same amount of organic material in approximately 4-6 hours. This allows a much higher degree of overall process efficiency. In most cases treatment efficiencies and removal levels are so much improved, additional downstream treatment components are dramatically reduced or totally eliminated.

Filamentous Organisms
The majority of filamentous organisms are bacteria, although some of them are classified as algae, fungi or other life forms. There are a number of types of filamentous bacteria which proliferate in the activated sludge process. Filamentous organisms perform several different roles in the process, some of which are beneficial and some of which are detrimental. When filamentous organisms are in low concentrations in the process, they serve to strengthen the floc particles. This effect reduces the amount of shearing in the mechanical action of the aeration tank and allows the floc particles to increase in size.

Larger floc particles are more readily settled in a clarifier. Larger floc particles settling in the clarifier also tend to accumulate smaller particulates (surface adsorption) as they settle, producing an even higher quality effluent.

Conversely, if the filamentous organisms reach too high a concentration, they can extend dramatically from the floc particles and tie one floc particle to another (interfloc bridging) or even form a filamentous mat of extra-large size. Due to the increased surface area without a corresponding increase in mass, the activated sludge will not settle well. This results in less solids separation and may cause a washout of solid material from the system. In addition, air bubbles can become trapped in the mat and cause it to float, resulting in a floating scum mat. Due to the high surface area of the filamentous bacteria, once they reach an excess concentration, they can absorb a higher percentage of the organic material and inhibit the growth of more desirable organisms.

Protozoans and Metazoans
In a wastewater treatment system, the next higher life form above bacteria is protozoans. These single-celled animals perform three significant roles in the activated sludge process. These include floc formation, cropping of bacteria and the removal of suspended material. Protozoans are also indicators of biomass health and effluent quality. Because protozoans are much larger in size than individual bacteria, identification and characterization is readily performed. Metazoans are very similar to protozoans except they are usually multi-celled animals. Macroinvertebrates such as nematodes and rotifers, are typically found only in a well-developed biomass. The presence of protozoans and metazoans and the relative abundance of certain species can be a predictor of operational changes within a treatment plant. In this way, an operator is able to make adjustments and minimize negative operational effects simply by observing changes in the protozoan and metazoan population.

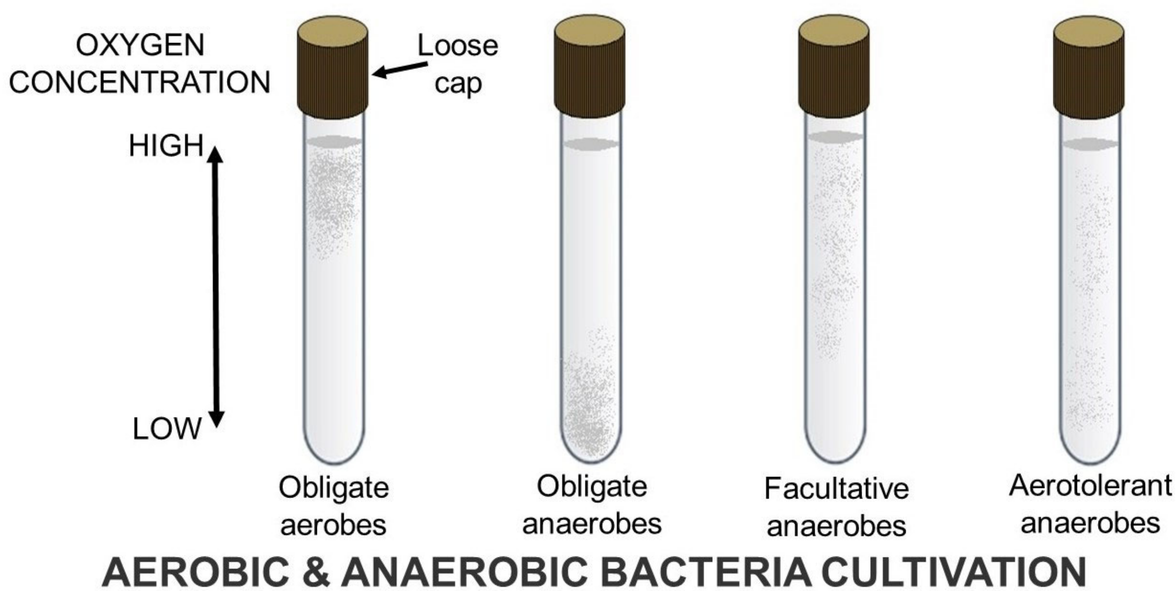
Dispersed Growth
Dispersed growth is material suspended within the activated sludge process that has not been adsorbed into the floc particles. This material consists of very small quantities of colloidal (too small to settle out) bacteria as well as organic and inorganic particulate material. While a small amount of dispersed growth in between the floc particles is normal, excessive amounts can be carried through a secondary clarifier. When discharged from the treatment plant, dispersed growth results in higher effluent solids.

Other Wastewater Treatment Components

Biochemical Oxygen Demand
Biochemical Oxygen Demand (**BOD or BOD5**) is an indirect measure of biodegradable organic compounds in water, and is determined by measuring the dissolved oxygen decrease in a controlled water sample over a five-day period.

During this five-day period, **aerobic** (oxygen-consuming) bacteria decompose organic matter in the sample and consume dissolved oxygen in proportion to the amount of organic material that is present. In general, a high BOD reflects high concentrations of substances that can be biologically degraded, thereby consuming oxygen and potentially resulting in low dissolved oxygen in the receiving water.

The BOD test was developed for samples dominated by oxygen-demanding pollutants like sewage. While its merit as a pollution parameter continues to be debated, BOD has the advantage of a long period of record.



Nutrients
Nutrients are chemical elements or compounds essential for plant and animal growth. Nutrient parameters include ammonia, organic nitrogen, Kjeldahl nitrogen, nitrate nitrogen (for water only) and total phosphorus. High amounts of nutrients have been associated with eutrophication, or over fertilization of a water body, while low levels of nutrients can reduce plant growth and (for example) starve higher level organisms that consume phytoplankton.

Organic Carbon
Most organic carbon in water occurs as partly degraded plant and animal materials, some of which are resistant to microbial degradation. Organic carbon is important in the estuarine food web and is incorporated into the ecosystem by photosynthesis of green plants, then consumed as carbohydrates and other organic compounds by higher animals.

In another process, formerly living tissue containing carbon is decomposed as detritus by bacteria and other microbes.

Total organic carbon (TOC)
TOC bears a direct relationship with biological and chemical oxygen demand. High levels of TOC can result from human sources, high oxygen demand being the main concern.

Priority Pollutants
Priority Pollutants refer to a list of 126 specific pollutants that includes heavy metals and specific organic chemicals. The priority pollutants are a subset of "***toxic pollutants***" as defined in the Clean Water Act.

These 126 pollutants were assigned a high priority for development of water quality criteria and effluent limitation guidelines because they are frequently found in wastewater. Many of the heavy metals, pesticides, and other chemicals listed on the following page are on the priority pollutant list.

Heavy Metals (Total and Dissolved)

Heavy metals are elements from a variety of natural and human sources. Some key metals of concern and their primary sources are listed below:

- **Arsenic** from fossil fuel combustion and industrial discharges;
- **Cadmium** from corrosion of alloys and plated surfaces, electroplating wastes, and industrial discharges;
- **Chromium** from corrosion of alloys and plated surfaces, electroplating wastes, exterior paints and stains, and industrial discharges;
- **Copper** from corrosion of copper plumbing, anti-fouling paints, and electroplating wastes;
- **Lead** from leaded gasoline, batteries, exterior paints and stains;
- **Mercury** from natural erosion and industrial discharges; and
- **Zinc** from tires, galvanized metal, and exterior paints and stains.

Discharge to POTW

As noted above, POTWs are not designed to treat toxics in industrial waste. As such, these discharges, from both industrial and commercial sources, can cause serious problems. The undesirable outcome of these discharges can be prevented using treatment techniques or management practices to reduce or eliminate the discharge of these contaminants. The act of treating wastewater prior to discharge to a POTW is commonly referred to as "**pretreatment**." The National Pretreatment Program, published in **Title 40 Code of Federal Regulations (CFR) Part 403**, provides the regulatory basis to require non-domestic dischargers to comply with pretreatment standards (effluent limitations) to ensure that the goals of the CWA are attained.

As noted in 40CFR §403.2, the objectives of the National Pretreatment Program are to:
a. Prevent the introduction of pollutants into POTWs which will interfere with the operation of a POTW, including interference with its use or disposal of municipal sludge;
b. Prevent the introduction of pollutants into POTWs which will pass through the treatment works or otherwise be incompatible with such works; and
c. Improve opportunities to recycle and reclaim municipal and industrial wastewaters and sludges.

The two key terms used in the EPA's objectives for the National Pretreatment Program, "***interference***" and "***pass through***," are defined below.

Definitions

Interference - a discharge which, alone or in conjunction with a discharge or discharges from other sources, both inhibits or disrupts the POTW, its treatment processes or operations, or its sludge processes, use or disposal, and- therefore is a cause of a violation of any NPDES permit requirement or of the prevention of sewage sludge use or disposal in compliance with any applicable requirements.

Pass Through - a discharge which exits the POTW into waters of the U.S. in quantities or concentrations which, alone or in conjunction with a discharge or discharges from other sources, is a cause of a violation of any NPDES permit requirement. As outlined in the EPA's objectives, toxic pollutants may pass through the treatment plant into the receiving stream, posing serious threats to aquatic life, to human recreation, and to consumption of fish and shellfish from these waters. Pass through can make waters unswimmable or unfishable in direct contrast to the goals of the CWA. Or, these discharges can interfere with the biological activity of the treatment plant causing sewage to pass through the treatment plant untreated or inadequately treated.

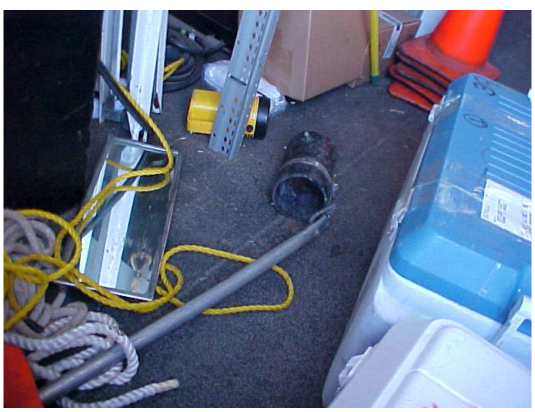
Problems Associated With Toxic Discharges ***Figure 3***

Air pollution can occur from volatilization of toxic chemicals in the POTW collection system or treatment plant, or through incineration of sewage sludge.
Corrosion of collection system and treatment plant from acidic discharges or discharges containing elevated levels of sulfate (forming toxic and corrosive hydrogen sulfide).
Groundwater pollution can occur from leaks in the collection system or pollutants from contaminated sewage sludge.

Toxic Emissions

Even where the POTW has the capability to remove these toxics, the pollutants may end up in the sewage sludge, thereby limiting sludge disposal options or escalating the cost of disposal. Incinerated contaminated sludge may release toxic emissions into the atmosphere. Toxic metals removed in primary treatment, while itself not an inhibitory process, can impact sludge digestion, a process that utilizes bacteria to stabilize sludge solids.

For example, chromium can inhibit reproduction of aerobic digestion microorganisms, thereby disrupting sludge treatment and producing sludges that must be disposed of with special treatment. Uncontaminated sludge, on the other hand, can be used as fertilizer or soil conditioner, thereby improving the productivity of our land. Many municipalities apply sewage sludge to pastureland or parkland that they could not do if the sludge were contaminated.



Tools of the Trade… Above photos, the Refrigerated Automatic Sampler will have a Data programmer which will allow you to set the time to collect the sample or samples. This machine can also measure the amount of the sample.

These can also be used for the collection of composite samples. Sometimes you will see a pH probe with real-time reads sent to the Operator's Command Center. A common site on most wastewater plants and SIUs.

One big disappointment, expect sampler failures. Dead batteries, wrong sample times and over and under filling the sampler is common.

VOCs

Volatile organics discharged to sewers can accumulate in the headspace of sewers, increasing the likelihood of explosions that can cause significant damage. Probably the most well-known impact from industrial discharges to POTWs in the U.S. is the explosion in Louisville, KY that occurred in 1981 as the result of excessive discharges of hexane into the collection system, eventually igniting and destroying more than 3 miles of sewers and causing $20 million in damage. Discharge limitations and management practices to control slug discharges have significantly reduced the likelihood of future catastrophes such as the explosion in Louisville.

Discharges of toxic organics can also result in the release of poisonous gas. This occurs most often when acidic wastes react with other wastes in the discharge. For example, cyanide and acid, both present in many electroplating operations, react to form highly toxic hydrogen cyanide gas. Similarly, sulfides from leather tanning can combine with acid to form hydrogen sulfide, another toxic gas. These can be highly dangerous to POTW collection system operators exposed to such conditions in the performance of their duties.

Other problems associated with toxic discharges were summarized in Figure 3 and further document the urgency of keeping toxics out of collection systems and POTWs.

The National Pretreatment Program is charged with controlling the 129 Priority Pollutants from industries that discharge into sewer systems as described in the CWA (see Figure 4).

These pollutants fall into two categories; metals and organics:

- Metals, including lead, mercury, chromium, and cadmium that cannot be destroyed or broken down through treatment or environmental degradation. Toxic metals can cause different human health problems such as lead poisoning and cancer. Additionally, consumption of contaminated seafood and agricultural food crops has resulted in exposures exceeding recommended safe levels.
- Toxic organics, including solvents, pesticides, dioxins, and polychlorinated biphenyls (**PCBs**) can be cancer-causing and lead to other serious ailments, such as kidney and liver damage, anemia, and heart failure. In 1996, the EPA's Office of Science and Technology (**OST**) identified 2,193 water bodies with fish and wildlife advisories, up more than 25 percent from 1995.

Reductions in pollutants can ensure that industrial development vital to the economic well-being of a community is compatible with a healthy environment.

Many POTWs are responsible for ensuring that industrial and commercial facilities do not cause problems resulting from their discharges. In 1991, the EPA estimated that 190 to 204 million pounds of metals and 30 to 108 million pounds of organics were removed each year as a result of pretreatment program requirements.

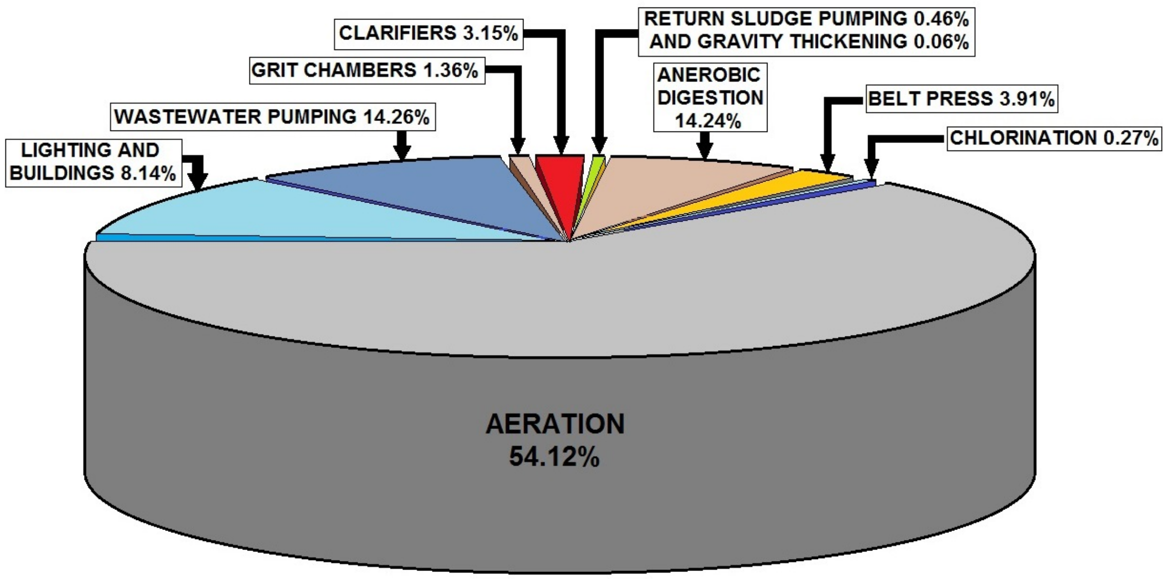
This is substantiated by many POTWs that report significant reductions in the loadings of toxics to their treatment plants that is directly attributable to implementation of the National Pretreatment Program.

Priority Pollutants *Figure 4*

001 Acenaphthene
002 Acrolein
003 Acrylonitrile
004 Benzene
005 Benzidine
006 Carbon tetrachloride
007 Chlorobenzene
008 1,2,4-trichlorobenzene
009 Hexachlorobenzene
010 1,2-dichloroethane
011 1,1,1-trichloreothane
012 Hexachloroethane
013 1,1-dichloroethane
014 1,1,2-trichloroethane
015 1,1,2,2-tetrachloroethane
016 Chloroethane
018 Bis(2-chloroethyl) ether
019 2-chloroethyl vinyl ethers
020 2-chloronaphthalene
021 2,4,6-trichlorophenol
022 Parachlorometa cresol
023 Chloroform
024 2-chlorophenol
025 1,2-dichlorobenzene
026 1,3-dichlorobenzene
027 1,4-dichlorobenzene
028 3,3-dichlorobenzidine
029 1,1-dichloroethylene
030 1,2-trans-dichloroethylene
031 2,4-dichlorophenol
032 1,2-dichloropropane
033 1,2-dichloropropylene
034 2,4-dimethylphenol
035 2,4-dinitrotoluene
036 2,6-dinitrotoluene
037 1,2-diphenylhydrazine
038 Ethylbenzene
039 Fluoranthene
040 4-chlorophenyl phenyl ether
041 4-bromophenyl phenyl ether
042 Bis(2-chloroisopropyl) ether
043 Bis(2-chloroethoxy) methane
044 Methylene chloride
045 Methyl chloride
046 Methyl bromide
047 Bromoform
048 Dichlorobromomethane
051 Chlorodibromomethane
052 Hexachlorobutadiene
053 Hexachlorocyclopentadiene
054 Isophorone
055 Naphthalene
056 Nitrobenzene
057 2-nitrophenol
058 4-nitrophenol
059 2,4-dinitrophenol
060 4,6-dinitro-o-cresol
061 N-nitrosodimethylamine
062 N-nitrosodiphenylamine
063 N-nitrosodi-n-propylamine
064 Pentachlorophenol
065 Phenol
066 Bis(2-ethylhexyl) phthalate
067 Butyl benzyl phthalate
068 Di-N-Butyl Phthalate
069 Di-n-octyl phthalate
070 Diethyl Phthalate
071 Dimethyl phthalate
072 benzo(a) anthracene
073 Benzo(a)pyrene
074 Benzo(b) fluoranthene
075 Benzo(b) fluoranthene
076 Chrysene
077 Acenaphthylene
078 Anthracene
079 Benzo(ghi) perylene
080 Fluorene
081 Phenanthrene
082 Dibenzo(,h) anthracene
083 Indeno (1,2,3-cd) pyrene
084 Pyrene
085 Tetrachloroethylene
086 Toluene
087 Trichloroethylene
088 Vinyl chloride
089 Aldrin
090 Dieldrin
091 Chlordane
092 4,4-DDT
093 4,4-DDE
094 4,4-DDD
095 Alpha-endosulfan
096 Beta-endosulfan
097 Endosulfan sulfate
098 Endrin
099 Endrin aldehyde
100 Heptachlor
101 Heptachlor epoxide
102 Alpha-BHC
103 Beta-BHC
104 Gamma-BHC
105 Delta-BHC
106 PCB–1242
107 PCB–1254
108 PCB–1221
109 PCB–1232
110 PCB–1248
111 PCB–1260
112 PCB–1016
113 Toxaphene
114 Antimony
115 Arsenic
116 Asbestos
117 Beryllium
118 Cadmium
119 Chromium
120 Copper
121 Cyanide, Total
122 Lead
123 Mercury
124 Nickel
125 Selenium
126 Silver
127 Thallium
128 Zinc
129 2,3,7,8-TCDD

Section 101 of the Clean Water Act (CWA)

To restore and maintain the chemical, physical, and biological integrity of the Nation's waters:
(1) it is the national goal that the discharge of pollutants into the navigable waters be eliminated by 1985;
(2) it is the national goal that wherever attainable, an interim goal of water quality which provides for the protection and propagation of fish, shellfish, and wildlife and provides for recreation in and on the water be achieved by July 1, 1983;
(3) it is the national policy that the discharge of toxic pollutants in toxic amounts be prohibited;
(4) it is the national policy that Federal financial assistance be provided to construct publicly owned waste treatment works;
(5) it is the national policy that Area wide waste treatment management planning processes be developed and implemented to assure adequate control of sources of pollutants in each State;
(6) it is the national policy that a major research and demonstration effort be made to develop technology necessary to eliminate the discharge of pollutants into the navigable waters, waters of the contiguous zone, and the oceans; and
(7) it is the national policy that programs for the control of nonpoint sources of pollution be developed and implemented in an expeditious manner so as to enable the goals of this Chapter to be met through the control of both point and nonpoint sources of pollution.



WASTEWATER ENERGY CONSUMPTION COSTS IN PERCENTAGE

Covered wastewater basins to help prevent or control odors.

Publicly Owned Treatment Works (POTW) *[40 CFR §403.3(o)]*
A treatment works as defined by section 212 of the Act, which is owned by a State or municipality (as defined by section 502(4) of the Act). This definition includes any devices or systems used in the storage, treatment, recycling, and reclamation of municipal sewage or industrial wastes of a liquid nature. It also includes sewers, pipes or other conveyances only if they convey wastewater to a POTW Treatment Plant.

Overview of the National Pretreatment Program
The Clean Water Act

On October 18, 1972, the 92nd Congress of the United States passed the Federal Water Pollution Control Act Amendments of 1972, declaring the restoration and maintenance of the chemical, physical, and biological integrity of the Nation's water as a National Objective. While procedures for implementing this act (more commonly referred to as the Clean Water Act (**CWA**)) have been re-evaluated and modified over time, the 1972 objective has remained unchanged in its 31 year history.

The 1972 Amendments to the CWA established a water quality regulatory approach along with the EPA-promulgated industry-specific technology-based effluent limitations. The National Pollutant Discharge Elimination System (**NPDES**) permit program was established under the CWA to control the discharge of pollutants from point sources and served as a vehicle to implement the industrial technology-based standards. To implement pretreatment requirements, the EPA promulgated 40 CFR Part 128 in late 1973, establishing general prohibitions against treatment plant interference and pass through and pretreatment standards for the discharge of incompatible pollutants from specific industrial categories.

In 1975, several environmental groups filed suit against the EPA, challenging it's criteria for identifying toxic pollutants, the EPA's failure to promulgate effluent standards, and the EPA's failure to promulgate pretreatment standards for numerous industrial categories.

As a result of this litigation, the EPA promulgated the General Pretreatment Regulations at 40 CFR Part 403 on June 26, 1978, replacing the 40 CFR Part 128 requirements. Additionally, as a result of the suit, the EPA agreed to regulate the discharge of 65 categories of pollutants (making up the 126 priority pollutants presented in Figure 4) from 21 industrial categories. The list of priority pollutants is still in effect today (the original list actually had 129 pollutants, three of which have since been removed from that list) while the list of regulated industrial categories has grown to more than 51 distinct industries.

Modern wastewater treatment plant.

The National Pretreatment Program is unique in that the General Pretreatment Regulations require all large POTWs (i.e., those designed to treat flows of more than 5 million gallons per day) and smaller POTWs with significant industrial discharges to establish local pretreatment programs. These local programs must enforce all national pretreatment standards and requirements in addition to any more stringent local requirements necessary to protect site-specific conditions at the POTW.

General Pretreatment Regulations at 40 CFR Part 403§ 403.1 Purpose and Applicability

Figure 6. The General Pretreatment Regulations

§ 403.2 Objectives of general pretreatment regulations
§ 403.3 Definitions
§ 403.4 State or local law
§ 403.5 National pretreatment standards: Prohibited discharges
§ 403.6 National pretreatment standards: Categorical pretreatment standards
§ 403.7 Removal credits
§ 403.8 Pretreatment program requirements: Development and implementation by POTW
§ 403.9 POTW pretreatment programs and/or authorization to revise pretreatment standards: Submission for approval
§ 403.10 Development and submission of NPDES State pretreatment programs
§ 403.11 Approval procedures for POTW pretreatment programs and POTW granting of removal credits
§ 403.12 Reporting requirements for POTW's and industrial users
§ 403.13 Variances from categorical pretreatment standards for fundamentally different factors
§ 403.14 Confidentiality
§ 403.15 Net/Gross calculation
§ 403.16 Upset provision
§ 403.17 Bypass
§ 403.18 Modification of POTW pretreatment programs
Appendix A: Program Guidance Memorandum
Appendix B: [Reserved]
Appendix C: [Reserved]
Appendix D: Selected Industrial Subcategories Considered Dilute for Purposes of the Combined Wastestream Formula
Appendix E: Sampling Procedures
Appendix F: [Reserved]
Appendix G: Pollutants Eligible for a Removal Credit

The General Pretreatment Regulations

1. The General Pretreatment Regulations establish responsibilities of Federal, State, and local government, industry and the public to implement Pretreatment Standards to control pollutants which pass through or interfere with POTW treatment processes or which may contaminate sewage sludge. The regulations, which have been revised numerous times since originally published in 1978, consist of 18 sections and several appendices.

2. The General Pretreatment Regulations apply to all non-domestic sources which introduce pollutants into a POTW. These sources of "***indirect discharge***" are more commonly referred to as industrial users (**IUs**).

3. Since IUs can be as simple as an unmanned coin operated car wash to as complex as an automobile manufacturing plant or a synthetic organic chemical producer, EPA developed four criteria that define a Significant Industrial User (**SIU**). Many of the General Pretreatment Regulations apply to SIUs as opposed to IUs, based on the fact that control of SIUs should provide adequate protection of the POTW.

These four criteria are as follows:

- An IU that discharges an average of 25,000 gallons per day or more of process wastewater to the POTW;
- An IU that contributes a process wastestream making up 5 percent or more of the average dry weather hydraulic or organic capacity of the POTW treatment plant;
- An IU designated by the Control Authority as such because of its reasonable potential to adversely affect the POTW's operation or violate any pretreatment standard or requirement; or
- An IU subject to Federal categorical pretreatment standards.

Unlike other environmental programs that rely on Federal or State governments to implement and enforce specific requirements, the Pretreatment Program places the majority of the responsibility on local municipalities. Specifically, section 403.8(a) of the General Pretreatment Regulations states that any POTW (or combination of treatment plants operated by the same authority) with a total design flow greater than 5 million gallons per day (**MGD**) and smaller POTWs with SIUs must establish a local pretreatment program.

As of early 1998, 1,578 POTWs are required to have local programs. While this represents only about 15 percent of the total treatment plants nationwide, these POTWs account for more than 80 percent (i.e., approximately 30 billion gallons a day) of the national wastewater flow.

Control Authority

The General Pretreatment Regulations define the term "**Control Authority**" as a POTW that administers an approved pretreatment program since it is the entity authorized to control discharges to its system.

Section 403.10(e) provides States authority to implement POTW pretreatment programs in lieu of POTWs. Five States have elected to assume this responsibility (Vermont, Connecticut, Alabama, Mississippi, and Nebraska). In these instances, the State is defined as the Control Authority. As described above, all Control Authorities must establish a local pretreatment program to control discharges from non-domestic sources.

Approval Authority

These programs must be approved by the "**Approval Authority**" who is also responsible for overseeing implementation and enforcement of these programs.

A total of 44 States /Territories are authorized to implement State NPDES Permit Programs, but only 27 are authorized to be the Pretreatment Program Approval Authority (i.e., those with approved State pretreatment programs excluding the five §403.10(e) States). In all other States and Territories (including the 403.10(e) States), the EPA is considered to be the Approval Authority.

POTW Pretreatment Programs

The actual requirement for a POTW to develop and implement a local pretreatment program is a condition of its NPDES permit. Once the Approval Authority determines that a POTW needs a pretreatment program, the POTW's NPDES permit is modified to require development of a local program and submission of the program to the Approval Authority for review and approval. Consistent with §403.8(f), POTW pretreatment programs must contain the six minimum elements.

In addition to the six specific elements, pretreatment program submissions must include:

- a statement from the City Solicitor (or the like) declaring the POTW has adequate authority to carry out program requirements;
- copies of statutes, ordinances, regulations, agreements, or other authorities the POTW relies upon to administer the pretreatment program including a statement reflecting the endorsement or approval of the bodies responsible for supervising and/or funding the program;
- a brief description and organizational chart of the organization administering the program; and
- a description of funding levels and manpower available to implement the program.

Pretreatment program submissions found to be complete proceed to the public notice process, Public Participation and POTW Reporting. Upon program approval, the Approval Authority is responsible for modifying the POTW's NPDES permit to require implementation of the approved pretreatment program. Once approved, the Approval Authority oversees POTW pretreatment program implementation via receiving annual reports and conducting periodic audits and inspections.

As of early 1998, of the 1,578 POTWs required to develop pretreatment programs, 97 percent (1,535) have been approved. The National Pretreatment Program regulates IUs through three types of regulatory entities: the EPA, Approval Authorities, and Control Authorities. As noted above, Approval Authorities oversee Control Authorities while Control Authorities regulate IUs.

Using an extension pole with a sample attachment to grab a sample.

Approved State NPDES Permit Program		Approved State Pretreatment Program
Alabama	10/19/79	10/19/79*
Arizona	Has program	
Arkansas	11/01/86	11/01/86
California	05/14/73	09/22/89
Colorado	03/27/75	--
Connecticut	09/26/73	06/03/81*
Delaware	04/01/74	--
Florida	05/01/95	05/01/95
Georgia	06/28/74	03/12/81
Hawaii	11/28/74	08/12/83
Illinois	10/23/77	--
Indiana	01/01/75	--
Iowa	08/10/78	06/03/81
Kansas	06/28/74	--
Kentucky	09/30/83	09/30/83
Louisiana	08/27/96	08/27/96
Maryland	09/05/74	09/30/85
Michigan	10/17/73	04/16/85
Minnesota	06/30/74	07/16/79
Mississippi	05/01/74	05/13/82*
Missouri	10/30/74	06/03/81
Montana	06/10/74	--
Nebraska	06/12/74	09/07/84*
Nevada	09/19/75	--
New Jersey	04/13/82	04/13/82
New York	10/28/75	--
North Carolina	10/19/75	06/14/82
North Dakota	06/13/75	--
Ohio	03/11/74	07/27/83
Oklahoma	11/19/96	11/19/96
Oregon	09/26/73	03/12/81
Pennsylvania	06/30/78	--
Rhode Island	09/17/84	09/17/84
South Carolina	06/10/75	04/09/82
South Dakota	12/30/93	12/30/93
Tennessee	12/28/77	08/10/83
Texas	09/14/98	09/14/98
Utah	07/07/87	07/07/87
Vermont	03/11/74	03/16/82*
Virgin Islands	06/30/76	--
Virginia	03/31/75	04/14/89
Washington	11/14/73	09/30/86
West Virginia	05/10/82	05/10/82
Wisconsin	02/04/74	12/24/80
Wyoming	01/30/75	--

* - Denotes 403.10(e) State Approval

Six Minimum Pretreatment Program Elements

1. Legal Authority
The POTW must operate pursuant to legal authority enforceable in Federal, State or local courts, which authorizes or enables the POTW to apply and enforce any pretreatment regulations developed pursuant to the CWA. At a minimum, the legal authority must enable the POTW to:
I. deny or condition discharges to the POTW;
ii. require compliance with pretreatment standards and requirements;
iii. control IU discharges through permits, orders, or similar means;
iv. require IU compliance schedules when necessary to meet applicable pretreatment standards and/or requirements and the submission of reports to demonstrate compliance;
v. inspect and monitor IUs;
vi. obtain remedies for IU noncompliance; and
vii. comply with confidentiality requirements.

2. Procedures
The POTW must develop and implement procedures to ensure compliance with pretreatment requirements, including:
I. identify and locate all IUs subject to the pretreatment program;
ii. identify the character and volume of pollutants contributed by such users;
iii. notify users of applicable pretreatment standards and requirements;
iv. receive and analyze reports from IUs;
v. sample and analyze IU discharges and evaluate the need for IU slug control plans;
vi. investigate instances of noncompliance; and
vii. comply with public participation requirements.

3. Funding
The POTW must have sufficient resources and qualified personnel to carry out the authorities and procedures specified in its approved pretreatment program.

4. Local limits
The POTW must develop local limits or demonstrate why these limits are not necessary.

5. Enforcement Response Plan (ERP)
The POTW must develop and implement an ERP that contains detailed procedures indicating how the POTW will investigate and respond to instances of IU noncompliance.

6. List of SIUs
The POTW must prepare, update, and submit to the Approval Authority a list of all Significant Industrial Users (**SIUs**).

Pretreatment Roles and Responsibilities

EPA Headquarters
< Oversees program implementation at all levels
< Develops and modifies regulations for the program
< Develops policies to clarify and further define the program
< Develops technical guidance for program implementation
< Initiates enforcement actions as appropriate

Regions
< Fulfill Approval Authority responsibilities for States without a State pretreatment program
< Oversee State program implementation
< Initiate enforcement actions as appropriate.

Approval Authorities (EPA Regions and delegated States)
< Notify POTWs of their responsibilities
< Review and approve requests for POTW pretreatment program approval or modification
< Review requests for site-specific modifications to categorical pretreatment standards
< Oversee POTW program implementation
< Provide technical guidance to POTWs
< Initiate enforcement actions, against noncompliant POTWs or industries.

Control Authorities (POTWs, States, or EPA Regions)
< Develop, implement, and maintain approved pretreatment program
< Evaluate compliance of regulated IUs
< Initiate enforcement action against industries as appropriate
< Submit reports to Approval Authorities
< Develop local limits (or demonstrate why they are not needed)
< Develop and implement enforcement response plan.

Industrial Users
< Comply with applicable pretreatment standards and reporting requirements.

What Types of Businesses are Subject to Pretreatment Regulations?

Pretreatment regulations apply to a variety of businesses discharging wastewater from industrial and commercial processes.

Certain types of industries with the potential to discharge pollutants are regulated through an industrial discharge permit system. Industries are considered Significant Industrial Users and therefore require a discharge permit if the user:

- Is subject to the Environmental Protection Agency's Categorical Pretreatment Standards. Categorical users receive increased scrutiny due to their potential to pollute. Examples of categorical users are metal finishers and pharmaceutical manufacturers.
- Is discharging an average of 25,000 gallons per day or more of process wastewater.
- Has the potential to adversely affect the wastewater utility.

Industry-Specific Guides
Aluminum, Copper, And Nonferrous Metals Forming And Metal Powders

- Pretreatment Standards: A Guidance Manual
- Guidance Manual For Battery Manufacturing Pretreatment Standards
- Guidance Manual for Electroplating and Metal Finishing Pretreatment Standard
- Guidance Manual For Iron And Steel Manufacturing Pretreatment Standards
- Guidance Manual for Leather Tanning and Finishing Pretreatment Standards
- Guidance Manual for Pulp, Paper, Paperboard, Builders' Paper, and
- Board Mills Pretreatment Standards

Pretreatment Standards

The National Pretreatment Program identifies specific requirements that apply to all IUs, additional requirements that apply to all SIUs, and certain requirements that only apply to CIUs. The objectives of the National Pretreatment Program are achieved by applying and enforcing three types of discharge standards:

< prohibited discharge standards
< categorical standards
< local limits.

Prohibited Discharge Standards

All IUs, whether or not subject to any other National, State, or local pretreatment requirements, are subject to the general and specific prohibitions identified in 40 CFR §§403.5(a) and (b), respectively. General prohibitions forbid the discharge of any pollutant(s) to a POTW that cause pass through or interference (Figure 10). Specific prohibitions forbid eight categories of pollutant discharges as follows:
(1) discharges containing pollutants which create a fire or explosion hazard in the POTW, including but not limited to, wastestreams with a closed cup flashpoint of less than 140°F (60°C) using the test methods specified in 40 CFR §261.21;
(2) discharges containing pollutants causing corrosive structural damage to the POTW, but in no case discharges with a pH lower than 5.0, unless the POTW is specifically designed to accommodate such discharges;
(3) discharges containing pollutants in amounts causing obstruction to the flow in the POTW resulting in interference;
(4) discharges of any pollutants released at a flow rate and/or concentration which will cause interference with the POTW;
(5) discharges of heat in amounts which will inhibit biological activity in the POTW resulting in interference, but in no case heat in such quantities that the temperature at the POTW treatment plant exceeds 40°C (104°F) unless the Approval Authority, upon request of the POTW, approves alternative temperature limits;
(6) discharges of petroleum oil, nonbiodegradable cutting oil, or products of mineral oil origin in amounts that will cause interference or pass through;
(7) discharges which result in the presence of toxic gases, vapors, or fumes within the POTW in a quantity that may cause acute worker health and safety problems; and
(8) discharges of trucked or hauled pollutants, except at discharge points designated by the POTW.

Compliance with the general and specific prohibitions is mandatory for all IUs, although a facility may have an affirmative defense in any action brought against it alleging a violation of the general prohibitions or of certain specific prohibitions [(3), (4), (5), (6) and (7) above] where the IU can demonstrate it did not have reason to know that its discharge, alone or in conjunction with a discharge or discharges from other sources, would cause pass through or interference, and the IU was in compliance with a technically-based local limit developed to prevent pass through or interference. These prohibited discharge standards are intended to provide general protection for POTWs. However, their lack of specific pollutant limitations creates the need for additional controls, namely categorical pretreatment standards and local limits.

Interference and Pass Through

Pass through - A discharge which exits the POTW into waters of the US in quantities or concentrations which, alone or in conjunction with a discharge or discharges from other sources, is a cause of a violation of any requirement of the POTW's NPDES permit (including an increase in the magnitude or duration of a violation).

Interference - A discharge which, alone or in conjunction with a discharge or discharges from other sources, both (1) inhibits or disrupts the POTW, its treatment processes or operations, or its sludge processes, use or disposal; and (2) therefore is a cause of a violation of any requirement of the POTW's NPDES permit or of the prevention of sewage sludge use or disposal.

Categorical Pretreatment Standards

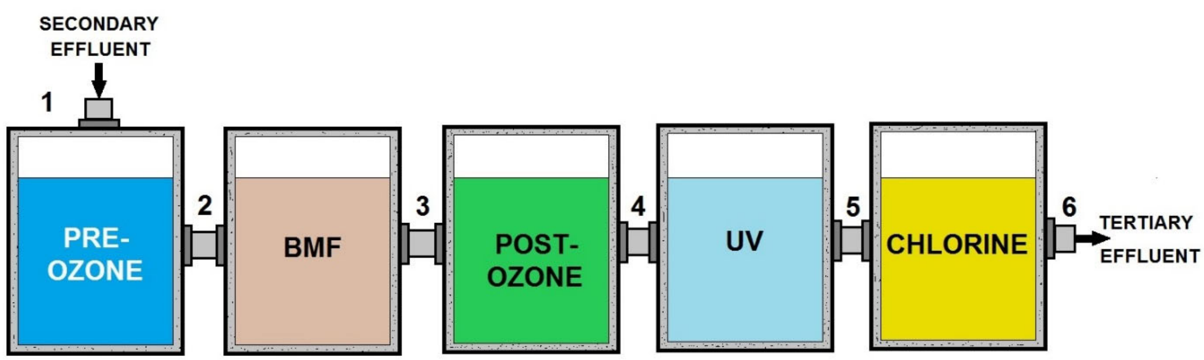
Categorical pretreatment standards (i.e., categorical standards) are national, uniform, technology-based standards that apply to discharges to POTWs from specific industrial categories (i.e., **indirect dischargers**) and limit the discharge of specific pollutants. Categorical pretreatment standards for both existing and new sources (PSES and PSNS, respectively) are promulgated by the EPA pursuant to Section 307(b) and (c) of the CWA. Limitations developed for indirect discharges are designed to prevent the discharge of pollutants that could pass through, interfere with, or otherwise be incompatible with POTW operations. Effluent limitations guidelines (**ELGs**), developed in conjunction with categorical standards, limit the discharge from facilities directly to waters of the U.S. (i.e., **direct discharger**s) and do not apply to indirect dischargers.

ELGs include Best Practicable Control Technology Currently Available (**BPT**), Best Conventional Pollutant Control Technology (**BCT**), and Best Available Technology Economically Achievable (**BAT**) limitations and New Source Performance Standards (**NSPS**). ELGs (i.e., BPT, BCT, BAT, and NSPS) do not apply to indirect dischargers. The significant difference between categorical standards and effluent limitations guidelines is that categorical standards account for any pollutant removal that may be afforded through treatment at the POTW, while effluent limitations guidelines do not. Industries identified as major sources of toxic pollutants are typically targeted for effluent guideline and categorical standard development.

If limits are deemed necessary, the EPA investigates affected IUs and gathers information regarding process operations as well as treatment and management practices accounting for differences in facility size and age, equipment age, and wastewater characteristics.

Sub categorization within an industrial category is evaluated based on variability in processes employed, raw materials used, types of items produced, and characteristics of wastes generated. Availability and cost of control technologies, non-water quality environmental impacts, available pollution prevention measures, and economic impacts are then identified prior to the EPA's presentation of findings in proposed development documents and publishing a notice of the proposed regulations in the *Federal Register*. Based on public comments on the proposed rule, the EPA promulgates (i.e., publishes) the standards.

Self-Monitoring
Sampling and analyses performed by a facility to ensure compliance with a permit or other regulatory requirements.



TERTIARY TREATMENT PROCESS SAMPLING POINTS

Definition of New Source (40 CFR 403.3(k))

New Source is defined at 40 CFR §403.3 (k)(1) to mean any building, structure, facility or installation from which there is or may be a discharge of pollutants, the construction of which commenced after publication of proposed Pretreatment Standards under Section 307(c) of the Act which will be applicable to such source if Standards are thereafter promulgated in accordance with that section, *provided that:*
(i) the building, structure, facility, or installation is constructed at a site at which no other source is located; or
(ii) the building, structure, facility, or installation totally replaces the process or production equipment that causes the discharge of pollutants at an existing source; or
(iii) the production or wastewater generating processes of the building, structure, facility or installation are substantially independent of an existing source at the same site. In determining whether these are substantially independent, factors such as the extent to which the new facility is integrated with the existing plant, and the extent to which the new facility is engaged in the same general type of activity as the existing source should be considered.
(2) Construction on a site at which an existing source is located results in a modification rather than a new source if the construction does not create a new building, structure, facility, or installation meeting the criteria of paragraphs (k)(1)(ii), or (k)(1)(iii) of this section but otherwise alters, replaces, or adds to existing process or production equipment.
(3) Construction of a new source as defined under this paragraph has commenced if the owner or operator has:
(i) begun, or caused to begin as part of a continuous onsite construction program:
(ii) any placement, assembly or installation of facilities or equipment, or
(B) significant site preparation work, including clearing, excavation, or removal of existing buildings, structures, or facilities which is necessary for the placement, assembly, or installation of new source facilities or equipment; or
(ii) entered into a binding contractual obligation for the purchase of facilities or equipment which are intended to be used in its operation within a reasonable time.
Options to purchase or contracts which can be terminated or modified without substantial loss, and contracts for feasibility, engineering, and design studies do not constitute a contractual obligation under this paragraph.

New Source
As noted above, categorical pretreatment standards are developed both for existing (**PSES)** and new sources (**PSNS**). Facilities are classified as either PSES or PSNS based on the definition of "**new source**" set out in 40 CFR§403.3(k) of the General Pretreatment Regulations. Dischargers subject to PSES are required to comply with those standards by a specified date, typically no more than three years after the effective date of the categorical standard. Users subject to PSNS, however, are required to achieve compliance within the shortest feasible time, not to exceed 90 days from commencement of discharge. PSNS are often more stringent than PSES based on the opportunity for new sources to install the best available demonstrated technology and operate the most efficient production processes.

Congress established an initial list of 21 categorical industries under Section 306 of the CWA of 1972. As a result of various court decrees and settlement agreements resulting from litigation, and from the EPA's internal work plan development process, the EPA has developed effluent guidelines (for direct dischargers) and/or categorical pretreatment standards (for indirect dischargers) for 51 industrial categories.

Of these industrial categories, the EPA implements pretreatment standards for 32 categories, and either requires compliance solely with 40 CFR Part 403 General Pretreatment Regulations or does not address pretreatment standards for the remaining categories.

Plans for the EPA's expansion and modification of the list is detailed in the *Effluent Guidelines Plan,* published in the *Federal Register* biennially as required in section 304(m) of the CWA. A list of the industrial categories that have categorical standards is provided as Figure 13. Categorical pretreatment standards developed can be concentration-based or mass-based.

Concentration-based standards are expressed as milligrams of pollutant allowed per liter (mg/l) of wastewater discharged and are issued where production rates for the particular industrial category do not necessarily correlate with pollutant discharges. Mass-based standards are generally expressed on a mass per unit of production (e.g., milligrams of pollutant per kilogram of product produced, pounds of pollutant per million cubic feet of air scrubbed, etc.) and are issued where water conservation is an important component in the limitation development process.

For a few categories where reducing a facility's flow volume does not provide a significant difference in the pollutant load discharged, the EPA has established both mass and concentration-based standards. Generally, both a daily maximum limitation and a long-term average limitation (e.g., average daily values in a calendar month) are established for every regulated pollutant.

Primary Wastewater Treatment Clarifier.

Summary of Categorical Pretreatment Standards *Figure 13*

Category	40 CFR Part	Subparts	Type of Standard Overview of Pretreatment Standards
Aluminum Forming	467 A-F	PSES PSNS	Limits are production-based, daily maximums and monthly averages. Subpart C prohibits discharges from certain operations.
Battery Manufacturing	461 A-G	PSES PSNS	Limits are production-based, daily maximums and monthly averages. No discharge is allowed from any process not specifically identified in the regulations.
Builders' Paper and Board Mills	431 A	PSES PSNS	Limits are production-based daily maximums. These facilities may certify they do not use certain compounds in lieu of performing monitoring to demonstrate compliance.
Carbon Black Manufacturing	458 A-D	PSNS	Limits are for Oil & Grease only (no limit duration specified).
Coil Coating	465 A-D	PSES PSNS	Limits are production-based, daily maximums and monthly averages.
Copper Forming	468 A	PSES PSNS	Limits are production-based, daily maximums and monthly averages.
Electrical and Electronic Components	469 A-D	PSES PSNS	Limits are concentration-based, daily maximums and 30 day averages or monthly averages (varies per subpart and pollutant parameter). Certification is allowed in lieu of monitoring for certain pollutants when a management plan is approved and implemented.
Electroplating	413 A-B, D-H	PSES	Limits are concentration-based (or alternative mass-based equivalents), daily maximums and four consecutive monitoring days averages. Two sets of limits exist, depending on if facility discharges more or less than 10,000 gallons per day of process wastewater. Certification is allowed in lieu of monitoring for certain pollutants when a management plan is approved and implemented.
Feedlots	412 B	PSNS	Discharge of process wastewater is prohibited, except when there is an overflow resulting from a chronic or catastrophic rainfall event.
Fertilizer Manufacturing	418 A-G	PSNS	Limits may specify zero discharge of wastewater pollutants (Subpart A), production-based daily maximums and 30-day averages (Subparts B-E) or concentration-based (Subparts F-G) with no limit duration specified.
Glass Manufacturing	426 H, K-M	PSNS	Limits are either concentration- or production-based, daily maximums and monthly averages.
Grain Mills	406 A	PSNS	Discharge of process wastewater is prohibited at a flow rate or mass loading rate which is excessive over any time period during the peak load at a POTW.
Ink Formulating	447 A	PSNS	Regulations specify no discharge of process wastewater pollutants to the POTW.
Inorganic Chemicals Manufacturing	415 A-BO	PSES PSNS	Limits vary for each subpart with a majority of the limits concentration-based, daily maximums and 30-day averages, or may specify no discharge of wastewater pollutants. Numerous subparts have no pretreatment standards.
Iron and Steel Manufacturing	420 A-F, H-J, L	PSES PSNS	Limits are production-based, daily maximums and 30 day averages.
Leather Tanning and Finishing	425 A-I	PSES PSNS	Limits are concentration-based, daily maximums and monthly averages. In certain instances, production volume dictates applicable pretreatment standards.
Metal Finishing	433 A	PSES PSNS	Limits are concentration-based, daily maximums and monthly averages. Certification is allowed for certain pollutants where a management plan is approved and implemented.
Metal Molding and Casting	464 A-D	PSES PSNS	Limits are primarily production-based, daily maximums and monthly averages. Discharges from certain processes are prohibited (Subparts A-C).
Nonferrous Metals Forming and Metal Powders	471 A-J	PSES PSNS	Limits are production-based, daily maximums and monthly averages. In some instances, the regulations prohibit the discharge of wastewater pollutants.

Nonferrous Metals Manufacturing	421 B-AE	PSES PSNS	Limits are production-based, daily maximums and monthly averages. The majority of the Subparts have both existing and new source limits, with others having solely new source requirements.

Summary of Categorical Pretreatment Standards *Figure 13*

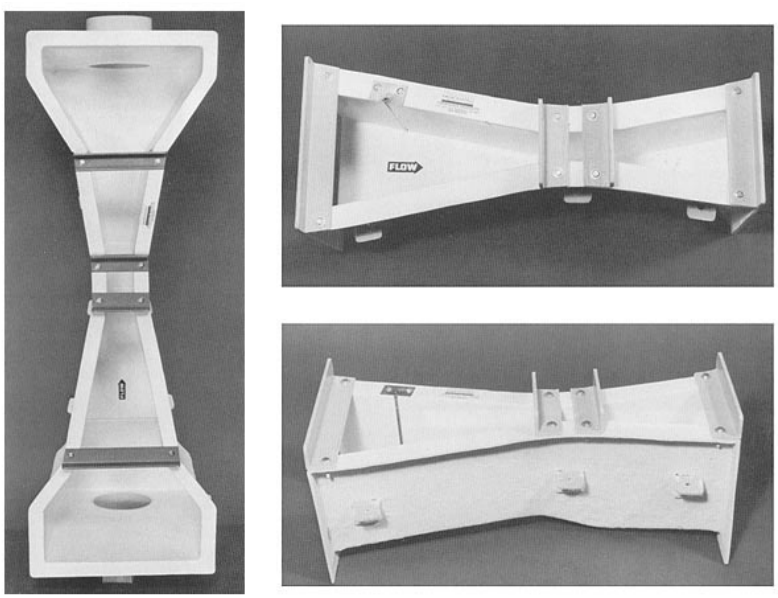
Organic Chemicals, Plastics, and Synthetic Fibers	414 B-H, K	PSES PSNS	Limits are mass-based (concentration-based standards multiplied by process flow), daily maximums and monthly averages. Standards for metals and cyanide apply only to metal- or cyanide-bearing wastestreams.
Paint Formulating	446 A	PSNS	Regulations specify no discharge of process wastewater pollutants to the POTW.
Paving and Roofing Materials (Tars and Asphalt)	443 A-D	PSNS	Limits are for Oil & Grease only (no limit duration specified).
Pesticide Chemicals	455 A, C, E	PSES PSNS	Limits are mass-based (concentration-based standards multiplied by process flow), daily maximums and monthly averages. Subpart C specifies no discharge of process wastewater pollutants but provides for pollution prevention alternatives. Subpart E specifies no discharge of process wastewater pollutants.
Petroleum Refining	419 A-E	PSES PSNS	Limits are concentration-based (or mass based equivalent), daily maximums.
Pharmaceutical Manufacturing	439 A-D	PSES PSNS	Limits are concentration-based, daily maximums and monthly averages. These facilities may certify they do not use or generate cyanide in lieu of performing monitoring to demonstrate compliance.
Porcelain Enameling	466 A-D	PSES PSNS	Limits are concentration-based (or alternative production-based), daily maximums and monthly averages. Subpart B prohibits discharges certain operations.
Pulp, Paper, and Paperboard	430 A-G, I-L	PSES PSNS	Limits are production-based daily maximums and monthly averages. These facilities may certify they do not use certain compounds in lieu of performing monitoring to demonstrate compliance. Facilities subject to Subparts B and E must also implement Best Management Practices as identified.
Rubber Manufacturing	428 E-K	PSNS	Limits are concentration- or production-based, daily maximums and monthly averages.
Soap and Detergent Manufacturing	417 O-R	PSNS	Regulations specify no discharge of process wastewater pollutants to the POTW.
Steam Electric Power Generating	423 N/A	PSES PSNS	Limits are either concentration-based, daily maximums, or “maximums for any time”, or compliance can be demonstrated through engineering calculations.
Timber Products Processing	429 F-H	PSES PSNS	All PSNS (and PSES for Subpart F) prohibit the discharge of wastewater pollutants. PSES for Subparts G and H are concentration-based, daily maximums (with production-based alternatives).

CWF vs. FWA

Categorical standards apply to regulated wastewaters, i.e. wastewater from an industrial process that is regulated for a particular pollutant by a categorical pretreatment standard. Therefore, demonstrating compliance with categorical pretreatment standards is intended to be based on measurements of wastestreams containing only the regulated process wastewater. However, recognizing isolation of regulated wastestreams from nonregulated wastestreams was not always practicable or desirable, the EPA developed the combined wastestream formula (**CWF**) and flow weighted average (**FWA**) approach for determining compliance with combined wastestreams.

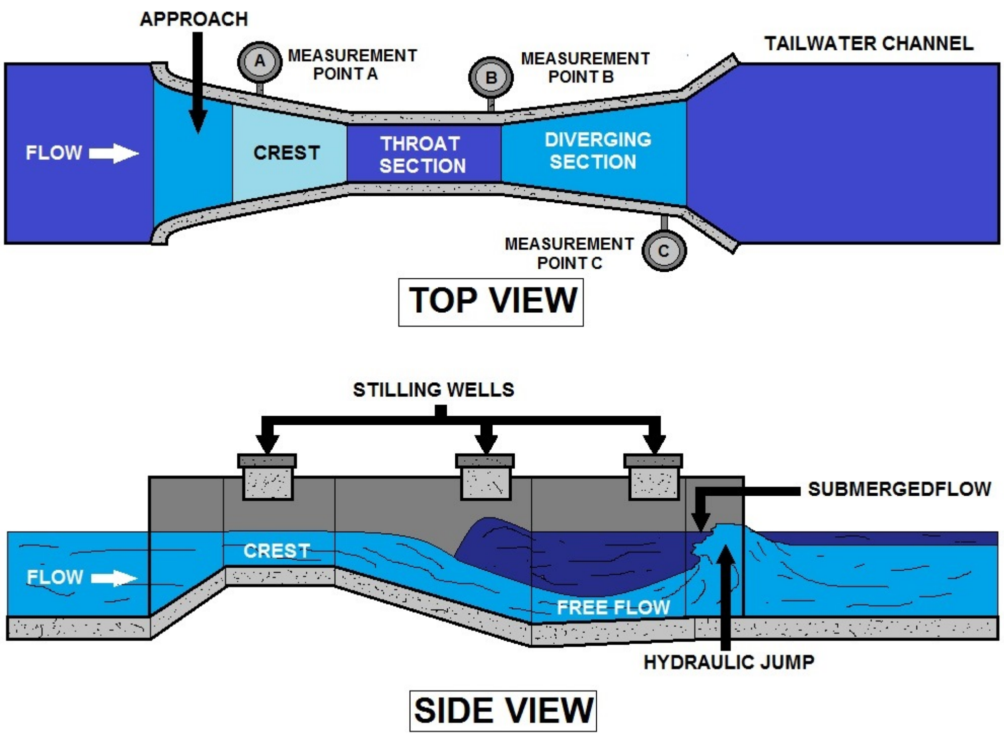
Pursuant to 40 CFR §403.6(e), the CWF is applicable where a regulated wastestream combines with one or more unregulated or dilute wastestreams prior to treatment. Where nonregulated wastestreams combine with process streams after pretreatment, the more stringent approach (whether CWF or FWA) is used to adjust the limits. The CWF and FWA approaches differ primarily in their allowances for nonregulated wastestreams. While the CWF provides a ***"full credit"*** (i.e., same pollutant levels as regulated wastestreams) for unregulated wastestreams yet no credit for dilute wastestreams, the FWA requires sampling and analysis of the untreated, nonregulated wastestreams to determine the credit to be granted (not to exceed that allowed for the regulated wastestreams).

Application of the CWF and FWA requires proper identification, classification, and quantification of the three wastestream types (Figure 16.) **Note:** in circumstances where boiler blowdown, noncontact cooling water, stormwater, or demineralized wastestreams contain a significant amount of a regulated pollutant, and the treatment of the wastewater with the regulated wastestream results in substantial reduction of the regulated pollutant, the Control Authority can classify the wastestream as unregulated rather than as a dilute wastestream.



Measuring device known as a *"Parshall Flume".*

Several POTW's are requiring the SIU to cover the flume inside the vault to lower the hazard of a permit required confined space.



PARSHALL FLUME

Ultra-sonic measuring device at the entrance of the flume. Data is stored directly to the computer or data recording device.

Parshall Flumes

Parshall Flume provides both accuracy and rangeability. Dimensions and capacities are in accordance with those published in the U.S. Department of the Interior's Water Measurement Manual.

Parshall Flumes are a primary flow element for flow measurement in open channels. The big advantages of Parshall Flumes are their self-cleaning capabilities, low head loss, single-head measurement, and wide operating range. While commonly used in rectangular channels, they can also be adapted for use in circular channels. Flumes feature stiffening ribs, braces and anchor clips. Options include stilling well, staff gauge, flow sensors, adaptors, etc.

Clarification

Clarification on category-specific wastestream classifications may be provided by consulting the applicable regulation(s) and associated development documents, since wastestream types are addressed in the effluent guideline and categorical standard development process. When in doubt, the Control Authority can always require the CIU to monitor the wastestream(s) in question to quantify the presence (or lack thereof) of categorically regulated pollutants.

Reasonably accurate flow data must also be obtained for each wastestream type flowing through the monitoring point to ensure categorical pretreatment standards are adjusted accordingly.

Proper application of the CWF or FWA will result in:

- alternative limits being established for each regulated pollutant in each regulated process;
- both daily maximum and long-term average (i.e., 4-day, 30-day, or monthly) alternative limits being calculated for each regulated pollutant;

Figure 16. Wastestream Types

Regulated
Wastewater from an industrial process that is regulated for a particular pollutant by a categorical pretreatment standard.

Nonregulated, Unregulated
Wastestreams from an industrial process that are not regulated for a particular pollutant by a categorical pretreatment standard and are not defined as a dilute wastestream, e.g.:
< a process wastestream for which categorical standards have been promulgated but for which the deadline for compliance has not yet been reached.
< a process wastestream that currently is not subject to categorical pretreatment standards
< a process wastestream that is not regulated for the pollutant in question but is regulated for other pollutants.

Dilute
Wastestreams which have no more than trace or non-detectable amounts of the regulated pollutant. Defined in 40 CFR § 403.6(e)(1) of the General Pretreatment Regulations to include sanitary wastestreams, demineralized backwash streams, boiler blowdown, noncontact cooling water, storm water, and process wastestreams from certain standards based on the findings that these wastewaters contained none of the regulated pollutant or only trace amounts of it.

The EPA's *Guidance Manual for the Use of Production Based Pretreatment Standards and the Combined Wastestream Formula* should be consulted for more information on the proper application and adjustment of categorical pretreatment standards.

Although categorical standards are established based on a particular industrial category, the EPA provides several options for unique circumstances that justify adjustment of categorical standards for an individual facility:

CHECKLIST EXAMPLE FOR ASSESSMENT OF PERMANENTLY INSTALLED FLOWMETERS

COMPANY NAME:		TYPE OF PRIMARY DEVICE:
SITE CODE #		SIZE:
ADDRESS:		
DIMENSIONS OF VAULT:	DEPTH OF VAULT:	

TAKE PICTURES!

1. IS FLUME LEVEL?

2. HEIGHT MEASUREMENT FROM TOP OF FLUME TO BOTTOM OF PERMANENT TRANSDUCER:

3. HOW HIGH DOES THE LEVEL GET IN FLUME?

4. DAILY MAXIMUM FLOW (CONVERTED TO LEVEL):

5. CAN YOU SETUP OUR TRANSDUCER UNDER OR NEXT TO THEIRS, WITHOUT DISTURBING THEIRS?

6. IS THEIR PERMANENT TRANSDUCER SETUP OVER THE PROPER MEASURING POINT ON THE FLUME?

7. RECORD ANY PROBLEMS WITH THE WAY THE PERMANENT TRANSDUCER / FLOWMENTER IS SETUP:

8. COMMENTS____

Removal Credits

40 CFR §403.7 details the conditions by which a Control Authority may demonstrate consistent removal of pollutants regulated by categorical standards at their POTW, and in so doing, may extend removal credits to industries on a pollutant-specific basis to prevent redundant treatment. Removal credits are available for a pollutant if the pollutant is regulated by the sewage sludge use or disposal option employed by the POTW making the application request, or if the pollutant is listed in 40 CFR Part 403, Appendix G.

Also, the availability of removal credits is not limited to Appendix G pollutants for POTWs that dispose of sewage sludge in municipal solid waste landfills. Steps for developing such a request are in the EPA's *Guidance Manual for the Preparation and Review of Removal Credit Application*s.

Fundamentally Different Factors Variance Section 301(n) of the CWA authorizes adjustments of categorical pretreatment standards for existing sources who demonstrate they have factors which are fundamentally different from the factors the EPA considered during standards development (40 CFR §403.13). Variance requests must be based solely on information and data submitted during the development of the categorical standards and the adjusted effluent limitations must neither be more nor less stringent than justified by the fundamental difference nor result in a non-water quality environmental impact markedly more adverse than the impact considered by the EPA when developing the categorical standard.

Successful requests must detail factors well outside the range considered by the EPA in establishing the standard and not merely factors deviating from the average. Further, differences must not be similar to a significant number of other facilities in the category. A facility must request a variance in writing no later than 180 days after publication of a categorical Pretreatment Standard in the Federal Register.

Net/Gross Adjustment Categorical Pretreatment Standards

Net/Gross Adjustment Categorical pretreatment standards can be adjusted to reflect the presence of pollutants in a CIU's intake waters (40 CFR §403.15). To obtain a net/gross credit, the CIU must submit a formal written request to the Control Authority that demonstrates:

- Its intake water is drawn from the same body of water that the POTW discharges into (this can be waived if the Control Authority finds no environmental degradation will result);
- The pollutants present in the intake water will not be entirely removed by the treatment system operated by the CIU; and
- The pollutants in the intake water do not vary chemically or biologically from the pollutants limited by the applicable standard.

Inherent in this provision is the requirement that the CIU employ a treatment technology capable of meeting the categorical pretreatment standard(s). Net/gross adjustments should not be granted to CIUs that have no treatment. Further, credits are only granted to the extent necessary to meet the applicable standard(s), up to a maximum value equal to the influent value.

Innovative Technology--in accordance with 307(e) of the CWA, existing CIUs choosing to install an innovative treatment system may receive approval from the Control Authority for up to a two year extension to their applicable categorical pretreatment standards compliance deadline, provided:

- The innovative treatment has a reasonable potential to result in significantly greater pollutant removal or equivalent removal at a substantially lower cost than the technologies considered by the EPA when developing the categorical standard;
- The innovative technique has the potential for industry-wide application; and
- The proposed compliance extension will not cause or contribute to the violation of the POTW's NPDES permit.

While policy has been established for universal categorical variance requests, occasionally, a Control Authority may merely need assistance to classify a CIU and/or to determine applicable categorical limitations. Provisions in the General Pretreatment Regulations allow POTWs and IUs to request an EPA category determination for a specific IU within 60 days after the effective date of the standard in question [40 CFR §403.6(a)].

Even after the formal timeframe for requesting a categorical determination, the EPA (and states) will assist POTWs and IUs with categorization issues. Such requests, however, do not affect applicable reporting requirements, including timely requests submitted under 40 CFR §403.6(a). Additionally, the EPA has addressed universal CIU questions posed by Control Authorities in various memoranda and guidance:

Research and Development (R&D) Facilities

Unless specifically addressed in the categorical regulation or associated development document, R&D facilities where there is no commercial sale of products from the facility, are not subject to categorical standards.

Should an R&D facility need pollution controls to comply with prohibited discharge standards and/or local limits, the development documents may serve as guidance on the performance of pollution control technologies.

Certification Statements

In lieu of requiring self-monitoring, some standards allow CIUs to certify that they do not use, generate or discharge a regulated pollutant [e.g. Pulp, Paper and Paperboard facilities can certify that chlorophenolic compounds are not used (40 CFR Part 430) and Pharmaceutical Manufacturing facilities can certify that cyanide is not used or generated (40 CFR Part 439)]. Facilities providing such certifications are still considered CIUs, and therefore are subject to other pretreatment standards and requirements.

Lack of specific categorical effluent limitations IUs subject to PSES or PSNS that merely require compliance with 40 CFR Part 403 are not considered CIUs. However, these users may still be classified as SIUs and are still subject to the general and specific prohibitions and any local limits.

Total Toxic Organics (TTO)

Seven categorical regulations currently limit the discharge of TTO:

- **40 CFR Part 413 - Electroplating**
- **40 CFR Part 433 - Metal Finishing**
- **40 CFR Part 464 - Metal Molding and Casting**
- **40 CFR Part 465 - Coil Coating**
- **40 CFR Part 467 - Aluminum Forming**
- **40 CFR Part 468 - Copper Forming**
- **40 CFR Part 469 - Electrical and Electronic Components (Phase I and II)**

For each of these standards, TTO refers to the sum of the masses or concentrations of certain toxic organic pollutants found in the regulated discharge at a concentration greater than 0.01 milligrams per liter (mg/l).

However, the toxic organic pollutants regulated by the TTO limit are specific to each industrial category. Further, industrial categories may provide some flexibility with regard to monitoring and/or reporting requirements as follows:

40 CFR Parts 413 and 433 allow development and implementation of a Toxic Organic Management Plan (**TOMP**) in lieu of routine monitoring while 40 CFR Part 469 allows development and implementation of a Solvent Management Plan. Upon approval of these plans by the Control Authority, the CIU can demonstrate compliance with TTO requirements by certifying that the facility is adhering to this Plan to prevent organics from being discharged to the POTW. A specific certification statement must be signed and provided to the Control Authority on a regular basis.

40 CFR Parts 464, 465, 467, and 468 allow an option to demonstrate compliance with an Oil and Grease limit in lieu of demonstrating compliance with a TTO limit. The option chosen by the CIU must be utilized for all reports required (i.e., BMR, 90-daycompliance report, and periodic compliance reports).

The EPA's *Guidance Manual for Implementing Total Toxic Organics (TTO) Pretreatment Standards* should be consulted for more information on TTO.

MAHL MAIL

Maximum Allowable Headworks Loading Method (MAHL)
Pollutant by pollutant, treatment plant data are used to calculate removal efficiencies, before applying the most stringent criteria (i.e., water quality, sludge quality, NPDES permit, or pollutant inhibition levels) to back-calculate the MAHLs. Subtracting out contributions from domestic sources, the available industrial loading is then either evenly distributed among the IUs, or allocated on an as needed basis to those IUs discharging the pollutant above background levels.

Maximum Allowable Industrial Load (MAIL)
The MAIL is the total daily mass that a POTW can accept from all permitted IUs and ensure the POTW is protecting against pass through and interference.

Headworks' "Rotating Barscreens"

Headworks flooding or overflowing because of high grease loading.

LOCAL LIMITS OBSERVATION SHEET *Example*

SITE DESCRIPTION:

SITE CODE #: **DATE:**

TIME	pH	TEMP.	RES.CL_2	INITIALS
0900				
1200				
1430				
1700				
2000				
2230				
0100				
0430				

DAILY TOTAL FLOW:

PICKLE JAR IW#			
FIELD COMP IW#			
VOC's IW#			
TPH IW#			

SAMPLES COLLECTED

PARAMETER	YES	NO	PARAMETER	YES	NO
601/602 (HOW MANY)			BOD, COD, TSS		
8240 (HOW MANY)			NO_2/NO_3		
SULFIDES			METALS		
TKN			608		
AMMONIA (NH_4)			1657		
CN			625		
TPH (HOW MANY)			8270		
8140			8080		

IF NO SAMPLE COLLECTED, RECORD ON BACK AS TO WHY.

More on Local Limits

Prohibited discharge standards are designed to protect against pass-through and interference generally. Categorical pretreatment standards, on the other hand, are designed to ensure that IUs implement technology-based controls to limit the discharge of pollutants. Local limits, however, address the specific needs and concerns of a POTW and its receiving waters.

Federal regulations at 40 CFR §§403.8(f)(4) and 122.21(j)(4) require Control Authorities to evaluate the need for local limits and, if necessary, implement and enforce specific limits as part of pretreatment program activities. Local limits are developed for pollutants (e.g. metals, cyanide, BOD5 TSS, oil and grease, organics) that may cause interference, pass through, sludge contamination, and/or worker health and safety problems if discharged in excess of the receiving POTW treatment plant's capabilities and/or receiving water quality standards.

Typically, local limits are developed to regulate the discharge from all IUs, not just to CIUs, and are usually imposed at the "**end-of-pipe**" discharge from an IU (i.e., at the point of connection to the POTW's collection system). In evaluating the need for local limit development, it is recommended that Control Authorities:

- Conduct an industrial waste survey to identify all IUs that might be subject to the pretreatment program;
- Determine the character and volume of pollutants contributed to the POTW by these industries;
- Determine which pollutants have a reasonable potential for pass through, interference, or sludge contamination;
- Conduct a technical evaluation to determine the maximum allowable POTW treatment plant headworks (influent) loading for at least arsenic, cadmium, chromium, copper, cyanide, lead, mercury, nickel, silver, and zinc (Figure19);
- Identify additional pollutants of concern;
- Determine contributions from unpermitted sources to determine the maximum allowable treatment plant headworks loading from "controllable" industrial sources (Figure 20);
- Implement a system to ensure these loadings will not be exceeded.

Other local limit approaches available to Control Authorities include:
Collection System Approach Pollutants found to be present which may cause fire and explosion hazards or other worker health and safety concerns, are evaluated for their propensity to volatilize and are modeled to evaluate their expected concentration in air. Comparisons are made with worker health exposure criteria and lower explosive limits. Where values are of concern, the Control Authority may set limits or require development of management practices to control undesirable discharges.

The collection system approach may also consider the prohibition of pollutants with specific flashpoints to prevent discharges of ignitable wastes. The EPA's *Guidance to Protect POTW Workers from Toxic and Reactive Gases and Vapors* details strategies for developing such local limits.

Industrial User Management Practice Plans
These plans typically consist of narrative local limits requiring IUs to develop management practices (e.g., chemical management practices, best management practices, and spill prevention plans) for the handling of chemicals and wastes.

The need for and suggested contents of such plans may be found in the EPA's *Control of Slug Loadings to POTWs: Guidance Manua*l, and *Spill Prevention, Control, and Countermeasure (SPCC) Information Guid*e.

Case-by-Case Discharge Limits

These numeric local limits are based on best professional judgment (**BPJ)** and available pollution prevention and treatment technologies which are known to be economically feasible. This approach is most often used when insufficient data are available to employ the methods outlined above.

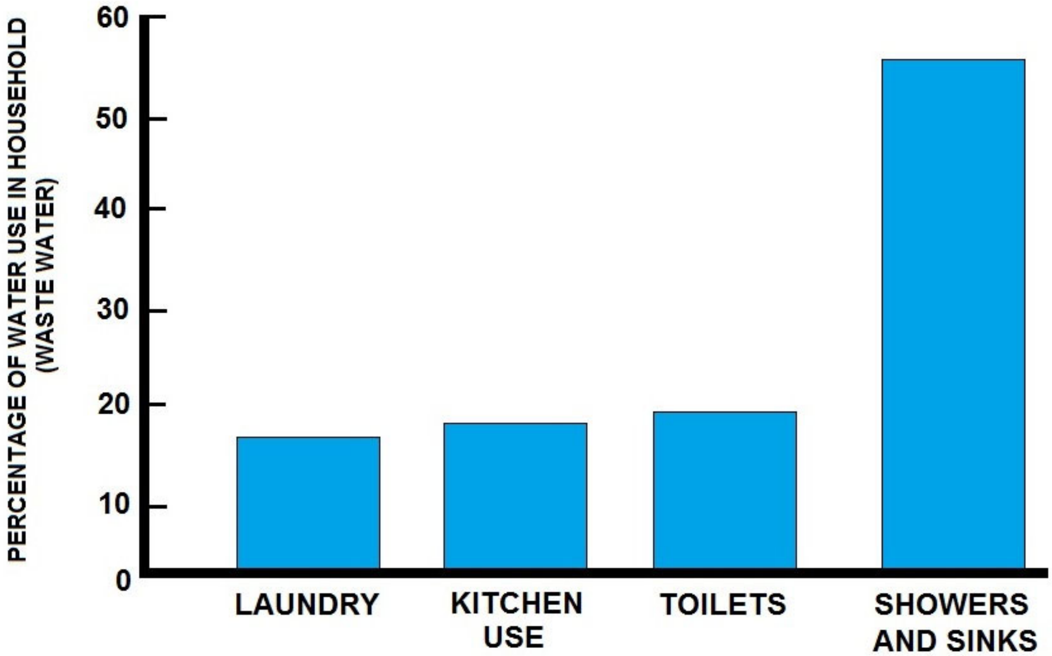
Local Specific Prohibitions
POTW specific prohibitions may be imposed in addition to the prohibitions detailed in 40 CFR § 403.5 (a) & (b) to address hydraulic, pollutant specific, and/or aesthetic concerns; e.g.:

- Noxious or malodorous liquids, gases, or solids creating a public nuisance.
- Wastestreams which impart color and pass through the POTW treatment plant.
- Storm water, roof runoff, swimming pool drainage.
- Wastewaters containing radioactive wastes or isotopes.
- Removed substances from pretreatment of wastewater.

Regardless of the approaches taken by a Control Authority, local limits should correct existing problems, prevent potential problems, protect the receiving waters, improve sludge use options, and protect POTW personnel. Additional existing EPA guidance on the subject includes:

- *Guidance for Preventing Interference at POTWs*
- *Guidance Manual on the Development and Implementation of Local Discharge Limitations Under the Pretreatment Program*
- *Supplemental Manual on the Development and Implementation of Local Discharge Limitations Under the Pretreatment Program: Residential and Commercial Toxic Pollutant Loadings and POTW Removal Efficiency Estimation*
- *Toxicity Identification Evaluation: Characterization of Chronically Toxic Effluent*s.

Additionally, many EPA Regions and States have developed local limits guidance to address regional and state issues.



Summary of Standards

A summary of all of the pretreatment standards, including general and specific prohibitions, categorical pretreatment standards, and local limits.

	General and Specific Prohibitions	Categorical Pretreatment Standards	Local Limits
Development	Established at the Federal level	Established at the Federal level	Developed by Control Authorities
Reference	40 CFR 403.5(a) & (b)	40 CFR Parts 405-471	Requirements for development found in 40 CFR §§403.5(c) & 403.8(f)(4)
Applicability	All IUs	CIUs	Commonly all IUs or all SIUs, but depends on allocation method used when developing limits.
Purpose	Provide for general protection of the POTW. May be superseded by more stringent categorical pretreatment standards or local limits.	Minimum standards based on available treatment technology and pollution prevention measures for controlling non-conventional and toxic pollutants that may cause pass through, interference, etc. at the POTW. May be superseded by more stringent local limits.	Provide site specific protection for a POTW and its receiving waters. May be superseded by more stringent categorical standards.
All standards are considered pretreatment standards for the purpose of section 307(d) of the Clean Water Act. A POTW is responsible for identifying standard(s) applicable to each industrial user and applying the most stringent requirements where multiple provisions exist. Compliance with imposed standards can be achieved through implementation of best management practices, development of a pollution prevention program, and/or installation of pretreatment.			

POTW Pretreatment Program Responsibilities

This section provides an overview of these POTW programs, highlighting each of the specific program areas that are to be addressed.

Legal Authority
POTWs seeking pretreatment program approval must develop policy and procedures for program implementation and establish the legal authority to implement and enforce program requirements. The General Pretreatment Regulations do not provide Control Authorities with the legal authority to carry out their pretreatment programs; rather, the regulations set forth the minimum requirements for POTWs with pretreatment programs.

A Control Authority's legal authority actually derives from State law. Therefore, State law must confer the minimum Federal legal authority requirements on a Control Authority. Where deficient, State law must be modified to grant the minimum requirements. In order to apply regulatory authority provided by State law, it is generally necessary for the Control Authority to establish local regulations to legally implement and enforce pretreatment requirements. Where the Control Authority is a municipality, legal authority is detailed in a Sewer Use Ordinance (SUO), which is usually part of city or county code.

Regional Control Authorities frequently adopt similar provisions in the form of "**rules and regulations**." Likewise, State agencies implementing a Statewide program under 40 CFR §403.10(e) set out pretreatment requirements as State regulations, rather than as an SUO. **[Local regulations cannot give the Control Authority greater authority than that provided by State law.]**

The EPA's 1992 guidance, *EPA Model Pretreatment Ordinance* provides a model for POTWs that are required to develop pretreatment programs. As POTW service areas expand, new contributions may arise from "**extra jurisdictional**" IUs located outside of the Control Authority's legal jurisdiction (see Figure 22). Multijurisdictional arrangements require special legal/contractual mechanisms to ensure adequate authority to implement and enforce program requirements in these other jurisdictions. Some state statutes may provide for general extraterritorial powers (i.e., a Control Authority is automatically allowed to regulate extra jurisdictional IUs contributing to their system).

However, the extent to which authorities (i.e., to permit, inspect, enforce, monitor, etc.) are granted may be somewhat limited, thereby, restricting a Control Authority's ability to implement and enforce a program. Where obtaining authority from the State to regulate extra jurisdictional IUs is not feasible, other options may be pursued:

Districts The creation of an independent organization (by affected municipalities or the State) which is authorized to administer and enforce an approved pretreatment program for the entire area in which it provides services is common in areas where multiple POTWs each serve various jurisdictions.

Agreements Affected Control Authorities may opt to enter into agreements requiring each municipality to implement and enforce the approved pretreatment program covering all IUs within their jurisdiction. The Control Authority must retain the means to regulate extra jurisdictional IUs where the contributing jurisdiction's efforts are inadequate. It is essential that agreements clearly define the roles of each party.

Annexation Where extra jurisdictional IUs lie in unincorporated areas, a Control Authority may annex or utility annex the service area.

Contracts
A Control Authority may enter into a contract with an extra jurisdictional IU, although contracts generally limit the enforcement capabilities of the Control Authority. As such, contracts should only be pursued when all other means fail. Since procedures for obtaining jurisdiction, creating sanitary districts, annexing service areas, etc. vary among states, Control Authority personnel should consult with their legal staff to thoroughly examine options allowed. This may include requesting State legislative changes if necessary.

The EPA's 1994 *Multijurisdictional Pretreatment Programs - Guidance Manual* provides more information on these jurisdictional issues, including sample language for agreements and contracts.

Industrial Waste Surveys
As part of program development and maintenance, the Federal regulations [40 CFR §403.8(f)(2)(I)] require Control Authorities to identify and locate all IUs that might be subject to the pretreatment program. While the General Pretreatment Regulations do not specify how a Control Authority is to accomplish this, it is beneficial to conduct an initial in-depth survey, and then institute measures to update the list continuously.

Control Authorities must ensure that the entire service area is reviewed. This may include IUs located outside the jurisdictional boundaries of the POTW. In these instances, it may be appropriate to solicit assistance from other jurisdictions in developing the list of potential dischargers. The types of resources that may be consulted in compiling and updating the master list include:
- Water and sewer billing records
- Applications for sewer service
- Local telephone directories
- Chamber of Commerce and local business directories
- Business license records
- POTW and wastewater collection personnel and field observations
- Business associations
- Internet

Once IUs are identified, the Control Authority must classify these users to determine if pretreatment standards and requirements should apply to these facilities. Typically, the Control Authority develops and distributes an Industrial Waste Survey (IWS) questionnaire to the identified IUs. The IWS questionnaire requests information regarding IU activities and the nature of wastes discharged.

The Control Authority may opt to send a detailed IWS questionnaire initially or conduct the survey in two phases (i.e., send a screener requesting basic information to eliminate obvious facilities and then send a detailed IWS to those facilities with greater potential to be SIUs). Key to the IWS is to identify facilities that are subject to categorical standards (i.e., CIUs) or otherwise have the potential to impact the POTW (i.e., SIUs). A POTW's IU inventory should include the name, location, classification, applicable standards, basis for limits imposed, and volume of discharge, control mechanism status, compliance dates and other special requirements for each IU.

The IWS should provide most of the information required to develop the inventory, although some supplementary information might be required from other sources, such as the permit application or monitoring data. The IU inventory must be updated as needed [40 CFR §403.8(f)(2)(I)] and provided to the Approval Authority as part of the annual report requirement (see POTW Reports section in this Chapter). The ongoing task of maintaining a complete list of IUs requires the Control Authority to implement a system to track existing IU information and/or classification changes and new user information.

Permitting

The General Pretreatment Regulations require all IUs be controlled through permit, order, or similar means to ensure compliance with applicable pretreatment standards and requirements. Section 403.8(f)(1)(iii)(A-E) clarifies this requirement to specify that all SIUs be issued a permit or equivalent individual control mechanism which contains, at a minimum:

- Statement of duration (not to exceed five years);
- Statement of non-transferabililty (unless outlined provisions are met);
- Effluent limitations based on applicable standards;
- Self-monitoring, sampling, reporting, notification, and record-keeping requirements;
- Statement of applicable civil and criminal penalties; and a schedule of compliance (where appropriate).

The EPA's 1989 *Industrial User Permitting Guidance Manual* details procedures for drafting IU discharge permits. SIU permits issued are site specific and tailored to the unique circumstances of the IU. Permit conditions must establish clear and explicit requirements for the permittee, to include using such terms such as "**shall**" and "**must**" in lieu of vague terms such as "**recommend**" or "**may**". The Control Authority must document its decision-making process when developing permits to ensure defensibility and enforceability. Adherence to sound, documented procedures will prevent any arbitrary and capricious claims by the permittee.

Whether developing or reissuing a permit, the permitting process consists of three phases:
Phase I - Collection and verification of information
Phase II - Data interpretation and fact sheet development
Phase III - Permit development and issuance.

Phase I
As part of Phase I, Control Authorities may review and verify information contained in the permit application, perform an inspection of the IU for confirmation of facts, tally data, and potentially sample and analyze the IU's wastestream. Knowledgeable Control Authority personnel, effective communication, and SIU cooperation are essential to collection of complete and accurate information.

Phase II requires that the Control Authority interpret data and other information and document the permit decision-making rationale, preferably in a permit fact sheet. Although the contents of a fact sheet will vary by permittee, fact sheets should provide a justification of all permitting decisions.

Typical components of a fact sheet are provided. Completed fact sheets should be included as part of the permit and provided to the Permittee to document the soundness of permitting decisions. For CIUs:

Components of Permit Fact Sheet

- the basis for the categorical determination(s)
- the identity and flow volume of all wastestreams generated and discharged to the POTW, and classified accordingly (i.e., regulated, unregulated, or dilution)
- data used and/or justification for estimates used to determine categorical limitations
- basis for limits imposed for categorical parameters.

For SIUs/CIUs:

- basis for limits imposed for non-categorical parameters
- rationale for compliance schedules, special plans required, special conditions, etc.
- basis for monitoring and reporting frequencies.

Inspection Considerations

- Provide current data on IUs
- Confirm or determine IUs' compliance status
- Determine completeness and accuracy of the IU's performance/compliance records
- Assess the adequacy of the IU's self-monitoring and reporting requirements
- Assess the adequacy of monitoring locations and IU's sampling techniques
- Assess the adequacy of imposed limitations and pollutants of concern
- Develop rapport with IUs
- Evaluate operation and maintenance and overall performance of an IU's pretreatment system
- Assess the potential for spills and slug loadings
- Evaluate the effectiveness of slug control plan
- Reveal issues requiring action
- Identify noncompliance needing resolution
- Suggest pollution prevention opportunities
- Collect samples
- Obtain data to support enforcement actions

After all permitting decisions are made; the Control Authority must incorporate those decisions into a permit. The permit, signed by the specified Control Authority official, is provided to the Permittee for comment and after comments are addressed, a final permit is issued to the IU. While many comments may be easily addressed/resolved by the Control Authority, occasionally resolution must be obtained through a formal adjudicatory hearing process where both the Permittee and Control Authority present their case to a third party.

Non-SIUs

Many POTWs also control contributions from non-SIUs using various means, such as through general permits issued to an entire industrial sector. These types of control mechanisms may not necessarily require compliance with specific pollutant limitations.

For example:

- ✓ Grease trap maintenance and record keeping requirements for food establishments;
- ✓ Maintenance and record-keeping requirements for photo processors' silver reclamation units;
- ✓ Best management practices for mercury recovery by hospitals and dentists.

Permit Application

All industrial users that require a permit must be sampled to determine the characteristics of the wastes to be discharged into the POTW's sewer system. Prior to the issuance of a permit for existing industrial users, the POTW's Inspector or Water Quality Department/Pollution Control Division samples the user's effluent, and performs the analyses required by the applicable discharge standards (i.e., Categorical standards or local limits).

For new industrial users, estimates of the wastes to be discharged into the POTW's sewer system must be submitted along with the permit application. No sampling would be performed at these new facilities, since they do not presently discharge wastes into the sewer system.

A four-day sampling program is usually conducted at each site to collect both composite and grab (for pollutants not amenable to composite sampling) samples as needed.

Industrial Sector
Industrial sector general permitting programs are common where a real or potential POTW problem is linked to a particular pollutant discharged (e.g., collection system blockages caused by the discharge of excess oils and grease from food establishments). POTWs have authority to enforce their SUO or rules or regulations against non-SIUs without the need for any type of individual control mechanism. Control Authorities have the authority to require non-SIUs to comply with pretreatment standards and requirements contained in their local regulations and then take appropriate actions against IUs as noncompliance is identified.

Inspections
Control Authorities are required to inspect and sample all SIUs a minimum of once per year pursuant to 40 CFR §403.8(f)(2(v). The frequency with which a Control Authority actually inspects an SIU may vary depending on issues such as the variability of an SIU's effluent, the impact of their discharge on the POTW, and their compliance history.

Inspection considerations (see Figure 24) will hinge upon the type of inspection performed (i.e., scheduled, unscheduled or demand).

The EPA's 1994 *Industrial User Inspection and Sampling Manual for POTWs* provides a detailed reference for inspection procedures and protocols. Scheduled inspections are useful when the Control Authority wants to gather specific information from the facility that necessitates meeting with specific SIU contacts. However, since scheduled inspections may interrupt normal operations (e.g., altered production schedule as a result of preparative work undertaken by the IU), unscheduled inspections may more accurately reflect IU compliance status when the inspection is performed for that reason.

POTWs must evaluate, at least once every two years, whether each SIU needs a plan to control slug discharges (i.e., a discharge of a non-routine, episodic nature, including but not limited to an accidental spill or non-customary batch discharge). To accurately evaluate the slug potential, Control Authorities likely will have to examine the SIU during normal operating conditions. If undetected, slug discharges can have serious impacts on the POTW. The EPA's 1991 *Control of Slug Loadings to POTWs Guidance Manual* provides a description of procedures for development, implementation, and review of slug control plans. Demand inspections are non-routine in nature and occur in response to a concern (e.g., POTW collection problems downstream from an IU, elevated enforcement actions against an IU, suspicious IU behavior, or an informer complaint).

Routine Control Authority inspections of SIUs typically consist of three activities; preparation, on-site assessment, and follow-up.

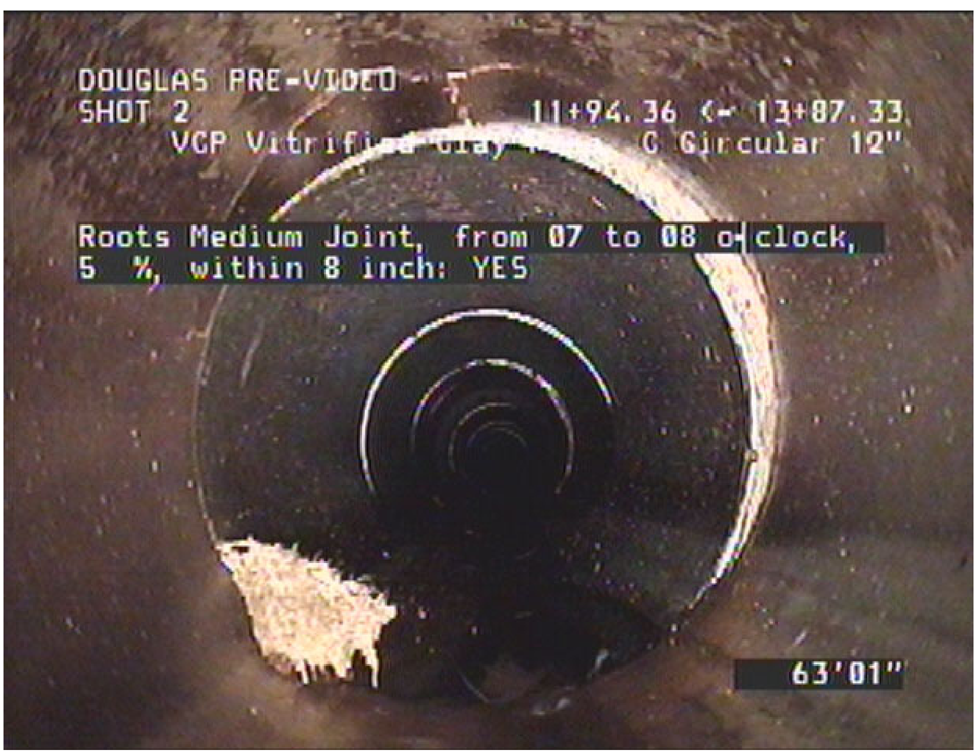
Preparation

Control Authority personnel should review POTW records for SIUs to be inspected to familiarize themselves with the facility. Information reviewed may include compliance status, compliance schedule activities, reports and plans, upcoming report and plan due dates, enforcement activities, permit applications, waste surveys, previous inspection summaries, categorical regulations, water use/billing records, and POTW collection system maps.

Control Authority personnel should also be familiar with any specific issues and concerns regarding the POTW treatment plant or collection system problems receiving the SIU's discharge.

On-site Assessment
Control Authority personnel typically discuss IU operations with IU contacts and perform a walkthrough of the facility to: update IU information regarding contacts, processes, production rates, pretreatment, and other waste management activities; review records required to be kept by the IU; visually verify the need for a slug control plan; and review pretreatment system maintenance, categorical standards applicable to processes employed, metering and sampling equipment, sampling procedures, chemicals used, processes employed, management practices, containment structures, locations of floor drains, etc. Many POTWs have developed a standard inspection questionnaire to facilitate the interview process and promote consistency during the inspection.

Follow-up
An inspection report should be prepared as soon as possible after the inspector returns to the office. Unanswered questions, required permit modifications, and/or necessary enforcement actions should be processed in a timely manner. Non-routine inspections (e.g., demand) may not encompass all the activities and steps specified above, but, like routine inspections, these activities may provide the Control Authority an opportunity to collect samples of the IU's discharge.



Sewer System Evaluation

On a regular basis, selected locations in the sewer system are sampled to develop background data for purposes of updating the local limits, and to screen areas for higher than "**background**" pollutant levels. In addition, problem areas are sampled on an as needed basis to determine potential sources of Code violations that either occur on a frequent basis, or are the result of a slug load to the sewer system.

To monitor sewers for background information, the sampling program would typically be conducted over a four-day period. In instances where the intent is to determine sources of pollutants and/or slug loads, the length of the program would vary.

Multi-City Users (Metering Stations) Example
All wastewater, which is transported to the POTW Treatment Plant from the Multi-City users, must be analyzed for pollutants of concern to the Industrial Pretreatment Program.

This type of sampling program is usually conducted over a seven-day period to obtain four-seven days of sampling data at each sewer location (i.e., a metering station) on a quarterly basis.

Once the sampling dates have been determined, the Inspector will notify, in writing, the Subregional Organizational Group (**SROG**) representative for that City of the dates when the sampling will be conducted.

Upon arrival at the site, safety is the priority. A visual inspection must be completed prior to any entry. The site must be free of any obstructions or hazards which may cause injury when entering the sampling area. If there are any problems detected, the SROG representative and the Inspector should be notified, and no entry should be attempted until the problem has been corrected.

Metering stations qualify as confined spaces (Example Policy)
If all safety criteria have been met, prepare equipment for the site. Check the assignment sheet to determine what parameters are required to be sampled, which in turn determines the type of tubing to be used (i.e. Tygon or Teflon).

The sampler must be completely assembled before performing QA/QC procedures. After QA/QC is complete, a sufficient amount of weight must be attached to the tubing to keep the strainer submerged in the effluent for proper siphoning of the sample, without allowing the strainer to hit the bottom of the flume. Make sure the intake tubing does not kink.

If the metering station has a flow meter, you may connect either their cable or a POTW cable to the sampler from the flow meter. Occasionally, you will set up a flow meter to have a comparison reading. Determine the pulse rate and proper setting from the flow, and program the sampler. After entering the data into the sampler, wait to make sure the equipment is pulling samples.

After the initial set-up of the sampling equipment, samples will be collected during the remainder of the sampling period. Split samples may be requested by the SROG representative. If the volume of the sample is adequate, these may be given, provided the representative supplies the containers and allows the City Inspector to pour off the samples.

No grab samples will be collected by POTW Inspectors for any SROG representatives. (Example Policy)
Upon exiting the confined space, continue to follow the confined space entry procedures as outlined by OSHA Standards. When you return to the sampling vehicle, you must immediately perform field tests and preserve the samples according to the techniques set forth in by Standard Methods or the State/Federal Rule.

All paper work must be filled out completely before the sampling crew's departure. This paperwork includes the chain of custody which is turned in to the laboratory with the samples, "Metering Station Field Observation Form" that remains with the sampling site file, and the Multi-City Metering Station Sample Record, of which the original is given to the Inspector and the copy is given to the SROG representative.

If there is not an SROG representative at the site, these copies will be turned over to the Inspector with the originals at the end of the week. Remember, all paperwork must be completed prior to leaving the site.

Compliance Monitoring
There are two types of sampling activities that are performed as part of compliance monitoring for permitted industries: unscheduled and demand.

Unscheduled sampling is used to determine the compliance status of the user. Instances of noncompliance are often identified during unannounced monitoring visits. No notice is given for this type of sampling. This type of sampling is performed two to four times a year, at each industrial user site, over a two to five-day period to obtain sampling data

Demand sampling is usually initiated in response to a known or suspected violation, discovered as a result of a self-monitoring report, routine sampling visit, public complaint, unusual influent condition at the wastewater treatment plant, or emergency situations (e.g., plant upsets, sewer line blockages, fires, explosions, etc.). Most often, this type of sampling is conducted to support enforcement actions against an industrial user. This type of sampling activity is performed on an as needed basis.

The length of the sampling program depends on the flow, nature of the wastes, and type of samples (i.e., grab or composite) to be collected.

Typically, composite and grab samples are collected at each user site.

Non-permitted Industrial Users (User Rate Charge Program) (Example Policy)
On a periodic basis (i.e., once every two to three years), commercial and minor industrial users are sampled to determine discharge concentrations of various pollutants. Typical types of users which may be sampled include: restaurants, photo processing laboratories, laundries, car washes, and printing shops.

A three- to four-day sampling program is usually conducted at each assigned site. Commercial establishments are sampled to establish BOD and SS levels for various groups of users for the Finance/ Utilities department.

This activity is also helpful in identifying industrial or commercial users which may discharge pollutants of concern.

Sampling

The General Pretreatment Regulations require Control Authorities to monitor each SIU at least annually and each SIU to self-monitor semi-annually. As with inspections, the Control Authority should assess site-specific issues, such as SIU effluent variability, impact of this effluent on the POTW, and the SIU's compliance history to determine appropriate sampling frequencies (i.e., if more frequent monitoring is necessary).

For more detailed information on sampling frequencies, consult the EPA's 1994 *Industrial User Inspection and Sampling Manual for POTWs*.

Parameter	**Sample type**	**Container**	**Preservative**	**Holding time**
pH	Grab	Polyethylene or Glass	N/A	analyze immediately
BOD	Composite	Polyethylene or Glass	chilled to 4°C	48 hours
TSS	Composite	Polyethylene or Glass	chilled to 4°C	7 days
NH_3 as N	Composite	Polyethylene or Glass	chilled to 4°C, H_2SO_4 to pH<2	28 days
Oil and Grease	Grab	Glass	chilled to 4°C, HCl or H_2SO_4 to pH<2	28 days
Cyanide, total	Grab	Polyethylene or Glass	chilled to 4°C, NaOH to a pH >12, and 0.6g of ascorbic acid if residual chlorine is present	14 days
Metals (total) excl. Cr^{+6} B, and Hg	Composite	Polyethylene or Glass	HNO_3 to pH<2	6 months
624 (volatiles organics)	Grab	Amber glass, w/ Teflon septum lid and zero headspace	chilled to 4°C (additional laboratory preservation required)	7 or 14 days, depending on specific organic
625 (semi-volatile organics)	Composite	Amber glass w/ Teflon lined lid	chilled to 4°C (additional laboratory preservation required)	7 days for sample prep; 40 days for extract

Types of Samples

General

There are four types of samples that are collected by the POTW's Sampling Section: grab, time proportional composites, flow proportional composites, and hand composites. The sampling method used depends largely on the types of analyses to be run, and the nature of the wastestream being sampled. Each sampling method is described in this section.

Most POTW's will define the sampling methods which must be used by industrial users (**IUs**) to obtain representative samples to show compliance with their permits: ***Example***

(1) A grab sample is an individual sample collected in less than 15 minutes without regard for flow or time of day. pH, cyanide, oil and grease, sulfide, and volatile organics must be collected as grab samples.

(2) 24-hour flow proportional composite samples where feasible. The POTW may waive this requirement if the IU demonstrates that this method is not feasible. Samples would then be taken by means of time proportional composite sampling methods, or by hand composite where the IU can demonstrate that this will provide a representative sample of the effluent being discharged.

The volume of sample to be collected by any of these methods is dependent on the number and types of analyses that must be performed.

Grab Samples

Grab samples are individual samples collected in less than 15 minutes without regard to flow or time of day. Grab samples are normally taken manually, but can be pumped. Oil and grease samples and purgeable organics are exceptions and must be taken manually. A grab sample is usually taken when a sample is needed to:

(1) Provide information about an instantaneous concentration of pollutants at a specific time.

(2) Quantify the pollutants in a non-continuous discharge (e.g., batch discharge).

(3) Corroborate composite samples if the waste is not highly variable.

(4) Monitor parameters not amenable to compositing such as pH, temperature, dissolved oxygen, chlorine, purgeable organics and sulfides, oil and grease, coliform bacteria, and sulfites.

Collecting Procedure for Water/Wastewater Grab Samples

- Lower dipper or mouth of the bottle into water just below surface. In some cases, you will need to rinse the bottle or dipper three times in the sample before obtaining the sample.
- Retrieve the collected sample to a clean processing area.
- Rinse the outside of the bottle 3 times to remove any contaminants.
- Pour the sample into the required laboratory bottle.
- You may need to filter the sample; this is true with some water and wastewater samples. Filtering (for ortho-P and NOx samples)--some Surface water virus samples need to be filtered.
- Bottle preservation is performed in the truck or lab before sampling.
- Secure sample container caps tightly.
- Label the sample containers and place them in an iced cooler before storage.

Timed Composites
Timed samples are usually taken in instances where the intention is to characterize the wastes over a period of time without regard to flow, or where the flow is fairly constant.

Timed composite samples consist of a series of equal volume grab samples taken at regular intervals. Usually the interval is 15 minutes, with a maximum sampling duration of 24 hours.

However, other intervals can be used and may be more appropriate under some circumstances.

Samplers are available which can take up to 10 discreet samples per bottle, for a total of 240 discreet samples. The sampler may be programmed to take any number of samples into one composite bottle which has a 2.5-gallon capacity.

Flow Proportional Composites
Flow proportional composite samples consist of: a series of grab samples whose volumes are equal in size and proportion to the flow at the time of sampling. Samples are taken at varying time intervals, or continuous samples taken over a period of time based on the flow. Wherever possible, flow proportional sampling is recommended because it most accurately reflects the nature of the wastestream. Equal volume samples taken at varying time intervals are most often collected by the sampling inspectors. A flow measuring device must be used in conjunction with the automatic sampler.

This sampling method is used for all sampling activities except for instances where grab samples are required or time proportional sampling is more expedient and can provide the same accuracy as flow proportional sampling (i.e., constant flow levels).

Hand Compositing
Hand compositing is a series of time proportional grab samples which are collected and composited by hand. Provided the sample volumes are equal and are collected at even intervals, the results should be the same as if done by an automatic sampler (i.e., flow proportional composite sampling).

A specific instance where this sampling method may be used is in metal plating shops which have batch discharges from the treatment tank.

Provided the tank contains a homogeneous mixture, a minimum of four grab samples are taken of equal amounts and at evenly spaced intervals of time during discharge, to accurately represent the entire tank.

This should represent the waste characteristics of the entire batch discharge to the sewer. One hand composite per batch discharge would be equivalent to a 24-hour composite sample taken at other types of facilities. The sampling data would be compared with the average daily categorical standards or local limits where applicable.

Pre-Sampling Procedures
To ensure acceptable analytical results, numerous steps must be followed before a sampling program can be initiated:

(1) Sampling equipment must be clean and be in good working order.
(2) Sampling site must be selected.
(3) Types of analyses must be determined.
(4) Proper sample containers must be selected and prepared.

Sampling Equipment Example
The POTW may use one of the following portable samplers, ISCO Ultra-Sonic flow meters, SIGMA Depth Sensor samplers, and SIGMA pH Probe samplers. Safety equipment and other necessary equipment are also used.

The equipment that is kept in the sampling vehicle is dependent on the types of sampling activities planned each week, while the equipment stored in the storeroom is for back-up needs and future sampling demands.

Each sampling vehicle should be equipped with at least one sampler and one flow meter more than is needed for the particular sampling period. For example, three scheduled flow proportionate sampling sites would require a vehicle to be equipped with four samplers and four flow meters. At least one spare battery for each type of equipment taken into the field should also be placed in the sampling vehicle.

Auxiliary equipment, such as supports, harnesses, blowers, etc., that must be carried in each vehicle will depend on the nature of the sampling location.

In order to keep the equipment in good working order, the equipment should be maintained and cleaned on a regular basis. Routine maintenance and cleaning procedures should be written into your standard operating procedures.

Sampling Equipment Maintenance Example

Basic maintenance for samplers includes: periodic calibration and general equipment checking, and replacement of the internal desiccant and fuses. Routine cleaning should be done as covered in SOP.

Basic maintenance of the flow meters includes: periodic replacement of the internal desiccant, plotter paper, ribbon, fuses, and any broken re-roll spool assemblies. **Note: on the flow meters there are two tabs on the sides which are extremely thin and easily broken.**

The NiCad and Gel Cell batteries need to be recharged on a regular basis. Any battery that reads less than 12.50 when checked should not be installed or left on any of the sampling equipment. At the battery charging station, areas are set aside for batteries that need to be charged and batteries already charged.

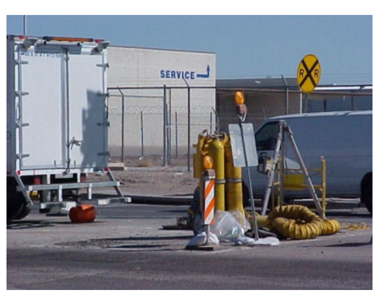
To prolong battery life, NiCad batteries should be fully discharged before recharging for a maximum of 24 hours, in accordance with the procedures described in the manufacturer's operations and maintenance manuals. Always bring a second set or back-up set of batteries with you.

It is important to note that charged NiCad batteries, if left unused for a long time, are nevertheless slowly discharging. Gel cell batteries are generally more stable. Voltage readings should be taken **before** the charged batteries are taken into the field to be sure that they still have a full charge.

When a sampler, flow meter, or ancillary equipment needs more specific repairs, the manufacturer representative should be contacted and arrangements made for repair or replacement of the equipment.

Inside Modern Wastewater Sampling Trucks

Wastewater sampler set-up in traffic to obtain composite sample from a sewer manhole. Notice the tri-pod and barricades.



Sampling

Sampling is the most appropriate method for verifying compliance with pretreatment standards. Monitoring location(s) are designated by the Control Authority and must be such that compliance with permitted discharge limits can be determined. Where possible, the Control Authority should not designate monitoring locations that are confined spaces or that are difficult to access or difficult to place the automated sampling equipment.

Monitoring locations should:

- be appropriate for waste stream conditions;
- be representative of the discharge;
- have no bypass capabilities; and
- allow for unrestricted access at all times.

Control Authorities should measure flow to allow for collection of flow-proportioned composite samples, which are required, unless flow-proportional sampling is not feasible. Flow-proportional composite samples are preferred over time composite samples particularly where the monitored discharge is intermittent or variable.

Desired analyses dictate the preparation protocols, equipment, and collection bottles to be used to avoid contamination of samples or loss of pollutants through improper collection. Sampling for such pollutants as pH, cyanide, oil and grease, flashpoint, and volatile organic compounds require manual collection of grab samples.

Similar to composite samples, grab samples must be representative of the monitored discharge and are to be collected from actively flowing wastestreams. Fluctuations in flow or the nature of the discharge may require collection of and hand-composting of more than one grab sample to accurately assess compliance.

To ensure defensibility of data, Control Authorities should develop and implement standard operating procedures and policies detailing sample collection and handling protocols in accordance with 40 CFR Part 136.

Adherence to proper sample collection and handling protocols, 40 CFR Part 136 approved analytical methodologies, and record-keeping requirements [40 CFR §403.12(o)(1)] (see Figure 25) can be verified through review of field measurement records, chain of custodies, and lab reports. Field measurement records may require information regarding sample location, condition of and programmed settings for sampling equipment, wastewater meter readings, and information for such parameters as pH and temperature which require analysis in the field.

Chain of custody forms serve as a link between field personnel and the laboratory and contain information regarding sample matrix, type, and handling. Lab reports should contain the minimum information specified in 40 CFR §403.12(o)(1)(ii-iv) as well as any additional information necessary to demonstrate compliance with 40 CFR Part 136 requirements (e.g., analytical methodology, sample preparation date and time, time of analysis).

Use of standardized forms which prompt recording of information necessary for demonstrating compliance with applicable requirements will aid in ensuring it can be used as admissible evidence in enforcement proceedings or in judicial actions.

Wastewater Sampling Information

Required Containers, Preservation Techniques, and Holding Times
40 CFR 136.3

Parameter No./name Container Preservation Maximum holding time

Table IA--Bacteria Tests:
1-4 Coliform, fecal and total. P,G............. Cool, 4C, 0.008% $Na_2S_2O_3$...... 6 hours.
5 Fecal streptococci.......... P,G............. Cool, 4C, 0.008% $Na_2S_2O_3$ ...... 6 hours.

Table IA--Aquatic Toxicity Tests:
6-10 Toxicity, acute and chronic. P,G........... Cool, 4 deg.C .... 36 hours.

Table IB--Inorganic Tests:
1. Acidity.................... P, G............ Cool, 4 deg. C................... 14 days.
2. Alkalinity................. P, G............ Cool, 4 deg. C................... 14 days.
4. Ammonia.................... P, G............ Cool, 4 deg. C, H_2SO_4 to pH< 2..... 28 days.
9. Biochemical oxygen demand.. P, G............ Cool, 4 deg. C................... 48 hours.
10. Boron..................... P, PFTE, or Quartz. HNO_3 TO pH2.................... 6 months.

11. Bromide................... P, G............ None required................... 28 days.
14. Biochemical oxygen demand, carbonaceous. P, G............ Cool, 4 deg. C............ 48 hours.
15. Chemical oxygen demand.... P, G............ Cool, 4 deg. C, H_2SO_4 to pH<2..... 28 days.
16. Chloride.................. P, G............ None required................... 28 days.
17. Chlorine, total residual.. P, G............ None required .... Analyze immediately.
21. Color..................... P, G............ Cool, 4 deg. C................... 48 hours.
23-24. Cyanide, total and amenable to chlorination. P, G............ Cool, 4 deg. C, NaOH to pH>12, 0.6g Ascorbic acid 14 days.
25. Fluoride.................. P................ None required................... 28 days.
27. Hardness.................. P, G............ HNO_3 to pH<2, H_2SO_4 to pH <2....... 6 months.
28. Hydrogen ion (pH)......... P, G............ None required................... Analyze immediately.
31, 43. Kjeldahl and organic nitrogen. P, G............ Cool, 4 deg. C, H_2SO_4 to pH <2..... 28 days.

Metals:
18. Chromium VI............... P, G............ Cool, 4 deg. C................... 24 hours.
35. Mercury................... P, G............ HNO_3 to pH<2................. 28 days.
3, 5-8, 12, 13, 19, 20, 22, 26, 29, 30, 32-34, 36, 37, 45, 47, 51, 52, 58-60, 62,63, 70-72, 74, 75. Metals, except boron, chromium VI and mercury. P, G............ ......do........................ 6 months.

38. Nitrate................... P, G............ Cool, 4 deg. C................... 48 hours.
39. Nitrate-nitrite........... P, G............ Cool, 4 deg. C, H_2SO_4 to pH <2..... 28 days.
40. Nitrite................... P, G............ Cool, 4 deg. C................... 48 hours.
41. Oil and grease............ G................ Cool to 4 deg. C, HCl or H_2SO_4 to pH <2 to 28 days.
42. Organic Carbon............ P, G............ Cool to 4 deg. C HC1 or H_2SO_4 to pH <2 or 28 days.
44. Orthophosphate............ P, G............ Filter immediately, Cool, 4 deg. C. .... 48 hours.
46. Oxygen, Dissolved Probe... G Bottle and top. None required......... Analyze immediately.
47. Winkler.................. .... G Bottle and top. Fix on site and store in dark... 8 hours.
48. Phenols................... G only........... Cool, 4 deg. C,..... H_2SO_4 to pH <2 28 days.
49. Phosphorus (elemental).... G................ Cool, 4 deg. C................... 48 hours.
50. Phosphorus, total......... P, G............ Cool, 4 deg. C, H_2SO_4 to pH <2…………..28 days.
53. Residue, total............ P, G............ Cool, 4 deg. C................... 7 days.
54. Residue, Filterable....... P, G............ Cool, 4 deg. C.................... 7 days.
55. Residue, Non-filterable P, G............ Cool, 4 deg. C........................ 7 days.

56. Residue, Settleable(TSS)........ P, G............ Cool, 4 deg. C....................... 48 hours.
57. Residue, volatile......... P, G............ Cool, 4 deg. C....................... 7 days.
61. Silica................... P, PFTE, or Quartz…….. Cool, 4 deg. C................. 28 days.
64. Specific conductance...... P, G.......... . Cool, 4 deg. C....................... 28 days.
65. Sulfate.................. P, G............ ...... Cool, 4 deg. C .... 28 days.
66. Sulfide.... P, G...... Cool, 4 deg. C add zinc acetate plus sodium hydroxide to pH>9. 7 days.
67. Sulfite.................. P, G............ None required.................. Analyze immediately.
68. Surfactants.............. P ,G............ Cool, 4 deg. C.................. 48 hours.
69. Temperature............... P, G............ None required.................. Analyze.
73. Turbidity................ P, G............ Cool, 4 deg. C .... 48 hours.

Table IC--Organic Tests
13, 18-20, 22, 24-28, 34-37, G, Teflon-lined septum Cool, 4 deg. C, 0.008% $NA_2S_2O_3$
14 days.
39-43, 45-47, 56, 76, 104, 105, 108-111, 113.
Purgeable Halocarbons. 6, 57, 106.
Purgeable aromatic hydrocarbons G, Teflon-lined septum Cool, 4 deg.C, 0.008% $NA_2S_2O_3$
14 days.
3, 4. Acrolein and acrylonitrile G, Teflon-lined septum Cool, 4 deg.C, 0.008% $NA_2S_2O_3$ pH 4-5 14 days.
23, 30, 44, 49, 53, 77, 80, 81, 98, 100, 112. G, Teflon-lined Cool, 4 deg.C, 0.008% $NA_2S_2O_3$ 14 days.
Phenols G, Teflon-lined septum Cool, 4 deg.C, 0.008% $NA_2S_2O_3$ pH 4-5 7 days until extraction; 40 days after extraction.
7, 38. Benzidines G, Teflon-lined septum………… Cool, 4 deg.C, 0.008% $NA_2S_2O_3$ 7 days until extraction.
14, 17, 48, 50-52. Phthalate G, Teflon-lined septum Cool, 4 deg.C................. 7 days until extraction; esters 40 days after extraction.
82-84. Nitrosamines G, Teflon-lined septum ……Cool, 4 deg. C, 0.008% $NA_2S_2O_3$...Store in dark
88-94. PCBs G, Teflon-lined septum Cool, 4 deg.C .... 7 days until extraction; 40 days after extraction.
54, 55, 75, 79. Nitroaromatics ...... G, Teflon-lined septum…………Cool, 4 deg.C, 0.008% $NA_2S_2O_3$ and isophorone
1, 2, 5, 8-12, 32, 33, 58, 59, 74, 78, 99, 101. Polynuclear aromatic hydrocarbons. Cool, 4 deg.C, 0.008% $NA_2S_2O_3$......Store in dark
15, 16, 21, 31, 87. Haloethers .... G, Teflon-lined septum....... Cool, 4 deg.C, 0.008% $NA_2S_2O_3$ 7 days until extraction; 40 days after extraction.
29, 35-37, 63-65, 73, 107. Chlorinated hydrocarbons G, Teflon-lined septum…………Cool, 4 deg.C, 7 days until extraction; 40 days after extraction.
60-62, 66-72, 85, 86, 95-97, 102, 103. CDDs/CDFs aqueous: field and lab G........ Cool, 0-4 deg. C, pH9, 0.008% $NA_2S_2O_3$ 1 year preservation.
Solids, mixed phase, and ......do......... Cool, 4 deg. C............ 7 days.tissue: field preservation..
Solids, mixed phase, and ......do......... Freeze, -10 deg. C............. 1 year.
tissue: lab preservation.

Table ID--Pesticides Tests:
1-70. Pesticides \11\......... ......do......... Cool, 4 deg. C, pH 5-9 .... Do.
Table IE--Radiological Tests:
1-5. Alpha, beta and radium... P, G............ HNO_3 to pH2..................... 6 months.

Polyethylene (P) or glass (G). For microbiology, plastic sample containers must be made of sterilizable materials (polypropylene or other autoclavable plastic).

Sample preservation should be performed immediately upon sample collection. For composite chemical samples each aliquot should be preserved at the time of collection. When use of an automated sampler makes it impossible to preserve each aliquot, then chemical samples may be preserved by maintaining at 4 degrees C until compositing and sample splitting is completed.

When any sample is to be shipped by common carrier or sent through the United States Mails, it must comply with the Department of Transportation Hazardous Materials Regulations (49 CFR part 172). The person offering such material for transportation is responsible for ensuring such compliance. For the preservation requirements of Table II, the Office of Hazardous Materials, Materials Transportation Bureau, Department of Transportation has determined that the Hazardous Materials Regulations do not apply to the following materials: Hydrochloric acid (HCl) in water solutions at concentrations of 0.04% by weight or less (pH about 1.96 or greater); Nitric acid (HNO_3in water solutions at concentrations of 0.15% by weight or less (pH about 1.62 or greater); Sulfuric acid (H_2SO_4) in water solutions at concentrations of 0.35% by weight or less (pH about 1.15 or greater); and Sodium hydroxide (NaOH) in water solutions at concentrations of 0.080% by weight or less (pH about 12.30 or less).

Samples should be analyzed as soon as possible after collection. The times listed are the maximum times that samples may be held before analysis and still be considered valid. Samples may be held for longer periods only if the permittee, or monitoring laboratory, has data on file to show that for the specific types of samples under study, the analytes are stable for the longer time, and has received a variance from the Regional Administrator under Sec. 136.**3**(e). Some samples may not be stable for the maximum time period given in the table. A permittee, or monitoring laboratory, is obligated to hold the sample for a shorter time if knowledge exists to show that this is necessary to maintain sample stability. See Sec. 136.**3**(e) for details. The term ``analyze immediately'' usually means within 15 minutes or less of sample collection. Should only be used in the presence of residual chlorine.

Maximum holding time is 24 hours when sulfide is present. Optionally all samples may be tested with lead acetate paper before pH adjustments in order to determine if sulfide is present. If sulfide is present, it can be removed by the addition of cadmium nitrate powder until a negative spot test is obtained. The sample is filtered and then NaOH is added to pH 12.

Samples should be filtered immediately on-site before adding preservative for dissolved metals.

Guidance applies to samples to be analyzed by GC, LC, or GC/MS for specific compounds.

Sample receiving no pH adjustment must be analyzed within seven days of sampling.

The pH adjustment is not required if acrolein will not be measured. Samples for acrolein receiving no pH adjustment must be analyzed within **3** days of sampling.

When the extractable analytes of concern fall within a single chemical category, the specified preservative and maximum holding times should be observed for optimum safeguard of sample integrity. When the analytes of concern fall within two or more chemical categories, the sample may be preserved by cooling to 4 deg. C, reducing residual chlorine with 0.008% sodium thiosulfate, storing in the dark, and adjusting the pH to 6-9; Samples preserved in this manner may be held for seven days before extraction and for forty days after extraction. Exceptions to this optional preservation and holding time procedure are noted in footnote 5 (re the requirement for thiosulfate reduction of residual chlorine), and footnotes 12, 13 (re the analysis of benzidine).

If 1,2-diphenylhydrazine is likely to be present, adjust the pH of the sample to 4.0<plus-minus>0.2 to prevent rearrangement to benzidine.

Extracts may be stored up to 7 days before analysis if storage is conducted under an inert (oxidant-free) atmosphere.

For the analysis of diphenylnitrosamine, add 0.008% $NA_2S_2O_3$ and adjust pH to 7-10 with NaOH within 24 hours of sampling.

The pH adjustment may be performed upon receipt at the laboratory and may be omitted if the samples are extracted within 72 hours of collection. For the analysis of aldrin, add 0.008% $NA_2S_2O_3$.

Sufficient ice should be placed with the samples in the shipping container to ensure that ice is still present when the samples arrive at the laboratory. However, even if ice is present when the samples arrive, it is necessary to immediately measure the temperature of the samples and confirm that the 4^0C temperature maximum has not been exceeded.

In the isolated cases where it can be documented that this holding temperature cannot be met, the permittee can be given the option of on-site testing or can request a variance. The request for a variance should include supportive data which show that the toxicity of the effluent samples is not reduced because of the increased holding temperature.

Metals Sampling *(Example Procedure)*

Metals sampling will encompass a variety of individual samples within a sample, i.e., nickel, zinc, silver and others. As a general rule, metals samples need to be collected as a composite and preserved with 1:1 nitric acid to pH < 2.

If ICP (inductively coupled plasma) laboratory analysis will be used, a 500 ml sample is sufficient. ICP is used for a general scan; if more stringent detection limits are needed then furnace analysis is used.

If additional analysis is required, i.e., furnace method analysis, collect a 2 liter bottle of sample (instead of the 500 ml sample) and preserve with nitric acid.

Ice is not necessary for preservation, but it won't jeopardize the sample, either.

PARAMETER	CONTAINER	PRESERVATIVE	MAX. HOLDING TIME
Metals	P	HNO_3 to pH < 2	6 months

Common Wastewater Sample Collection Bottles

625/608, 1657, TTO/Organics, TPH/Oil/Grease,
Smaller bottles-TOCs, VOCs, 601/602 and 502.2

NO_2/NO_3, Flouride, Sulfide, Metals, BOD-TDS-TSS
Wide-mouth Sludge/Metals bottle

LAB I.D. NUMBER

Laboratory

123 W. Main St
Sun City, Arizona 85541

Sampler:

DATE: PAGE **1** OF **1**

Company:
Department:
Address:
Contact:
Telephone:

Sample Identification	Date	Time	Matrix	Lab ID	Metals* See Attached	TSS	Lead/Copper	BOD/COD	Nitrate	Nitrate + Nitrite	TKN / Amonia	VOC / THM's	Semi Volital Organics (625)	Chloride		Cyanide	Floride	Surfactants (MBAS)	Tot. Coliform MPN	Fecal Coliform MPN-HPC	Organo-Phosphorus Pest. (8141)	Sulfate	EC Conductivity	Number/Containers

Project Name

Project Number

Field Measurements:

pH:

Temp:

Sample Receipt

No. Containers:

Custody Seals:

Received Intact: Yes No

Received Cold: Yes No

Temperature:

PRIORITY:

RELINQUISHED BY:

Signature: Time:

Printed Name: Date:

SAMPLED RECEIVED BY:

Signature: Time:

Printed Name: Date:

RELINQUISHED BY:

Signature: Time:

Printed Name: Date:

Company

SAMPLED RECEIVED BY:

Signature: Time:

Printed Name: Date:

Company

Wastewater Treatment Plant Sampling

POTW samples are collected in accordance with the National Pollutant Discharge Elimination System (**NPDES**) permit which sets discharge limits for certain pollutants and specifies sampling frequencies and sample types.

The POTW is responsible for coordinating the plant sampling activity with laboratory personnel who prepare any special sampling bottles and laboratory appurtenances necessary (i.e. trip blanks, etc.) to complete the sampling objectives.

Plant Sampling Procedure *(Example Procedure)*

Set up two samplers at the plant influent channel and two samplers at the plant effluent channel. Two samplers are used to provide sufficient sample quantity and to minimize sampler failure. All sampling equipment must be prepared and cleaned as established in your POTW's procedures. Teflon hose is required. Sampling sites are specified in each plant's NPDES permit.

Collect the following composite samples at both sites.

(1) **Metals Sample** - (one 2-liter plastic bottle)

Preserve with 1:1 nitric acid to a pH < 2. Store sample on ice at 4°C.

(2) **Cyanide Sample** – (one 2-liter plastic bottle)

Collect the cyanide sample as a composite in accordance with NPDES permit. Check the sample for chlorine. If Cl_2 is present, use ascorbic acid to eliminate it. Add NaOH to a pH > 12. Store samples on ice at 4°C.

(3) EPA Test Method 608 and 625[i] samples are informational samples only. These results are used for local limits data.

608 and 625 samples are collected as composite samples. At the influent channel: Collect one 1-liter amber glass bottle of each sample (608, 625). Check samples for chlorine. At the effluent channel: Collect one 4-liter amber glass bottle of each sample (608, 625). Check samples for chlorine. If Cl_2 is present in the samples, use sodium thiosulfate ($Na_2S_20_3$) to eliminate it. Store samples on ice at 4°C.

(4) **625/Phenols** are collected as a grab sample. Collect one 4-liter amber glass bottle at the effluent channel only. Check the sample for chlorine. If Cl_2 is present, use sodium thiosulfate ($Na_2S_20_3$) to eliminate it. Store sample on ice at 4°C.

Bio-Solids Sampling *(Example Procedure)*

Bio-solids (dried sludge) samples are collected at POTWs. Normally, bio-solid samples will be collected from the final storage area for dry sludge. The location of the dried bio-solids may vary based on the individual plants. Sampling frequency will be determined on an as needed basis and to comply with the EPA requirements.

All samples collected are grabs. All samples are collected using a sterile plastic scoop in order to avoid any contamination.

The following is a list of samples to be collected:

PARAMETER	CONTAINER
Helminth Ova & Enteric Virus	1 Qt Plastic Bag (Ziploc)
Metals +	500 ml Plastic Bottle
Nitrogen (total)	4 oz Glass Bottle
TOC (Total Organic Carbon)	4 oz Glass Bottle
Fecal Coliform	(autoclaved from lab)
6 hr hold time	500 ml Plastic Bottle

Sample Scheduling

An active file is maintained on each sampling location which contains historical data including past process discharge flow readings, water meter readings, sampling dates, and conditions of sampling site.

River Sampling Activities *(Example Procedure)*

When developing a sampling plan for river sampling, the following considerations must be observed:

(1) Sampling sites must meet the objectives of the program or study.

(2) At the sampling sites the river must be flowing freely and the sample must be as representative as possible of river flow at that site. Consideration of all safety factors must be observed.

(3) Samples must be collected midstream of the main channel at approximately two-thirds of the depth unless specific depths have been requested.

(4) All safety precautions must be observed during sampling which includes the use of harnesses, waterproof boots and other equipment.

Sewers *(Example Procedure)*

Sewer system and user rate sampling are conducted in manholes. General guidelines for selection of sampling locations include the following:

(1) Samples should be taken at points of high turbulent flow to ensure good mixing and prevent the deposition of solids.

(2) The sample location should be easily accessible and free of any major safety hazards.

(3) Sample lines should not be located where there is surface scum.

(4) If a flow study or a flow/proportional sampling event is required, make sure that the sewer pipe does not have a curve, a drop in the line or any obstructions. These would cause false readings.

Cleaning Automatic Samplers *(Example Procedure)*
Samplers, sample jars, grab beakers, and all other equipment used in collecting samples must be cleaned between their use at each site, to avoid the possibility of cross contamination. Latex or nitrile gloves should be worn to protect against infections and acid burns. The following steps should be taken to ensure the proper cleaning of the sampling equipment.

(1) Break down the sampler and lay the three components in a row.

(2) Place the strainers and weights in a plastic bucket.

(3) Set the glass composite jars and Teflon caps off to the side, to be cleaned separately from the samplers.

(4) Pour a small amount of diluted (1:128) O-Syl disinfectant and MICRO soap into each sampler component, the bucket containing the strainers and weights, and the composite jars.

(5) To clean the sampler components:

(a) Partially fill the sampler bases and cover with water.

(b) Use a brush to scrub the inside and outside of each sampling component. Using a small bottle brush, thoroughly scrub the inside of the intake tube and the float housing of the sampler head (these are critical areas since they come in contact with the sample).

(c) Rinse off the soap with fresh water.

(d) Stack each component so that it will dry quickly and thoroughly.

(e) Reassemble the sampler after the components are dry, and store it in the proper compartment of the sampling van. Leave the sampler lid loose so moisture won't be trapped.

(f) Clean the strainers and weights in the bucket. Empty the contents of the bucket and rinse the bucket, strainers, and weights. After they have dried, place them in the proper storage areas of the sampling van.

(g) Drain the wastewater tank of the sampling van into the sewer drain.

(h) Refill the fresh-water tank on the sampling van with potable water.

Sampler Bottle Cleaning and Preparation *(Example Procedure)*

(1) Fill each jar with O-Syl (same dilution as used in the sampler disinfection), MICRO soap, and fresh water.

(2) Thoroughly scrub the inside and outside of the jars until they are sparkling clean. Make sure that all oil and grease are removed.

(3) Rinse the jars with fresh water.

(4) Pour a small amount of 1:1 nitric acid into one jar, and securely place the proper Teflon cap on the jar. Swirl the nitric acid throughout the jar, remove the lid, and pour the nitric acid into the next jar. Repeat this procedure until all the bottles have been treated. Rinse bottles with water after the acid wash. **NOTE:** ***Wear safety glasses or a full-face shield to protect your eyes.***

(5) Place the jars in the drying oven. If the jars are to air dry, use Acetone to clean the bottles the same way as stated in (4) above. Let the jars and caps dry completely.

(6) Place the jars, with their caps on loosely, in their respective places in the sampling van.

Selection of Sampling Site
In order to ensure the collection of valid samples, a representative sampling site must be selected. For industrial sampling, the sites are designated in the permit.

Direct deposit

Industrial Users - Permitted/Non-permitted *(Example Procedure)*

The sampling points within an industry vary with each industry, depending on the nature of the process and location of pretreatment facilities. Therefore, exact locations must be identified on a case by case basis. However, the following general principles apply in all cases:

(1) A permanent sampling location(s) must be identified for use by the POTW and the IU.

All permitted industries are required to install a sampling vault. The location of the vault is designated by the enforcement inspector. The enforcement inspector responsible for an individual company or site is responsible for providing directions (maps) to the specific sampling points, as well as current copies of permits and the name of the contact person and phone number. This information needs to be kept current in the sampling file.

Locations of sampling points need to be compared to what is listed on the current permit. If sampling points that the POTW is using do not agree with permit location, do not sample and refer to Chief Inspector or Supervisor.

(2) The sampling location should be easily accessible and relatively free of safety hazards.

(3) For categorical industries, there should be, if possible, no discharge present other than that from the regulated process. If other wastestreams are combined with the regulated wastestream prior to the sampling location, the combined wastestream formula will need to be utilized. The sampling crew must be aware of lower limits to correctly show analysis on chain of custody.

(4) If the rate of industrial process discharge flow is needed (i.e., where mass limitations are applied), the sampling location will need to be located where the flow of the wastestream is known or can be measured or estimated and flow rates for the other wastestreams obtained.

(5) In instances where sampling must be performed in the sewer outside of the building, the IU must install a sampling vault in accordance with Code.

Sample Type and Analyses
Typical sample volumes are required for various analyses. In addition, the laboratory has developed standard volumes for routine analyses performed on industrial waste samples as follows:

(1) BOD/COD/TSS (1000-2000 ml, plastic)
(2) Heavy metals (500-2000 ml, plastic)
(3) Cyanide (2000 ml, plastic)
(4) Oil and grease (1000 ml, level-one glass)

Selection and Preparation of Sample Containers
The selection of a sample container is based on the parameter to be measured. The inspector should be familiar with the type of sampling containers and preservatives that are needed.

It is essential that the sample containers be made of chemically resistant material, and do not affect the concentrations of the pollutants to be measured. In addition, sample containers should have a closure (i.e., leak proof/resistant, Teflon lined) that protects the sample from contamination and should be properly labeled before leaving the sampling site.

Sample Preservation

Wastewater usually contains one or more unstable pollutants that require immediate analysis or preservation until an analysis can be made. Sample preservation is needed for composite samples, for example, which may be stored for as long as 24 hours prior to transferring them to the laboratory. Recommended preservatives and holding times that should be used for specific pollutants are presented in the front of this Chapter.

Chain of Custody

Documentation of all pertinent data concerning the collection, preservation and transportation of samples is critical to the overall success of the Wastewater Sampling Program. If sampling is performed for the Pretreatment program, any sampling data may be used as evidence in court proceedings against a noncompliant industrial user. In this case, documentation becomes critical. This form is a legal document and is of major importance in a court hearing.

Specific procedures with regard to chain of custody are outlined below:

(1) The sampling crew takes a sufficient supply of pre-numbered Industrial Waste Lab Reports, (custody forms) and sample containers into the field.

(2) The sampling crew fills in the sampling form at the time of sample collection, and returns the form to the lab along with the collected sample. Specific information to be completed on the form includes:

(a) CODE: The company ID number assigned by supervisor.

(b) SITE No.: The sampling point ID number assigned by supervisor.

(c) DATE SAMPLED: From - Date sampling began To - Date sample is pulled. If it is a grab sample, only the date the sample was taken will be entered with the other line crossed out.

(d) SUBMITTED BY: This will have a preprinted truck number. The sampling crew will write in their initials on the blank line which follows.

(e) LABEL: A letter is checked and the type of analysis to be performed. .

(f) PRESERVATIVE: The method of preservation used. See Table 8-5 to see which preservatives to use.

(g) TYPE SAMPLE: Check off whether flow proportional, timed composite, hand composite, or grab sample.

(h) TIME: The time frame needed for collection of the sample. A starting time for sample collection, an ending time, and a total time in hours and quarter hours is recorded, such as 23.25 hours. On a grab sample only, the end time, which is the time the sample was taken, will be entered and the other two lines will be crossed out.

(i) RELINQUISHED BY: This is the signature of person that relinquishes sample to lab personnel, or to any other person taking custody of the sample.

(j) DATE: Date sample is submitted to the laboratory or relinquished to another person.

(k) NOTES TO LAB: Includes any special notes to the lab, such as special analysis required of the sample, a letter code which is assigned to the entity being tested, the amount of flow if sample is flow proportional, grab sample pH and temperature, and/or actual sample temperature.

(l) FIELD TEST: Results of any field tests including sample pH, hexavalent chromium, dissolved sulfides, copper, and residual chlorine. See Table 8-5 to see which field tests need to be performed on the sample.

(m) RESULTS: The appropriate box(es) need to be checked to correspond to the label designation chosen above.

(3) When the sampling is completed at a site, the sampling crew labels the bottles with the label letter designation. The samples are sealed with chain of custody seals and placed in an ice chest for transportation to the lab.

(4) The sampling crew submits the samples and the chain of custody form to the laboratory.

(5) The laboratory logs the samples and assigns a Lab Reference Number to the sample. The sample is tracked by this number.

(6) Laboratory personnel sign and date the form, and return it to the sampling crew who makes two copies of the form. One copy is for the sampling crew files and the other is for data entry. The original form is returned to the laboratory. It is also important to note that the sampling vehicle should be kept locked at all times when the sampling crew is not in the vehicle, or in full view of the vehicle.

Quality Assurance/Quality Control (*example*)
Quality Assurance/Quality Control **(QA/QC)** measures taken by the sampling crew include equipment blanks, trip blanks, split samples and duplicate samples. Equipment blanks and trip blanks are routine QA/QC measures.

Split samples are taken for Local Limits sampling and when requested by an industry. Split samples requested by an industry are analyzed by their lab at their expense. Duplicate samples are run when requested by a Project Leader.

The laboratory prepares all trip blanks/travel blanks used by the sampling crews. This is performed in the laboratory rather than in the field in order to assure that there is no field contamination in the blanks.

Any contamination detected in the blanks would result from field exposure which could in turn affect collected samples.

In this photograph, an operator shows a group of Cub Scouts the quality of final effluent. A Pretreatment Inspector's work is reflected by the wastewater treatment system and the collection's system lack of problems. Most Wastewater Operators do not realize the benefits of having Pretreatment Inspectors protecting wastewater from illegal industrial and commercial discharges.

QA/QC Field Procedures for Plant Sampling *(Example)*

Duplicate Sampling Procedure
The purpose of Duplicate Samples is to check the laboratory's ability to reproduce analytical results. Duplicate Samples are to be collected using these steps:

1. Determine amount of sample needed. If a flow proportion sample is required, then base the amount of sample needed on the current flow reading. If a flow-proportion sample is not required, then use the predetermined amount for the sampling site.
2. Collect sample using a grab type sampler or a sampling head.
3. Measure the amount determined in Step 1 using a graduated cylinder or other accurate measuring device.
4. Pour measured sample into sample container that is not marked as the Duplicate Sample.
5. Measure same amount as in Step 1.
6. Pour second measured quantity into sample container marked for Duplicate Sample.
7. Process both samples using standard procedures and submit both samples to laboratory.

Split Sampling Procedure
The purpose of Split Samples is to check analytical procedures by having the samples analyzed by two different laboratories. Split Samples are to be collected using these steps:

1. Determine amount of sample needed. If a flow proportion sample is required, then base the amount of sample needed on the current flow reading. If a flow-proportion sample is not required, then use the predetermined amount for the sampling site.
2. Collect sample using a grab type sampler or a sampling head.
3. Measure the amount determined in Step 1 using a graduated cylinder or other accurate measuring device.
4. Pour measured sample into sample container that is not marked as the Split Sample.
5. Measure same amount as in Step 1.
6. Pour second measured quantity into sample container marked for Split Sample.
7. Process both samples using standard procedures and submit both samples to the laboratory. The laboratory will be responsible for submitting the samples to the outside laboratory that will be analyzing the Split Sample.

Trip Blank Procedure
The purpose of Trip Blanks is to determine if the sample bottles have been adequately cleaned, and if sample contamination occurs between the time sample bottles leave the laboratory to the time that samples are returned to the lab.

Trip blanks are prepared by the laboratory using bottles supplied by the sampler. They are picked up by the person who begins the sampling day. Trip blanks are placed in the cooler which contains the other samples, and remain there until the samples are turned into the laboratory.

Field Equipment Blank Procedure *(Example)*

The purpose of Field Equipment Blanks is to test the procedure for cleaning the sample measuring container to determine if cross contamination between sample sites has occurred. These Blanks are needed only at sites where flow-proportion samples are taken. Follow these steps when collecting a Field Equipment Blank:

1. Collect Field Equipment Blank **AFTER** collecting a sample and **BEFORE** moving to the next sampling location.
2. Open a sealed bottle of High Purity Water.
3. After collecting a sample, triple rinse the sample measuring container, usually a graduated cylinder, using High Purity water.
4. Pour the High Purity Water into the sample measuring container that was just rinsed.
5. Pour the High Purity water from sample measuring device into sample bottles labeled for the Field Equipment Blanks.
6. Repeat Steps 3 through 5 until all Field Equipment Blank sample bottles have been filled.
7. Process samples using standard procedures and submit to laboratory.

An equipment blank is high purity water which has been collected in a composite sample bottle or a series of discrete bottles from an automatic sampler. Equipment blanks are used to evaluate the reliability of composite samples collected in the field. The data produced from the equipment blank indicates the performance of the sample collection system, which involves the cleaning of sampling equipment, and accessories, preservation techniques, and handling of samples. The objective is to demonstrate that the samples are not contaminated by inadequate cleaning of equipment, contaminated preservation additives or sample collection techniques, and to provide documented records on Quality Assurance Practices.

Procedures to be followed in collecting the equipment blanks are outlined below. (Also see QA/QC check list, example).

(1) The sampler is to be assembled completely in the manner determined by the parameters the crew will be sampling (i.e. if sampling for organics, Teflon suction tubing must be used at that site). The composite jar inside the sampler must always be rinsed out thoroughly with high purity water.

(2) Program the sampler to collect the proper amount of high purity water that is representative of the sample parameters that will be collected at that site. Grab samples are excluded. Pump high purity water through the strainer and intake tubing prior to filling the sampler bottle. Then, place the strainer into as many fresh, uncontaminated bottles of high purity water as needed to collect the necessary volume of sample.

(3) If the sampler is set up in the discrete mode, the crew must then transfer the collected samples into the field composite bottle and shake to mix thoroughly.

(4) Transfer the sample from the field composite bottle into its respective lab sample bottles. Test and preserve the samples as appropriate for the parameters being analyzed.

(5) Follow the chain of custody procedures outlined in SOP for turning the samples in to the laboratory. All paperwork must be completed at this time, and all bottles must be marked accordingly. Custody seals must be used. The crew must note the sampling activity in a logbook that is kept specifically for documenting preparation of equipment blanks and/or any other QA activities.

Sampling Techniques *(Example)*

General Guidelines
In general, the following guidelines should be observed in conducting sampling activities:

(1) Samples being collected must be representative of the wastestream being tested.

(2) Samples shall be collected in uncontaminated containers and preserved properly.

(3) Samples should be of sufficient volume for the required analyses.

(4) Samples should be stored in a manner which does not alter the properties of the sample prior to chain of custody transfer.

(5) Samples should be properly and completely identified by marking them with the proper information.

(6) Sample lines should be as short as possible and the smallest practical diameter to facilitate purging, reduce lag time, and give adequate consideration to maximum transport velocity. Also, they should have sufficient strength to prevent structural failure.

(7) Sample lines should be pitched downward at least 10 percent to prevent settling or separation of solids contained by the sample.

(8) Samples should be delivered as quickly as possible to the laboratory.

Specific Techniques
Sampling techniques in addition to the above general guidelines must also recognize differences in sampling methodology, preservation, and analytical methods.

The following sections specify techniques that differ by pollutant group and discuss such factors as sampling methodology (e.g., composite, grab, etc.), type of container, preservation and holding time.

Sampling Techniques for Volatile Organics *(Example)*
Volatile organics are analyzed in accordance with EPA methods 601, 602, 603 and 624.

Due to the volatility of these compounds, only grab samples can be taken. If a composite sample is needed, individual grab samples must be collected and composited in the laboratory prior to analysis.

The procedures that must be followed in taking these samples are outlined below.

NOTE: Gloves, clothing, face, and eye protection must be worn when handling volatile organics. In addition, the sampling crew must thoroughly clean those parts of the body that have been exposed to these materials.

(1) For each sampling date, the lab will also provide two additional bottles to be used as a backup in case of breakage. These sampling vials are only good for one week. If any are unused, they must be returned to the lab for disposal.

(2) The lab will provide one sample trip blank per sampling date. This bottle is to be kept on ice until the samples are submitted to the lab. At least one day prior to sampling, go to the lab and request the sample bottles (40 ml vials) for the specific sampling site, as indicated by the sampling plan. The laboratory will arrange to have the appropriate number of sample bottles prepared, based on the number of analyses to be performed. The sampling crew should make sure that all bottles are provided for these samples by the lab technicians.

(3) Collect the sample in a clean glass beaker. Test for chlorine with the Hach test kit. If there is any chlorine residual, neutralize the chlorine with sodium thiosulfate ($Na_2S_2O_3$) and retest for chlorine. Repeat until there is no chlorine residual. Make notes on chain of custody sheet if extra amounts of sodium thiosulfate are required for neutralization.

(4) Remove the vials from the ice. There will be two empty vials for the 601 sample and two vials with HCl for the 602. The HCl will already have been measured into the vials by the lab personnel.

(5) Fill the vial to just overflowing in such a manner that no air bubbles pass through the sample as the vial is being filled. This is accomplished by pouring the sample from the beaker into the vial along the side of the vial to minimize the possibility of entrapping air in the sample. Do not rinse out or overfill the vials, this will wash out the preservative in the vial.

(6) Seal the vial so that no air bubbles are entrapped in it. Remember to put the Teflon side of the cap facing down onto the vial.

(7) To be sure there are no air bubbles, turn the vial upside down and tap it against the palm of the hand. Check to see if there are air bubbles along the sides or bottom of the vial. If there are bubbles, unseal the vial, top off the vial, and reseal. Check the vial again for the presence of bubbles.

(8) All samples must be maintained at 4°C from the time of collection until the time of extraction. Custody seals must be placed on all samples, and all paper work must be filled out properly.

(9) Return the sample bottles and QA/QC bottles to the laboratory the same day the sample is collected.

Acid/Base/Neutral Extractable Organics and Pesticides

Acid extractable organics are analyzed in accordance with EPA methods 604 and 625. Base/neutral extractable organics are analyzed in accordance with EPA method 625, or individual methods for various groups of compounds including EPA methods 605, 606, 607, 609, 611, and 612. Pesticides are analyzed in accordance with EPA method 608.

The procedures that must be followed in taking these samples are outlined below.

(1) Samples must be collected in certified clean one-gallon amber glass bottles with Teflon lids.

(2) No travel blanks or QA/QC bottles are required with the samples.

(3) Grab samples must be collected in amber glass bottles. They do not have to be completely filled, but must be a minimum of 1/3 to 1/2 full. Bottles should not be prewashed with samples prior to filling.

(4) For composite sampling, glass composite bottles must be used and precleaned. Teflon tubing must be used for the suction piping. The pump tubing must be medium grade silicone rubber.

(5) The composite bottle in the sampler must be kept refrigerated (putting ice in the sampler) at 4°C. If amber glass is not used (i.e. 2 1/2-gallon clear composite sampler bottle), the sample must be protected from the light during collection and compositing. The compositing must be done in the field (i.e. when discrete sampling has been used).

(6) All samples must be iced at 4°C from the time of collection until extraction.

(7) The sample should be checked for the presence of chlorine using field test kits that provide results in accordance with EPA methods 330.4 and 330.5. If chlorine is determined to be present, 80 mg of sodium thiosulfate should be added to each bottle. The sample must be retested for chlorine. This procedure must be repeated until there is no residual of chlorine shown. The amount of sodium thiosulfate added must be noted on the chain of custody if in excess of 80 mg.

(8) All necessary paperwork must be completed at sampling site. All bottles must be properly labeled, and have custody seals.

Sampling Techniques for Heavy Metals *(Example)*

(1) Generally, all metal samples collected are to be composite samples, i.e., flow/composite, time/composite, or hand composite.

(2) For composite sampling, place the lid on the bottle and agitate the bottle to completely mix the composite sample.

(3) Transfer the required amount from the composite container to either a 500 ml or 2000 ml clean plastic bottle. Check the pH of the sample.

Note: For inductively coupled plasma (ICP) metal analysis, a 500 ml clean plastic bottle is required. For extra metals or metals by furnace, a 2000 ml clean plastic bottle is required.

(4) Add nitric acid (1:1 solution) to the sample to reduce the pH to below 2.0. Usually, 2 ml/500 ml is sufficient. Recheck the pH to be sure it is below 2.0. Make a note on the lab sheet if more than two ml of acid is required to bring the pH below 2.0.

(5) Label the sample bottle with the corresponding IW number and proper analysis code letter. Attach the custody seal to the sample, then store in the ice chest until transferred to the laboratory. Fill out the IW lab sheet with all the pertinent information, being careful to include all required parameters and the type of analysis required, e.g., ICP/furnace.

(6) When a grab sample is necessary, rinse out the receiving sample bottle with an aliquot of the sample stream at least three times. Then fill the sample bottle and proceed with steps two through four described above.

(7) When a split sample is requested (i.e., one for the samplers and one for the user), the composite sample is prepared as described in item one. Providing there is sufficient sample, a portion is transferred into the bottle provided by the user.

(8) If more than one site is sampled per day, a clean composite container (i.e., two and one half-gallon glass jar), must be used at each site.

(9) If a discrete sampler is being used, at the time of collection combine all the samples that have been collected into a single clean composite bottle. Then follow the preceding steps one through four, and refer to step six if a split is requested.

Cyanide *(Example)*

To assure that the sample can be analyzed for cyanide, no chlorine can be present in the sample. Procedures for taking cyanide samples are as follows:

(1) This sample is normally a grab sample. The cyanide sample is a composite sample when collected as part of Priority Pollutants or Plant Sampling at the waste treatment plants.

(a) In the sampling file, check the industries' wastewater discharge permit and locate all cyanide (**CN**) sampling sites. If the sampling sites are located in a confined space, follow Confined Space procedures before collecting the sample or samples.

(b) Collect 2000 ml (maximum), 1000 ml (minimum), of CN sample into a type C plastic bottle.

NOTE: 2000 ml is the standard, but for batch dischargers 1000 ml is adequate.

(c) Test the cyanide sample for pH and temperature with the pH meter. Record the results on the custody sheet (Industrial Waste (IW) lab sheet).

(d) Test for chlorine with a **Hach Total Chlorine Test Kit** (the instructions are located in the kit)

(e) If chlorine is present in the CN sample, neutralize it with Ascorbic Acid ($C_6H_8O_6$). For ascorbic acid neutralization, add $C_6H_8O_6$, a few crystals at a time, until five mls of sample in the test tube produces no color. Then add an additional 0.06 g of $C_6H_8O_6$ for each liter of sample volume.

(f) Once all Cl_2 has been neutralized, preserve the sample with Sodium Hydroxide (NaOH) and raise the pH to >12. Verify the >12 pH with a pH meter or pH test strips.

(g) Mark on the side of the CN sample bottle the IW Lab sheet number (using a water proof marker), and place a corresponding custody seal across the sample bottle tightened cap. Place a Cyanide label on the bottle if cyanide is suspected of being present in the sample.

(h) Store the CN sample in the ice at 4°C and transport it to the laboratory.

Total Sulfides *(Example)*

(1) The Total Sulfide sample is collected as a grab sample only. Use a clean 500 ml plastic bottle to collect the sample. This sample may be pumped into the sample container or collected directly from the discharge side of the sampling device.

(2) Preserve the sample with 1 ml of 2N Zinc Acetate ($C_4H_6O_4Zn$) and then add Sodium Hydroxide (NaOH) to raise the pH > 9.

(3) Label and seal the sample with a custody seal. Cool to 4°C.

Oil and Grease/TPH *(Example)*

Oil and grease samples are collected as two separate samples:

METHOD 413.1 (Oil and Grease). Non-volatile hydrocarbons: vegetable oils, animal fats, waxes, soaps, and related matters.

METHOD 418.1 (TPH). Extractable petroleum hydrocarbons: light fuels and mineral oils.

(1) This is a grab sample only. The bottle used to take the sample must be the same bottle given to the laboratory for analysis. Do not pump or transfer the wastewater sample into the bottle. Obtain a clean 1000 ml glass bottle, do not use a pre-preserved bottle because you will lose the preservative when collecting the sample.

(2) Collect the sample by placing the bottle neck down (up-side down) into the effluent stream below the surface. This should be as close to the discharge pipe or point as physically possible. Turn the bottle, allowing the bottle to fill, while keeping the bottle below the surface. Remove the filled bottle and cap it. Never skim the surface of the effluent stream.

(3) Preserve the sample using five ml of sulfuric acid (H_2SO_4) for method 413.1 or hydrochloric acid (HCL) for method 418.1 (6:1 Ratio) to a pH of less than two. Reference 42 of methods 418.1 and 41 of methods 413.1. When more than five ml of HCL is used to lower the pH to less than two, make note of how much additional acid is used, and record this on the lab sheet. Also indicate required analyses method on lab sheet.

(4) After making sure the sample is well mixed and preserved, seal and attach the proper identification (custody) label to the bottle. Then attach a custody seal across the lid. Store all samples at 4°C.

(5) Under no circumstances are Inspectors to collect an oil and grease sample or any other grab sample for IUs.

(6) All samples must be taken from a good representative flow. If there is any question as to whether there is sufficient flow for a representative sample, do not collect any sample. Make the necessary notes in the file report as to why no sample was obtained.

BOD/COD/SS *(Example)*

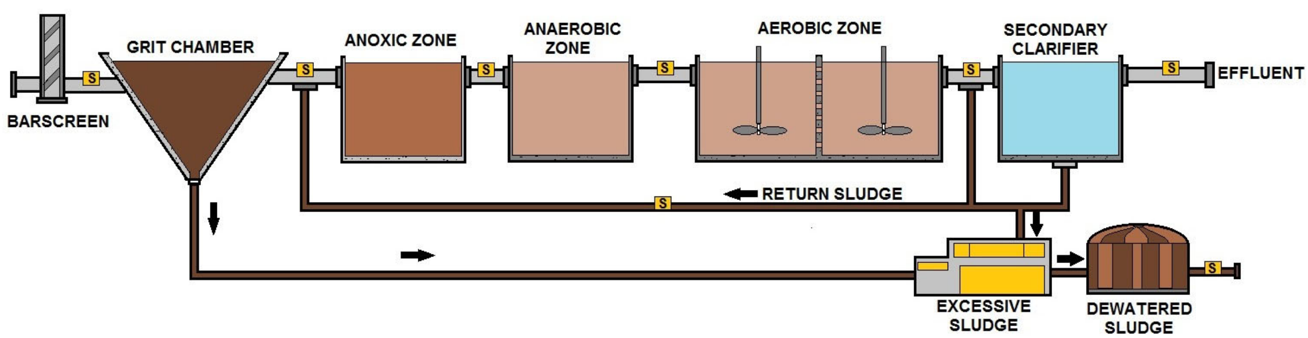
(1) 24-hour composite sampling is always used for this test. Agitate the bottle to completely mix the composite sample. Do not allow the solids to settle out before you pour off the sample.

(2) When more than one sample is being taken from a composite bottle, the BOD/COD/SS is taken first. The lab needs 1000 ml if the sample is cloudy or has solids. If the sample is clear, you must collect 2000 ml. Transfer the appropriate volume to the sample bottle.

(3) Take the pH/temperature of the sample with either pH paper and a thermometer, or the pH meter carried on the sampling trucks.

(4) Label the sample bottle and place a custody seal over the lid. Store on ice at 4°C.

(5) Should split samples be requested, they are given when it is sure there is enough sample for POTW's requirements. Users must provide their own sample containers and allow POTW's staff to pour off samples.



BASIC WASTEWATER TREATMENT PLANT AND SAMPLING POINTS

Virus Sampling *(Example)*

Viruses are microbiological organisms which can cause infectious diseases. Wastewater recharge and sewage disposal into the environment may contribute to the occurrence of viruses in surface water and groundwater. Viruses are the most mobile and infectious of the waterborne pathogens. Large volumes of water must be filtered to detect viruses. This involves passing the water samples through a cartridge filter by use of a gasoline driven pump.

(1) **Equipment Needed**

Most of the equipment required for virus sampling is available on the sampling trucks. However, some equipment is virus sampling specific. The needed equipment is as follows:

(a) Gasoline/oil powered water pump
(b) Hoses - intake (supplied with pump) and discharge (garden type, with female connectors at both ends)
(c) Two 55-gallon plastic containers
(d) Filter apparatus
(e) Cartridge filters
(f) Sodium thiosulfate (two 500 gram bottles/site)
(g) Gasoline can with gas/oil mixture
(h) Hach total chlorine test kit
(i) Large plastic Zip-lock bags (supplied with cartridges)
(j) Chain of custody sheets
(k) Thermometer
(l) Water-proof marker
(m) Latex gloves
(n) Liquid bleach
(o) Cooler with blue ice
(p) pH meter

(2) **Sampling Procedure**

Check the pump for gas/oil prior to starting **(do not fill while it is running).** Make sure the gas/oil mixture is correct by checking the mixing instructions on the side of the two-cycle pump oil can. Latex gloves should be worn for protection, and to prevent contamination of the filters.

Connect the hoses and filter housing (with no filter) to the pump, and run the effluent through it for one to two minutes to flush the system. Next, pump effluent into the two 55-gallon drums and rinse them out. (Note: If disinfection was not possible after the last sampling, then 50-100 gallons of effluent should be pumped through the entire equipment set up prior to placing the filter in the housing.)

Pump effluent almost to the top (just above the handles) of both containers. While the drums are filling, check the water in the drums for chlorine using a Hach test kit and record the results and the temperature on the custody sheet. If chlorine is present and needs to be eliminated, add 500 grams of sodium thiosulfate to each container to eliminate it. After visual observation has determined that all the sodium thiosulfate has dissolved, retest to make sure there is a <0.1 ppm chlorine residual. If chlorine was removed, take the hose from the channel, allow it to drain, and re-prime the pump with the de-chlorinated water.

Pump this water through the system to flush it, and adjust the flow to fill a one-gallon jug in about 15-20 seconds. Don't waste too much water, as the flow can be adjusted after the filter is inserted. Install the filter into the blue holder, being very careful not to touch it with your hands (wear clean latex gloves). There are two black washers that go with the filter, one on the bottom and the other on the top. Make sure these are aligned with the filter housing to prevent leaking. Screw the holder and filter onto the apparatus.

Refuel the pump, restart it, and adjust the water flow so that it is close to 15-20 seconds per gallon. Make sure the housing doesn't leak. Try to keep this amount of flow, since too great a flow will cause pass-through in the filter. Pump the water from both containers until they are empty. Stop the pump, remove the filter (wear clean latex gloves), and place it in its original zip-lock bag. The washers do not need to go with the filter, but if they fall into the bag it is better to leave them than take the chance of contaminating the filter trying to remove them. Fill in the information area on the zip-lock bag with a marker, indicating the plant being sampled and the date, and put it in the cooler with the blue ice provided. The blue ice keeps the temperature at 4°C to prevent significant die-off of the viruses.

While at the site, or later at the plant, mix a half-gallon of bleach to 10 gallons of clean water. Pump it through the flow system and the containers. Rinse everything with fresh water and drain it so it is ready for the next time. Let the pump cool before storing it. Store the gas/oil mixture in the warehouse flammable storage cabinet.

Parasitology Sampling
Parasitology sampling utilizes the same equipment and techniques as in the virus sampling described above. However, a different type of filter, which is provided by the Lab, is used.

Chapter 11 Wastewater Pollution Control Exercise

Scenario: The EPA Director was called to see the President about her outstanding efforts in developing your public awareness program and complemented her on the text. She was so grateful for your efforts that she had to confess that you had written this material.

The President dispatched Air Force One to pick you up and fly you back to Washington.

You do not have a clue what is going on. The Secret Service searches you and briefs you about the President and soon you are introduced to him and his Cabinet.

He is pleased to meet you and has informed you that he needs your assistance to develop a P2 public education campaign that will educate of the possible environmental dangers. Something that could be published and posted on bulletin boards across the nation. Maybe two to four pages with contact information.

Assignment: The President requests a short summary on P2 program that you feel the most comfortable about. He needs information about, air, water, wastewater, pretreatment, mail delivery, bloodborne pathogens, backflow, stormwater, interceptors, wastewater, germ warfare or any other P2 that you could think of.

He gives you the title of Special Deputy to the President and full presidential authority.

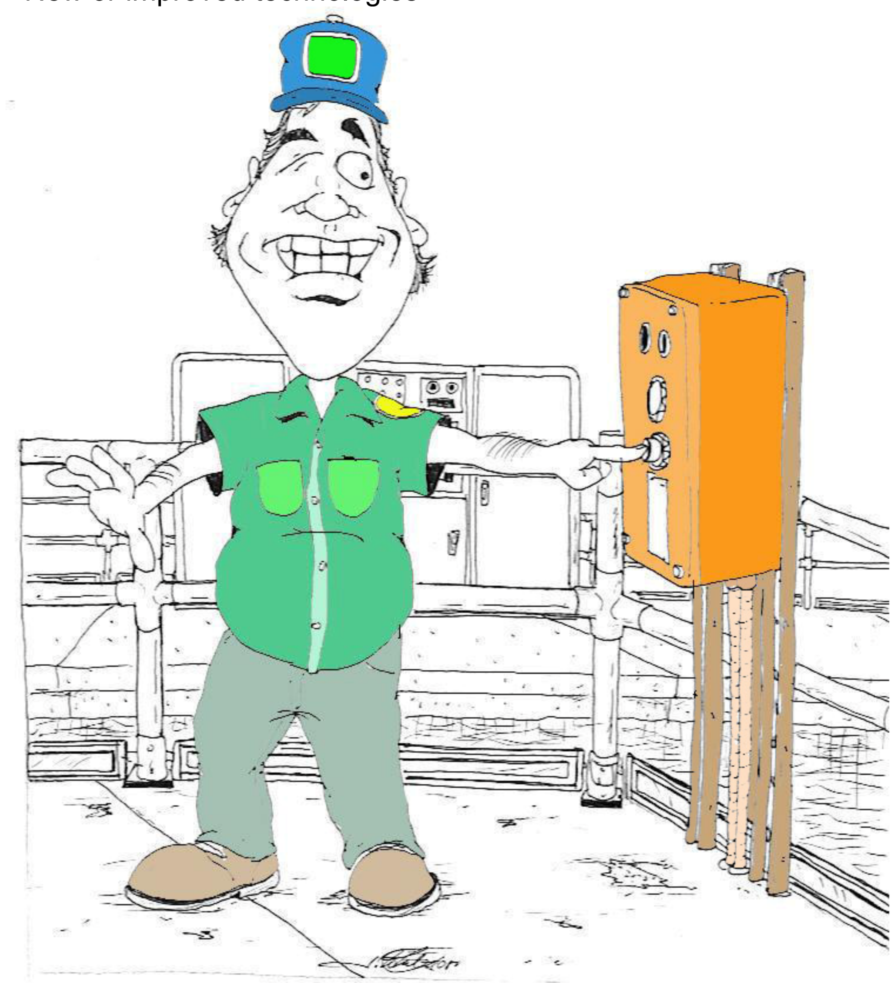
Chapter 12 Water and Energy Conservation

Water Conservation

More efficient water use begins with individuals, in the home and place of work. Heating and pumping water requires chemicals and energy. When we waste less water, we conserve fuel, and reduce the pollution generated by burning fuel and treating water with chemicals. Taking these and other steps, and encouraging others to do so, makes good economic as well as environmental sense.

Conservation activities are generally categorized as either long-term or emergency, and have traditionally been arranged in six general groups:

1. Education (outreach programs, awareness campaign programs)
2. Leak detection and repair
3. Metering
4. Pricing
5. Regulation
6. New or improved technologies



Water Conservation Plumbing Requirements

MAXIMUM ALLOWABLE WATER USAGE FOR PLUMBING FIXTURES		
Fixture Type	**Average Water Consumption**	**Effective Date**
Water Closets[1] low profile 1-piece gravity flush type or handicap accessible floor mount, gravity flush closets (min. 17" height)	1.6 gallons per flush[4]	January 1, 1992
Water Closets[1] flushometer tank of close-coupled 2-piece gravity flush type	1.6 gallons per flush[4]	January 1, 1991
Water Closets flushometer valve, floor mount	3.5 gallons per flush 2.5 gallons per flush	July 1, 1990 January 1, 1992
Water Closets - wall mount	3.5 gallons per flush	July 1, 1990
Urinals	1.5 gallons per flush 1.0 gallons per flush	July 1, 1990 January 1, 1992
Maximum Flow Rates (gallons per minute = gpm)		
Residential sink and lavatory faucets	3.0 gpm	July 1, 1990
Public Lavatory Faucets (self- closing/metering type (See Section 913 (d))	Self-closing 0.5 gpm, Metering 0.25 gallons per cycle	July 1, 1990
Public Lavatory Faucets (where self- closing/metering is not required)	0.5 gpm	July 1, 1990
Showerheads [2,3,5]	3.0 gpm	July 1, 1990
Other Fixtures	Not regulated to water usage	

NOTES:

1. Maximum water usage for all water closets prior to the listed effective date is 4.0 gallons per flush.
2. Showerhead flow rate as tested at 80 psi in accordance with American National Standard A112.18.1
3. **Exception**: Special purpose safety showers are exempted from minimum flow rate limitations.
4. Average water consumption for low consumption water closets over a range of test pressures shall not exceed 1.6 gpf. The consumption shall not exceed 2.0 gpf at any one test pressure. Conforms to American National Standards A112.19.6.
5. Federal Energy Policy Act supersedes this standard with requirement of 2.5 gpm., creating a de facto standard of 2.5 gpm..

Water Conservation Methods for the Home

In the Bathroom

- Install a toilet dam or plastic bottle in your toilet tank.
- Install a water-efficient showerhead (2.5 gallons or less per minute).
- Take short showers and draw less water for baths.
- When you buy a new toilet, purchase a low flow model (1.6 gallons or less per flush).
- Check your toilet for "silent" leaks by placing a little food coloring in the tank and seeing if it leaks into the bowl.
- Turn off water while brushing teeth and shaving.

In the Kitchen or Laundry

- Compost your food scraps rather than using a
- Keep a gallon of drinking water in the refriger
cold water.
- Run your washing machine with a full load c
instead of hot, rinse with cold water instead of warm. Wash with cold water when you can. (When possible) hang your wash out to dry.

Outdoors

- Install a drip-irrigation water system for valuable plants.
- Use drought-tolerant plants and grasses for landscaping and reduce grass-covered areas.
- Cut your grass at least three inches high to shade the roots, making it more drought tolerant; keep your mower sharp for the healthiest grass.
- Try to water only in the evening or very early morning to minimize evaporation.
- If you use porous pavement (gravel is a good example) instead of asphalt for driveways and walkways, the rain can recharge groundwater supplies instead of running off and contributing to erosion.
- Use a broom instead of a hose to clean off your driveway or sidewalk.
- Wash your car less often or wash it at a car wash where they clean and recycle the water. If you do wash your car at home, use a bucket of soapy water rather than running the hose. Keep a spring-loaded nozzle on the hose.

Water Provider's Conservation Plan and Public Awareness Campaigns

Example

Following a review of hydrogeologic conditions and existing water use trends indicates that the Town of Fontana water demand will exceed average recharge supplies by the year 2005. Complicating the water demand/water supply balance are the peak day demands. Current Town of Fontana production capacities may not meet projected peak day demands in the near future if anticipated production rates are not realized. Since the peak day demand is a result of increased tourism, commercial use, and outdoor irrigation, a pro-active water conservation program needs to be implemented to help offset the peak day demand. An implemented water conservation program would also extend the available resources by reducing the overall water demand of the Town.

A typical pro-active water conservation program as implemented in numerous communities throughout the state, have included at a minimum, the following;

1. Educate the public, tourists and public officials of the importance of conserving the local water resources.
2. Re-use all effluent directly or recharge to off-set over-pumping of our aquifers.
3. Adjust water rates to discourage waste and to encourage conservation.
4. Encourage use of native vegetation landscaping, and require future developments to incorporate the use of native vegetation and low-flow water saving fixtures.
5. Set consumption goals for all users during periods of below normal precipitation and peak demands. For example, by April of every year it will be known, based on the amount of winter precipitation, if sufficient recharge has occurred.

If the winter precipitation is below normal, then certain water conservation restrictions should be enforced to reduce anticipated summer demands. The most effective conservation plan to reduce overall water consumption is to increase water rates commensurate with the cost of water to the Town, and the cost of developing additional supplies for the future and as a hedge against future droughts. Water conservation should be implemented on a year-round basis. Based on current uses, additional emphasis should be placed on reducing outdoor irrigation and summer commercial uses.

Customer-Centered Plan Examples

The 2000 Fontana Water Conservation Plan builds on the premise that in order to insure adequate water resources in the future, that customers[1] must be active partners in water conservation. Stated in another way, the 2000 plan involves water users as involved customers participating in an effort to be water efficient, not merely as utility customers receiving and paying for the delivery of water.

Most traditional municipal planning efforts can be described succinctly as expert-driven customer service-oriented plans. Staff and consultants identify problems and search for potential solutions, usually provided by expert opinion and research. Customer participation is sometimes encouraged in identifying problems and in identifying potential solutions, but most plan development is done by those with expertise in the subject.

After possible solutions are developed, costs and benefits are calculated, and a tentative plan is drawn, public participation may again be sought through a public hearing process to ascertain if the plan has broad support or if it needs improvement.

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[1] "Customer" as used in this context means a member of a community coalesced around common needs and wants, pursuing common goals in a pluralistic democratic society. Customer service, as used in this document, refers to quality attention that Town of Payson strives for each customer.

Fontana strives to deliver municipal services and products in a manner similar to the private business sector. Such customer service approaches require that government emulate the business model of provider and buyer.

For many municipal services, this emulation of business is appropriate. For the Fontana Water Department, such a model supports a conventional business approach to the delivery, billing, and payment for water service. The Town Council sets the rates and customers are billed based on their use of the service. The Town seeks to deliver water as efficiently as possible, and recover the costs of doing so in a businesslike manner.

This customer service model has not worked well for water conservation. There are several probable reasons for this. As customers, water users focus on their own immediate desires and how those can be satisfied.

If water is seen as a shared resource, it is only rational for water users to want to maximize their share of the resource, particularly when the cost of doing so is relatively minor compared to other commodities and resources in the environment. Providing for the future is implicitly transferred to the water provider and the customer eschews any responsibility.

Applying a customer service model to water conservation assumes that customers, as rational persons, will strive to save water because it saves them money by reducing their billable water use. For single-family water users, the direct savings in reduced water use charges are minor in comparison to the effort required to save water.

With a significant portion of the customer's water bill devoted to fixed service charges, the discretionary part of that bill -- water use -- is relatively small and cannot readily be reduced beyond a few dollars per month. Appeals to saving money by saving water ring hollow to many customers.

At its core, conservation constitutes an action directly at odds with the business of selling water -- the utility company asks the customer to use less of the product, thereby reducing revenues. Customers are skeptical, assuming that a reduction in use will bring about an increase in price to offset lower revenues. With rising costs for obtaining and treating water, this assumption would appear to be true, at least in the short run.

For these users, there is an economic detachment or disconnection between water consumption and the value of the water used (or wasted.) In common-metered multifamily housing and in the work setting, the end user of water does not receive a bill for their own use. For those who do pay the bill, water is just another cost center, and not usually a significant component of overhead costs. Water conservation does not offer these customers a substantial, direct, immediate, and visible economic benefit.

For these reasons, the 2000 plan is based on a customer service model, not an economic customer service model. It focuses on what Fontana residents have said they want to see done to save water and what, as customers, they indicate they are willing to do to help achieve these savings. The 2000 Water Conservation Plan does not view Town of Fontana water users as customers who purchase a commodity or a service, but rather as long-term partners with the Water Department in pursuing a sustainable water future, while minimizing difficulties and hardships in times of short supply.

Customer service focuses on the long-term service responsibility to the community, and encourages a partnership between water provider and the water service customer, both active and involved, jointly responsible for defining a water future.

It is a two-way street that promotes reciprocal responsiveness and responsibility by customers who take pride in their commitment to their community, and the Town willing to support these efforts.

CONSERVATION OPTIONS (*Program Example*)

The evaluation of options that preceded the 2000 Water Conservation Plan identified and assessed a wide universe of potential water conservation measures. Programs and measures which appeared to be feasible and cost effective were included in that plan, and many have formed the operational basis for budget requests, and staff and contractor activity. Measures which proved to be less productive or more expensive (and therefore less cost beneficial) than original estimates were discarded or postponed. Some were implemented later in a modified form or in partnership with other agencies, ones with common social or environmental goals, to share the financial burden.

In the 2000 plan, no additional attempts have been made at empirical evaluation of potential conservation savings. The 1997 evaluations have been used and, where actual implementation experience has shown them to be inaccurate, staff has made adjustments. Many of these program elements will be continued, to the extent they are congruent with the expressed wishes of Fontana customers, and are cost effective for the Town.

The desires of the customers of Fontana, direct and indirect customers, residents, and businesses have formed the basis for program planning and advised the selection of options.

DETERMINING CUSTOMER PREFERENCES

To assess customer interest in water conservation, and to determine what activities Fontana customers would support (and participate in) to achieve a sustainable water future, the Water Department conducted research in several different ways.

The Town Council has had several meetings with business owners, government officials, environmental consultants, educational, and special interest leaders in the greater Fontana area and water customer service surveys were taken throughout the Town.

Issues about which the Department wished to assess customer attitudes included:

- the perceived importance of water conservation;
- personal knowledge of water conservation techniques;
- knowledge of local sources of water supply;
- personal involvement in water conservation;
- perceived effectiveness of selected water conservation techniques;
- attitudes about water conservation;
- factors which could motivate conscientious use of water.
- Fontana’s growth rate and development strategy.

Generally, both customers and community leaders revealed concern about water conservation, but did not place it at the same level as other Town concerns such as crime, traffic, and growth. Customers placed greater importance on conservation and had a much bleaker view of the Town's water future than did community leaders.

Both groups said they believed the best and most proactive step to conserve water is rate increases. Both groups overwhelmingly advocated water conservation being taught in schools as well as water conservation surveys of existing facilities.

Pricing for Water Conservation(*Program Example*)

The most effective tool in managing water consumption is water pricing. By increasing the unit cost of water, demand is reduced. Customers in Fontana follow national patterns in reducing water use in response to real increases in the price of water; i.e. increases above inflation. For indoor use, a ten percent increase in price will bring about only a one percent drop in use. Outdoor use is more responsive to pricing pressure, with demand dropping an average three to five percent as a result of a price increase of ten percent.[2]

A subsequent study of this pricing structure showed: (1) increasing blocks did not show a measurable impact on *total* water use, nor did they contribute to reduction in peak season demand for water; (2) calculation of revenue forecasts were extremely complicated; (3) some large users paid less per unit on an annual average than many small users; and, (4) customers frequently had difficulty understanding the rate structure.

After three years of study by a customer's committee, Fontana water rates were again restructured in 1999 to promote additional conservation as well as to simplify the rate structure and make it more equitable to all customers, while maintaining the required "revenue neutral" income stream (where revenue received closely matches expenditures incurred during the same time period.)

Education Outreach Example

Water Conservation Office developed and introduced an elementary education program to Fontana schools utilizing a classroom or assembly-style program for kindergarten through twelfth grade students. The program will be adaptable to changing conditions over the next 10 years.

An interactive multimedia computer presentation is being extensively used in assembly programs to educate students about the importance of conserving water. The education program included a curriculum for classroom use. In future years, as many as 5,000 children are predicted to participate.

In the fall of 2016, the Water Department implemented the Water Conservation Outreach Program. This program encourages the development and use of media and materials to teach water conservation and pollution prevention across the various businesses throughout the Town. This is also a free service.

Residential Water Use (*Program Example*)

Residential water use represents approximately 80 percent of Fontana water use. Much of the water conservation public information and program development efforts have targeted this audience.

Fontana developed a program to reduce indoor water use through the retrofit of existing toilets and showers in homes built before 1985. Since that time, more than 125 Fontana single-family and multi-family homes have been retrofitted. The plumbing retrofit program has employed a number of approaches to encourage public participation, and a variety to types of retrofit hardware have been used.

The easiest technology to employ, and one, which saves customers money on water heating costs as well as trimming their water bills, is the replacement of high-flow showerheads with low-flow models in older homes. Generally, residents can achieve a reduction of 50 percent in shower water use -- from 5 gallons per minute to 2.5 gallons per minute -- with no sacrifice in comfort or cleansing ability. As a byproduct, they also save money on water heating costs due to the reduction in hot water flow.

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[2] Although Fontana water customers emulate national patterns of response to price increases; research has shown a lower aggregate level of response to price increases; 1.7% to 1.8%. Fontana customers also defy the logical assumption that the higher response rate would occur in the summer when rates are higher, showing the least total response rate (1.7%) in summer and the greatest (1.8%) in winter.

Toilet retrofit poses a greater problem. Short of total replacement of toilets, any modification to toilets produces unreliable savings. What can be added or changed to make a toilet use less water can be readily undone, with a resulting loss of savings. Some types of retrofit modification will result in more water being used, and wasted, if and when the modifications fail.

The retrofit of plumbing is a purely voluntary activity for Fontana Water Department customers. A variety of programs, therefore, have been used to market the retrofit program. At various times these have included: mass distribution of materials to selected neighborhoods; offers of direct installation of hardware by Town staff; and distribution of materials at Town events. Additionally, materials have been made available for customers to pick up at the Water Department Customer Services office.

Since 1990, a revised plumbing code requires water conserving plumbing fixtures in new construction or renovation. This code specifies 1.6 gallon-per-flush toilets, 3.0 gallon-per-minute showers, and other water-saving restrictions on indoor plumbing (Table 2). The Fontana standards were included in state law in 1991 and incorporated, with minor modification[3], in the federal *Energy Policy Act* of 1992. Table 3 shows the impact these standards have on per-person water use in Fontana homes. Values represent weighted averages for each type of use.

Table 1: 2018 Example of Water Conservation Plan Measures

Implementation Priority	***New Program Element***	***Implementation Date***	***Annual Dept. Cost ($)***	***Average Annual Water Savings***
1	Water Rate Study	1998	(a)	(a)
	New Conservation Rate	1998	(b)	(a)
2	Plumbing Fixture Retrofit	1997	(b)	(a)
3	Increased Enforcement of Existing Low Flow Device Plumbing Code	1994	(b)	(a)
4	Best Available Commercial/ Industrial Technology Study	1998	(c)	(a)
5	Lawn Size Limitations	1998	(b)	(a)
6	New Plumbing Code with Additional Flow Restrictions	1998	(b)	(a)
7	Large Turf Watering and Water Features Size Limitation (DWR Requirement)	1998	(b)	(a)

3 The 1990 Fontana code calls for shower flow rates of nor more than 3.0 gallons per minute (GPM). Federal law, reflecting the American Society of Mechanical Engineers (ASME) Codes and Standards Committee standard calls for 2.5 gpm showerheads. If and when the ASME standard is revised, federal standards will reflect this change. Showerheads represent the only difference as of January 1999.

8	Separate Metering of Turf and Water Features	1998	None	(a)
9	Preparation of Plan for Drought Emergency Education Program	1997	(b)	(d)
12	Water Demand Model Refinement	1997	(b)	(a)
13	Watering Alert	1997	(d)	(d)

a Not yet determined.
b Cost included as part of the operations of existing Town Departments.
c One-time cost.
d Plan will be used only during severe droughts which may or may not occur during the 50 year planning period.

Newspaper and Service Billing Water Conservation Notification Examples

There are a number of ways to conserve our water

Despite the pine trees we see everywhere, we must remember that state of Arizona is first and foremost a desert state. And as we all know, appearances can be deceiving – especially here in the Rim Country. Barry Goldwater is to been reported to say, "***Arizona is so dry that trees look for dogs***." Barry lived up on Camelback Mountain down in the big city and could rely on surface water for his needs. We don't have that luxury; we must rely on what God gives us in rainfall. Rainfall replenishes our underground water supply. That's where we get our awesome mountain well water.

Xeriscape?

"Here is a tip for conserving water at home all year long"

The next time you replace a flower or a shrub, use a colorful low-water use plant. You can save over 400 gallons a month by planting a beautiful Xeriscape yard. We have some excellent Xeriscape resources available in town. If you would like to see our wonderful Xeriscape plant booklet, you can come on in to the Water Department and pick one up for free!

Faucets:

The other most common leak is in faucets and is often caused by worn washers. Check all the faucets inside and outside the house once a year.

60 drops per minute leak wastes 186 gallons per month. This amount would flush your toilet 53 times.

One half inch 1/2" drip leak wastes 603 gallons per month. This amount of water would wash the dishes from 30 meals. Pencil lead (16th" dia.) steady stream leak wastes 1,263 gallons per month. This amount of water would clean 28 loads of laundry.

Checking for leaking pipes

For leak detection, make sure no water is being used at the time. Go to the meter and see if the flow indicator is still moving (the red triangle near the center of the meter). If it is spinning, go in and shut off the master valve.

Check to see if the flow indicator is still moving. If so, there is a leak in
the pipe from the meter to the house. If the flow indicator has stopped, the leak is in the house. Start checking hose connections, faucets, the toilet, look for wet spots in the basement, etc.

Save water and energy

Install a low flow showerhead. It's easy to do and these showerheads use half or less of the water used by a regular showerhead. They save electricity, since half of the shower water used is heated. With the latest showerhead technology, you won't even feel the difference when you shower.

Did you know?…..

That one-quart of motor oil can pollute 250,000 gallons of water. Please bring your used oil to Checker or AutoZone.

Share your blanket with a tank.

Insulate your hot water pipes, particularly long runs and pipes that pass through cold or unheated areas. As a minimum, you should insulate the first 3 - 6 feet of hot water pipe from your hot water tank.

Consider wrapping your electric water heater with an insulation blanket. An insulation blanket will help keep the heat in and place less demand on your heater to maintain the 110 – 125 degree setting recommended for most homes.

About 25% of your hot water use is for laundry. When doing your laundry, try washing your clothes in warm water and rinsing in cold. Your synthetic garments will last longer and your hot water use will be reduced substantially.

Matching your water level to the size of the laundry load is an excellent way of ensuring you use only the hot water you need.

Did you know?…..
Now look what you can do with Alka-Seltzer: Clean a toilet - drop in two Alka-Seltzer tablets, wait twenty minutes, brush, and flush. The citric acid and effervescent action clean vitreous china.

Please Conserve Water, Every Drop Counts!
There are a number of ways to conserve water and they all start with you.
Today's water saving hint….

> Take shorter showers. Replace your showerhead with an ultra-low-flow version. Some units are available that allow you to cut off the flow without adjusting the water temperature knobs.

Water is our most valuable natural resource
Conservation is a very important issue here in the Rim Country. In order to maintain the quality of life we have come to expect, we must all look for ways to conserve our water supplies.
Install a toilet dam or displacement device such as a bag or bottle to cut down on the amount of water needed for each flushing. Be sure installation does not interfere with operating parts. When purchasing new or replacement toilets, consider low volume units which use less than half the water of older models. In many areas, low volume units are required by law.

The little girl that caused our drought
Did you know that this has been one of the driest years in recorded history? We have broken the record for the most consecutive days without rain back in the Fall of 1999.

Now this needed rainfall and snowfall is important since our groundwater (drinking water supply) is recharged by precipitation. Most of this problem is thanks to the weather effects of Y2K. Well, it should have caused something. But our drought is believed to be caused by La Nina's after effects.

Water conservation is essential during the summer months of the year when we experience a large influx of seasonal visitors. It is this time of year when conservation of our supplies is most important, for this is also our dry season.

Read your meter lately?
The residents have been doing a good job saving water, but we can do better. Check that your home is leak-free, because many homes have hidden water leaks. Read you water meter before and after a two-hour period when no water is being used. If the meter does not read exactly the same, there is a leak. Here is another helpful hint. Clean a vase- to remove a stain from the bottom of a glass or cruet, fill with water and drop in two Alka-Seltzer tablets.

Plentiful Water into the Next Millennium
The Water Department would like to ask your assistance in helping us maintain an adequate water supply this spring and summer for fire protection and our daily essential needs. We are at least one more summer away from increasing our water supply. Now is the time to start thinking about water conservation and efficiency. If we are able to maintain our fall and winter daily usage levels, we could make it well into the 21st century with our current supplies. However, water usage in spring and summer months more than doubles relative to winter usage and is directly attributable to outdoor water use. The average family of four uses between 4,500 and 6,500 cubic feet of water every six months or approximately, 33,700 gallons to 48,700 gallons.

Adjust Sprinkler Systems
Adjust Sprinkler Systems, Use Rain Sensors and Know How to Override There are several ways that our customers can help us achieve these goals. First and foremost is the efficient use of automatic underground sprinklers. Automatic underground sprinklers are the single largest factor in increased water use during the warmer months. Please remember the average lawn only needs 1" of water every two to three weeks to maintain itself.

Over-watering the lawn results in shallow root growth, which reduces drought tolerance and increases susceptibility to fungus and other lawn diseases. We have observed many systems and found that the following adjustments are needed in many yards in town: water early or late in the day only; adjust sprinkler heads to spray the lawn not driveways, streets and sidewalks; replace/fix leaky or defective heads; shut off sprinklers during rain storms. Purchasing Rain sensors can solve this last problem and you can recoup the price through lower water consumption. Learn how to override your sprinkler system's automatic cycle and let everyone in the family know how to do it. When rain is predicted or if it has just occurred, please override the automatic timers to keep your sprinklers from unnecessarily activating. Again, your lawn only needs 1" of water every two to three weeks.

Lawn and Garden Health and Conservation Tips
The latest lawn care research shows three inches is the best height for turf grasses throughout the growing season. The longer grass will allow the plant's roots to be shaded from the sun's rays and also promote a deeper root system. Don't water your lawn immediately after it has been mowed. Don't rush out to cut the lawn just before it rains. Research shows when grass is cut, the grass plant goes into shock and must recover before its roots can begin absorbing moisture again. Reduce the size of your lawn. Lawns demand much more water than trees and shrubs. Landscape your yard with plants that require only minimal amounts of water. Many of our native plants, such as oak, pine, juniper, shadbush, blueberry and mountain laurel have endured in the wild and flourish without our watering them.

Planting trees and shrubs will help shade your lawn and reduce its water needs. After planting, water your plants well before putting down mulch. Mulch will help retain soil moisture around plants. Use a rain barrel to collect water for your plants and gardens. Use a broom to sweep your driveway and sidewalks instead of spraying with the hose. As we saw this past year, even after several months of little rain, most lawns came back in less than two weeks with the rains of September. Select a lawn seed mix rather than a single type of grass and remember that blue grass requires far more water than fescue.

Retrofit Older Plumbing and Watch for Leaks
You can also help conserve water by retrofitting older plumbing with low flow toilets and shower heads. All homeowners can inspect faucets and toilets to ensure that they are not dripping or leaking. Leaky toilets are the number one water-waster in the home. They can waste up to 200 gallons in a day and often go undetected for months. Our newer water meters are equipped with low flow dials that can detect leaking fixtures. If you do not have one give us a call and we will schedule a free replacement. To learn more about conservation tips, or how to check for leaks and use your meter as a leak detective.

Conservation Will Protect Our Existing Wells
Our daily lives depend greatly on an abundant, clean supply of water and it is often a commodity that we take for granted. Because we can turn on our faucets 24 hours a day and watch the water flow, it is a misconception that we have an unlimited supply on earth. As the population grows and the amount of homes and roads increase, the greater the reduction in wetland and recharge areas for our water supplies. We must all act together to help conserve our most precious resource on earth. We can live weeks without food but on only a few days without water.

Our town water pumps and well fields are well maintained. However, some of them date back to the 1930's and 1940's.

When the warm summer months are upon us these wells are called on to pump nearly 24 hours a day. That not only causes significant wear and tear on mechanical parts, but also on the aquifers themselves. The more we pump the lower the ground water levels go and the greater the chance of sucking sand and air into the pumps. This can cause irreversible damage and can significantly reduce the pumping capacity of the wells. If a major pump were to malfunction or breakdown, our capacity to pump water could be reduced by as much as 35 to 40 percent. If a major fire were to occur, the Fire departments ability to battle the blaze could be significantly reduced or hindered by low water pressure and insufficient volume. It is essential that we be able to rest the pumps and allow the aquifers to recharge on a daily basis.

Planning for the Future

To help ensure the clean, adequate supply of water for our future needs, the Water department is taking a proactive approach. We have secured as much as 1,000,000 gallons a day with our inter-municipal agreement with the town of Fontana. Two other potential wells have been tested and land has been either donated or acquired around all our sites to maximize their protection. Leak detection on the existing water supply lines is conducted annually. Conservation and water efficiency are promoted yearly and recognized extensively during national drinking water week in May. With the introduction of the Consumer Confidence Reports, that are now required annually, even the legislators are recognizing the significance of our water supplies.

We take our job of supplying the town's water seriously and have been recognized by the Department of Environmental Protection for our water source protection and the overall operation of our water system, with two awards over the past year. We will continue to do our best to provide our citizens with safe, clean drinking water and we actively invite you to help us in our quest.

Energy Efficiency

The following tips will help curb energy use at home:

Turn down the Thermostat. Ideally, keep your home heated to 68 degrees Fahrenheit during the day and 60 at night. Use extra blankets and sweaters instead of turning up the heat. Likewise, in the summer, dress cool to save on air conditioning costs and energy.

Lower your water temperature. Turn your water heater down to 120 degrees Fahrenheit. You'll cut your water-heating costs by 6-10 percent.

Purchase Energy Efficient Products and Equipment. By looking for the Energy Star label on products and equipment, you can reduce your energy bill by 30 percent and your electric lighting charges by 40 percent while cutting pollution.

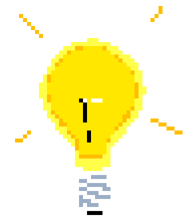
Insulate the house. Make sure your house is well insulated and, if heated or cooled, never leave windows or doors open. Raise shades on winter days; lower them in the summer. Seal all leaks. Block windows and doors with weather-strip tape and inexpensive door sweeps and install blinds to reduce outside heat transfer. Install storm windows—they are added insulation for your home.

Insulate pipes and fixtures. Insulate the hot water heater and heating and cooling pipes. An insulation blanket for a water heater will pay for itself in a year or less and will reduce heat loss by 25-40 percent.

Seal little holes around water pipes and stuff insulation into big holes around plumbing fixtures. Also, by covering waterbeds, you produce insulation and save up to 1/3 of the energy it uses.

Replace your showerhead. By using a low-flow showerhead, you reduce water consumption and energy usage to heat the water. They pay for themselves in only four months.

Turn unused appliances and equipment off. Turn off equipment and lights at night and on weekend - unplug appliances when they are not in use.



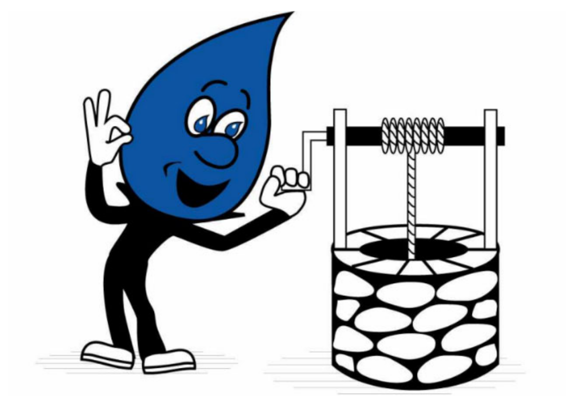
Use fluorescent lighting. By replacing your light fixtures with energy conserving fluorescent bulbs, you will save 75 percent of the energy used with incandescent bulbs. If you currently have fluorescent lighting, consider using a more efficient type that has an electronic ballast that burns cooler.

Clean or replace filters regularly. Be sure to check furnace, air-conditioner, and heat pump filters regularly. By cleaning your heating, ventilation and air-conditioning equipment, your units will last longer, avoid costly down time, and improve indoor air quality.

Increase natural light. Paint your exterior and interior walls in a light color so more light is reflected. Paint the edges of the window in white so more light reflected inside. During the day, open blinds to bring in natural light instead of turning on lights.

Reduce paper usage. By double siding on copiers, reusing single-sided paper, using electronic mail, and circulating documents with routing slips, an organization can save a significant amount of energy and natural resources. One ton of waste paper saves enough energy to power an average home for 6 months.

Use public transportation or carpool. Not only does this save energy costs, but it extends the life of your vehicle.



Chapter 12 Water and Energy Conservation Exercise

Scenario: You have successfully saved the nation because of your public education efforts.

But the President does not have any further use for you. You cannot find another job because certain political groups believe that you have abused Presidential authorities, especially since you landed the Presidential helicopter at a local restaurant.

You call up the City Manager and he wants you back at your old position. He doesn't say a word about your leaving or what has happened since. Most people at the city didn't even notice that you had left.

The City Manager has a job waiting for you. He needs for you to produce a series of 3 short newspaper ads and 1 radio 15 seconds ad on water and/or energy conservation.

He has informed you that there is extra program funding for your program if you can implement a retro-fit program of wasteful devices campaign into these ads.

You are glad to be home.

Chapter 13 Groundwater Protection

CATEGORIES OF ACTIVITIES THAT IMPACT GROUNDWATER AND SOURCES OF DRINKING WATER

RUNOFF
Water washes away many substances which later seep into the ground and mix with groundwater.

Examples of runoff including stormwater include:

AGRICULTURAL
- Animal Wastes
- Fertilizers
- Pesticides
- Sediments

URBAN
- Chemicals
- Grease and Oils
- Solvents

LANDFILL
- Garbage
- Leachate

CONSTRUCTION
- Contaminated Soil
- Stormwater Runoff
- Waste and Trash

LEAKING STORAGE TANKS (ULST)
Fuels and chemicals stored in underground or above ground tanks can leak into groundwater.

Examples of substances that are expensive and difficult to remove are:
- Chemicals
- Diesel Fuel
- Fertilizers
- Gasoline
- Heating Oil
- Pesticides
- Solvents

HOLDING PONDS
Surface ponds serve a number of purposes in rural or industrial areas but also threaten groundwater quality.

Some examples are:

ANIMAL WASTES
- Microbial Contaminants
- Toxic levels of Nitrogen and Phosphorus

MINE WASTES
- Acid Waters
- Heavy Metals, Arsenic, Lead, etc.
- Sediments

WASTEWATER LAGOONS
- Microbial Contaminants
- Toxic Levels of Nitrogen and Phosphorus

WASTES FROM HUMAN AND ANIMALS
Waste by-products from humans and animals can seep into the ground and stay in a concentrated form. Groundwater containing harmful waste by-products cannot be used as drinking water.

Some examples of possible pollutant sources are:
- Animal Feeding Operations including Aqua-Culture
- Animal Waste Ponds
- Leaking Wastewater Lines
- Manure Spreading
- Septic Systems

WELLS
Wells are drilled into the ground for drinking water, irrigation water, to recharge (injection) the aquifer, and to dispose of low-concentrated wastes. Any of these wells can allow pollutants to reach groundwater. Wells not in use must be properly capped and sealed to prevent contamination to the groundwater.

COMMON SOURCES OF WELL POLLUTANTS
- Abandoned or improperly closed wells
- Injection wells
- Irrigation wells left uncapped when not in use

DRINKING WATER WELLS ARE SUSCEPTIBLE TO POLLUTANTS WHEN THE WELL:
- Has an improperly cased/grouted pipe
- Is to shallow
- Is located within 50 feet to septic or leach fields
- Is too close to chemical or biological contaminants

Paint and chemicals that were drained into a storm drain.

Citizen's Guide To Ground- Water Protection

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PREFACE

Half of all Americans and more than 95 percent of rural Americans get their household water supplies from underground sources of water, or ground water. Ground water also is used for about half of the nation's agricultural irrigation and nearly one-third of the industrial water needs. This makes ground water a vitally important national resource.

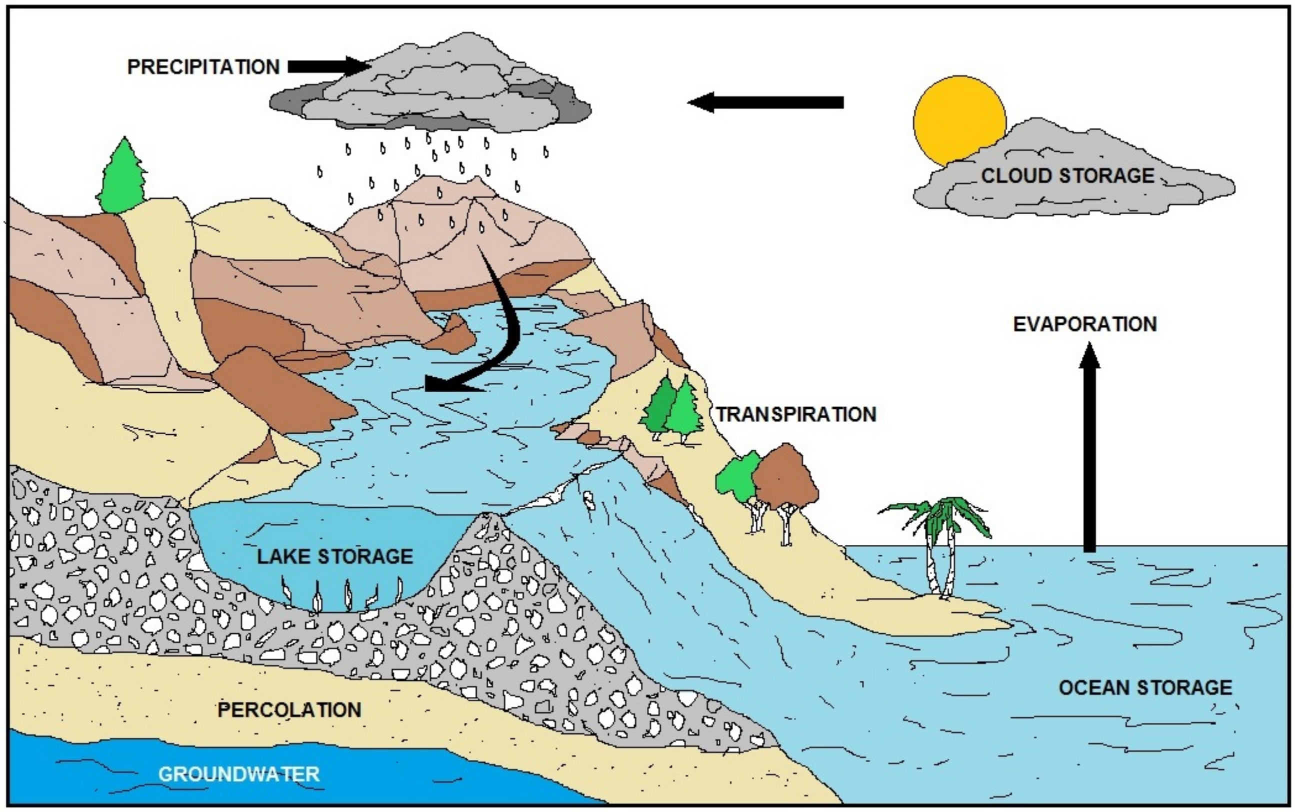
Over the last 10 years, however, public attention has been drawn to incidents of ground-water contamination. This has led to the development of ground-water protection programs at federal, state, and local levels. Because ground-water supplies and conditions vary from one area to another, the responsibility for protecting a community's ground-water supplies rests substantially with the local community.

If your community relies on ground water to supply any portion of its fresh water needs, you, the citizen, will be directly affected by the success or failure of a ground-water protection program. Equally important, you, the citizen, can directly affect the success or failure of your community's ground-water protection efforts.

This guide is intended to help you take an active and positive role in protecting your community's ground-water supplies. It will introduce you to the natural cycle that supplies the earth with ground water, briefly explain how ground water can become contaminated, examine ways to protect our vulnerable ground-water supplies, and, most important of all, describe the roles you and your community can play in protecting valuable ground-water supplies.

CHAPTER I. Introduction

Many people have never heard of ground water. That's not really so surprising since it isn't readily visible -- ground water can be considered one of our "hidden" resources.



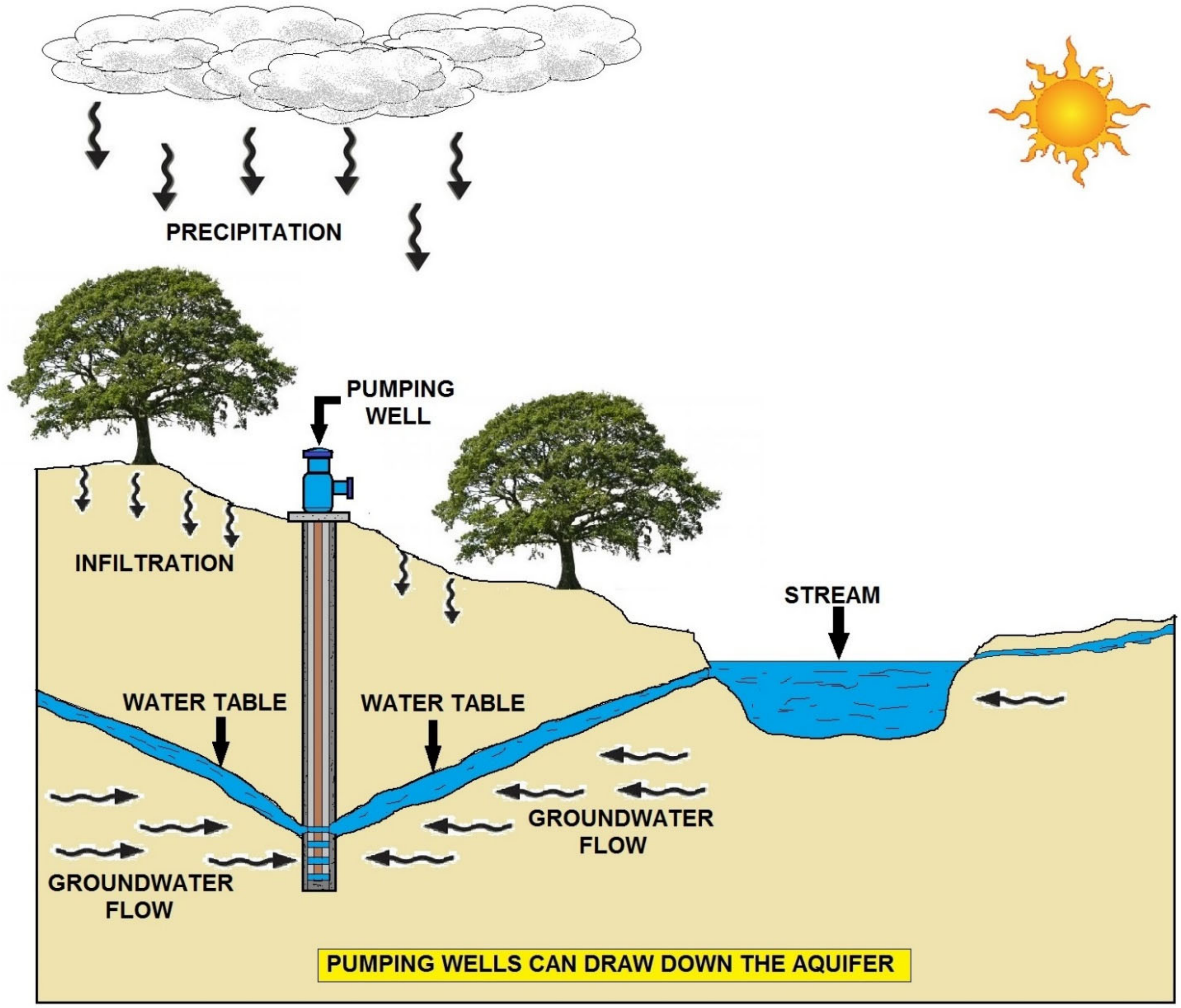
BASIC WATER CYCLE

What Is Ground-water, and Where Does It Come From?

Actually ground water occurs as part of what can be called the oldest recycling program - the **hydrologic cycle**. The hydrologic cycle involves the continual movement of water between the earth and the atmosphere through evaporation and precipitation. As rain and snow fall to the earth, some of the water runs off the surface into lakes, rivers, streams, and the oceans; some evaporates; and some is absorbed by plant roots. The rest of the water soaks through the ground's surface and moves downward through the **unsaturated zone**, where the open spaces in rocks and soil are filled with a mixture of air and water, until it reaches the **water table**. The water table is the top of the **saturated zone**, or the area in which all interconnected spaces in rocks and soil are filled with water. The water in the saturated zone is called ground water. In areas where the water table occurs at the ground's surface, the ground water discharges into marshes, lakes, springs, or streams and evaporates into the atmosphere to form clouds, eventually falling back to earth again as rain or snow - thus beginning the cycle all over again.

Where Is Ground Water Stored?

ground water is stored under many types of geologic conditions. Areas where ground water exists in sufficient quantities to supply wells or springs are called **aquifers**, a term that literally means "water bearer." Aquifers store water in the spaces between particles of sand, gravel, soil, and rock as well as cracks, pores, and channels in relatively solid rocks.



An aquifer's storage capacity is controlled largely by its **porosity**, or the relative amount of open space present to hold water. Its ability to transmit water, or **permeability**, is based in part on the size of these spaces and the extent to which they are connected.

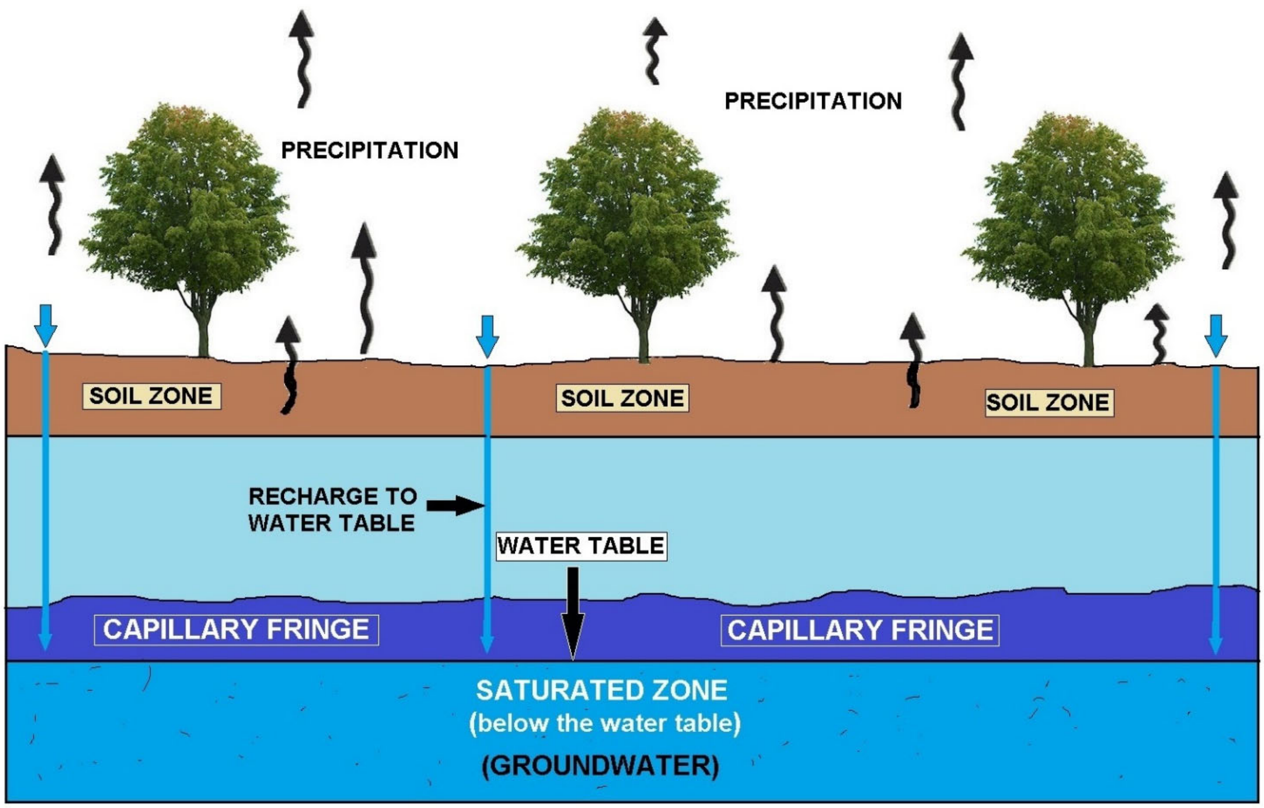
Basically, there are two kinds of aquifers: **confined** and **unconfined**. If the aquifer is sandwiched between layers of relatively impermeable materials (e.g., clay), it is called a confined aquifer. Confined aquifers are frequently found at greater depths than unconfined aquifers. In contrast, unconfined aquifers are not sandwiched between these layers of relatively impermeable materials, and their upper boundaries are generally closer to the surface of the land.

Does Ground Water Move?
Ground water can move sideways as well as up or down. This movement is in response to gravity, differences in elevation, and differences in pressure. The movement is usually quite slow, frequently as little as a few feet per year, although it can move as much as several feet per day in more permeable zones. ground water can move even more rapidly in **karst** aquifers, which are areas in water soluble limestone and similar rocks where fractures or cracks have been widened by the action of the ground water to form sinkholes, tunnels, or even caves.

How Is Ground Water Used?
According to the U.S. Geological Survey, ground-water use increased from about 35 billion gallons a day in 1950 to about 87 billion gallons a day in 1980. Approximately one-fourth of all fresh water used in the nation comes from ground water. Whether it arrives via a public water supply system or directly from a private well, ground water ultimately provides approximately 35 percent of the drinking water supply for urban areas and 95 percent of the supply for rural areas, quenching the thirst and meeting other household needs of more than 117 million people in this nation.

Overall, more than one-third of the water used for agricultural purposes is drawn from ground water; Arkansas, Nebraska, Colorado, and Kansas use more than 90 percent of their ground-water withdrawals for agricultural activities. In addition, approximately 30 percent of all ground water is used for industrial purposes.

Ground-water use varies among the states, with some states, such as Hawaii, Mississippi, Florida, Idaho, and New Mexico, relying on ground water to supply considerably more than three-fourths of their household water needs and other states, such as Colorado and Rhode Island, supplying less than one-quarter of their water needs with ground water.



CAPILLARY FRINGE
(Material above water table that may contain water by capillary pressure in small voids)

CHAPTER II. Ground-Water Quality

Until the 1970s, ground water was believed to be naturally protected from contamination. The layers of soil and particles of sand, gravel, crushed rocks, and larger rocks were thought to act as filters, trapping contaminants before they could reach the ground water. Since then, however, every state in the nation has reported cases of contaminated ground water, with some instances receiving widespread publicity. We now know that some contaminants can pass through all of these filtering layers into the saturated zone to contaminate ground water.

Between 1971 and 1985, 245 ground-water related disease outbreaks, with 52,181 associated illnesses, were reported. Most of these diseases were short-term digestive disorders. About 10 percent of all ground-water public water supply systems are in violation of drinking water standards for biological contamination. In addition, approximately 74 pesticides, a number of which are known carcinogens, have been detected in the ground water of 38 states. Although various estimates have been made about the extent of ground-water contamination, these estimates are difficult to verify given the nature of the resource and the difficulty of monitoring its quality.

How Does Ground Water Become Contaminated?
Ground-water contamination can originate on the surface of the ground, in the ground above the water table, or in the ground below the water table. Table I shows the types of activities that can cause ground-water contamination at each level. Where a contaminant originates is a factor that can affect its actual impact on ground-water quality. For example, if a contaminant is spilled on the surface of the ground or injected into the ground above the water table, it may have to move through numerous layers of soil and other underlying materials before it reaches the ground water.

As the contaminant moves through these layers, a number of processes are in operation (e.g., filtration, dilution, oxidation, biological decay) that can lessen the eventual impact of the substance once it finally reaches the ground water. The effectiveness of these processes also is affected by both the distance between the ground water and where the contaminant is introduced and the amount of time it takes the substance to reach the ground water. If the contaminant is introduced directly into the area below the water table, the primary process that can affect the impact of the contaminant is dilution by the surrounding ground water.

GROUND SURFACE	Infiltration of polluted surface water Land disposal of wastes Stockpiles Dumps Sewage sludge disposal	De-icing salt use & storage Animal feedlots Fertilizers & pesticides Accidental spills Airborne source particulates
ABOVE WATER TABLE	Septic tanks, cesspools, & privies Holding ponds & lagoons Sanitary landfills Waste disposal in excavations Underground storage tank leaks	Underground pipeline leaks Artificial recharge Sumps and dry wells Graveyards
BELOW WATER TABLE	Waste disposal in wells Drainage wells and canals Underground storage Mines	Exploratory wells Abandoned wells Water-supply wells Ground-water withdrawal

TABLE 1. Activities That Can Cause Ground-Water Contamination

In comparison with rivers or streams, ground water tends to move very slowly and with very little turbulence. Therefore, once the contaminant reaches the ground water, little dilution or dispersion normally occurs. Instead, the contaminant forms a concentrated plume that can flow along the same path as the ground water.

Among the factors that determine the size, form, and rate of movement of the contaminant plume are the amount and type of contaminant and the speed of ground-water movement. Because ground water is hidden from view, contamination can go undetected for years until the supply is tapped for use.

What Kinds of Substances Can Contaminate Ground-water, and Where Do They Come From?
Substances that can contaminate ground water can be divided into two basic categories: substances that occur naturally and substances produced or introduced by man's activities. Substances that occur naturally include minerals such as iron, calcium, and selenium. Substances resulting from man's activities include synthetic organic chemicals and hydrocarbons (e.g., solvents, pesticides, petroleum products); landfill **leachates** (liquids that have dripped through the landfill and carry dissolved substances from the waste materials), containing such substances as heavy metals and organic decomposition products; salt; bacteria; and viruses. A significant number of today's ground-water contamination problems stem from man's activities and can be introduced into ground water from a variety of sources.

Septic Tanks, Cesspools, and Privies
A major cause of ground-water contamination in many areas of the United States is **effluent**, or outflow, from septic tanks, cesspools, and privies. Approximately one fourth of all homes in the United States rely on septic systems to dispose of their human wastes. If these systems are improperly sited, designed, constructed, or maintained, they can allow contamination of the ground water by bacteria, nitrates, viruses, synthetic detergents, household chemicals, and chlorides. Although each system can make an insignificant contribution to ground-water contamination, the sheer number of such systems and their widespread use in every area that does not have a public sewage treatment system makes them serious contamination sources.

Surface Impoundments
Another potentially significant source of ground-water contamination is the more than 180,000 surface impoundments (e.g., ponds, lagoons) used by municipalities, industries, and businesses to store, treat, and dispose of a variety of liquid wastes and wastewater. Although these impoundments are supposed to be sealed with compacted clay soils or plastic liners, leaks can and do develop.

Agricultural Activities
Agricultural activities also can make significant contributions to ground-water contamination with the millions of tons of fertilizers and pesticides spread on the ground and from the storage and disposal of livestock wastes. Homeowners, too, can contribute to this type of ground-water pollution with the chemicals they apply to their lawns, rosebushes, tomato plants, and other garden plants.

Landfills
There are approximately 500 hazardous waste land disposal facilities and more than 16,000 municipal and other landfills nationwide. To protect ground water, these facilities are now required to be constructed with clay or synthetic liners and leachate collection systems. Unfortunately, these requirements are comparatively recent, and thousands of landfills were built, operated, and abandoned in the past without such safeguards. A number of these sites have caused serious ground-water contamination problems and are now being cleaned up by their owners, operators, or users; state governments; or the federal government under the Superfund program (see p. 8). In addition, a lack of information about the location of many of these sites makes it difficult, if not impossible, to determine how many others may now be contaminating ground water.

Underground Storage Tanks
Between five and six million underground storage tanks are used to store a variety of materials, including gasoline, fuel oil, and numerous chemicals. The average life span of these tanks is 18 years, and over time, exposure to the elements causes them to corrode. Now, hundreds of thousands of these tanks are estimated to be leaking, and many are contaminating ground water.

Replacement costs for these tanks are estimated at $1 per gallon of storage capacity; a cleanup operation can cost considerably more.

Abandoned Wells

Wells can be another source of ground-water contamination. In the years before there were community water supply systems, most people relied on wells to provide their drinking water. In rural areas this can still be the case. If a well is abandoned without being properly sealed, however, it can act as a direct channel for contaminants to reach ground water.

Accidents and Illegal Dumping

Accidents also can result in ground-water contamination. A large volume of toxic materials is transported throughout the country by truck, train, and airplane. Every day accidental chemical or petroleum product spills occur that, if not handled properly, can result in ground-water contamination. Frequently, the automatic reaction of the first people at the scene of an accident involving a spill will be to flush the area with water to dilute the chemical. This just washes the chemical into the soil around the accident site, allowing it to work its way down to the ground water. In addition, there are numerous instances of ground-water contamination caused by the illegal dumping of hazardous or other potentially harmful wastes.

Highway De-icing

A similar flushing mechanism also applies to the salt that is used to de-ice roads and highways throughout the country every winter. More than 11 million tons of salt are applied to roads in the United States annually. As ice and snow melt or rain subsequently falls, the salt is washed into the surrounding soil where it can work its way down to the ground water. Salt also can find its way into ground water from improperly protected storage stockpiles.

What Can Be Done After Contamination Has Occurred?

Unlike rivers, lakes, and streams that are readily visible and whose contamination frequently can be seen with the naked eye, ground water itself is hidden from view. Its contamination occurs gradually and generally is not detected until the problem has already become extensive. This makes cleaning up contamination a complicated, costly, and sometimes impossible process.
In general, a community whose ground-water supply has been contaminated has five options:

- Contain the contaminants to prevent their migration from their source.
- Withdraw the pollutants from the aquifer.
- Treat the ground water where it is withdrawn or at its point of use.
- Rehabilitate the aquifer by either immobilizing or detoxifying the contaminants while they are still in the aquifer.
- Abandon the use of the aquifer and find alternative sources of water

Which option is chosen by the community is determined by a number of factors, including the nature and extensiveness of the contamination, whether specific actions are required by statute, the geologic conditions, and the funds available for the purpose. All of these options are costly. For example, a community in Massachusetts chose a treatment option when the wells supplying its public water system were contaminated by more than 2,000 gallons of gasoline that had leaked into the ground from an underground storage tank less than 600 feet from one of the wells.

The town temporarily provided alternative water supplies for its residents and then began a cleanup process that included pumping out and treating the contaminated water and then recharging the aquifer with the treated water. The cleanup effort alone cost more than $3 million.

Because of the high costs and technical difficulties involved in the various containment and treatment methods, many communities will choose to abandon the use of the aquifer when facing contamination of their ground-water supplies.

This requires the community to either find other water supplies, drill new wells farther away from the contaminated area of the aquifer, deepen existing wells, or drill new wells in another aquifer if one is located nearby. As Atlantic City, New Jersey, found, these options also can be very costly for a community. The wells supplying that city's public water system were contaminated by leachate from a landfill. The city estimated that development of a new wellfield would cost approximately $2 million.

FACTOR	TYPE	SOURCE(S)	PROBLEM
FECAL COLIFORM BACTERIA	BIOLOGICAL	HUMAN SEWAGE; LIVESTOCK WASTE	POSSIBLE PRESENCE OF PATHOGENIC (DISEASE-CAUSING) ORGANISMS
DISSOLVED OXYGEN (DO)	CHEMICAL	AIR; AQUATIC PLANTS	LOW LEVELS CAN KILL AQUATIC ORGANISMS
NITROGEN AND PHOSPHORUS	CHEMICAL	FERTILIZERS AND DETERGENTS FROM LAWNS AND RUNOFF	EXCESSIVE ALGAE GROWTH CAN LEAD TO LOW DO
ZINC, ARSENIC, LEAD, MERCURY, CADMIUM, NICKEL	CHEMICAL	LANDFILLS; INDUSTRIAL DISCHARGES; RUNOFF	GENETIC MUTATIONS OR DEATH IN FISH & WILDLIFE (HUMAN HEALTH THREATS AS WELL)
SALT	CHEMICAL	SALTWATER INTRUSION (IF NEAR OCEAN)	KILLS FRESHWATER SPECIES OF PLANTS AND ANIMALS
MUD, SAND, OTHER SOLID PARTICLES (TURBIDITY)	PHYSICAL	EROSION AND RUNOFF FROM DEVELOPMENT; AGRICULTURE	REDUCES PHOTOSYNTHESIS IN AQUATIC VEGETATION; INTERFERES WITH RESPIRATION IN AQUATIC ANIMALS

WATER QUALITY FACTORS

CHAPTER III. Government Ground-Water Protection Activities

Given the importance of ground water as a source of drinking water for so many communities and individuals and the cost and difficulty of cleaning it up, common sense tells us that the best way to guarantee continued supplies of clean ground water is to prevent contamination.

Are There Federal Laws or Programs to Protect Ground Water?
The U.S. Environmental Protection Agency (EPA) is responsible for federal activities relating to the quality of ground water. EPA's ground-water protection activities are authorized by a number of laws, including:

- The Safe Drinking Water Act, which authorizes EPA to set standards for maximum levels of contaminants in drinking water, regulate the underground disposal of wastes in deep wells, designate areas that rely on a single aquifer for their water supply, and establish a nationwide program to encourage the states to develop programs to protect public water supply wells (i.e., wellhead protection programs).

- The Resource Conservation and Recovery Act, which regulates the storage, transportation, treatment, and disposal of solid and hazardous wastes to prevent contaminants from leaching into ground water from municipal landfills, underground storage tanks, surface impoundments, and hazardous waste disposal facilities.

- The Comprehensive Environmental Response, Compensation, and Liability Act (**Superfund**), which authorizes the government to clean up contamination caused by chemical spills or hazardous waste sites that could (or already do) pose threats to the environment, and whose 1986 amendments include provisions authorizing citizens to sue violators of the law and establishing "community right-to-know" programs (Title III).

- The Federal Insecticide, Fungicide, and Rodenticide Act, which authorizes EPA to control the availability of pesticides that have the ability to leach into ground water.

- The Toxic Substances Control Act which authorizes EPA to control the manufacture, use, storage, distribution, or disposal of toxic chemicals that have the potential to leach into ground water.

- The Clean Water Act, which authorizes EPA to make grants to the states for the development of ground-water protection strategies and authorizes a number of programs to prevent water pollution from a variety of potential sources.

The federal laws tend to focus on controlling potential sources of ground-water contamination on a national basis. Where federal laws have provided for general ground-water protection activities such as wellhead protection programs or development of state ground-water protection strategies, the actual implementation of these programs must be by the states in cooperation with local governments.

A major reason for this emphasis on local action is that protection of ground water generally involves making very specific decisions about how land is used. Local governments frequently exercise a variety of land-use controls under state laws.

Do the States Have Laws or Programs to Protect Ground Water?
According to a study conducted for EPA in 1988, most of the states have passed some type of ground-water protection legislation and developed some kind of ground-water policies. State ground-water legislation can be divided into the following subject categories:

- Statewide strategies - Requiring the development of a comprehensive plan to protect the state's ground-water resources from contamination.

- Ground-water classification - Identifying and categorizing ground-water sources by how they are used to determine how much protection is needed to continue that type of use.

- Standard setting - Identifying levels at which an aquifer is considered to be contaminated.

- Land-use management - Developing planning and regulatory mechanisms to control activities on the land that could contaminate an aquifer.

- Ground-water funds - Establishing specific financial accounts for use in the protection of ground-water quality and the provision of compensation for damages to underground drinking water supplies (e.g., reimbursement for ground-water cleanup, provision of alternative drinking water supplies).

- Agricultural chemicals - Regulating the use, sale, labeling, and disposal of pesticides, herbicides, and fertilizers.

- Underground storage tanks - Establishing criteria for the registration, construction, installation, monitoring, repair, closure, and financial responsibility associated with tanks used to store hazardous wastes or materials.

- Water-use management - Including ground-water quality protection in the criteria used to justify more stringent water allocation measures where excessive ground-water withdrawal could cause ground-water contamination.

Appendix 1 presents a matrix showing the types of ground-water protection legislation enacted by the states.

In addition to ground-water protection programs states may have developed under their own laws, one state ground-water protection program is required by federal law. The 1986 amendments to the Safe Drinking Water Act established the wellhead protection program and require each state to develop comprehensive programs to protect public water supply wells from contaminants that could be harmful to human health. Wellhead protection is simply protection of all or part of the area surrounding a well from which the well's ground water is drawn. This is called a **wellhead protection area (WHPA)**. The size of the WHPA will vary from site to site depending on a number of factors, including the goals of the state's program and the geologic features of the area.

The law specifies certain minimum components for the wellhead protection programs:

- The roles and duties of state and local governments and public water suppliers in the management of wellhead protection programs must be established.

- The WHPA for each wellhead must be delineated (i.e., outlined or defined).

- Contamination sources within each WHPA must be identified.

- Approaches for protecting the water supply within the WHPAs from the contamination sources (e.g., use of source controls, education, training) must be developed.

- Contingency plans must be developed for use if public water supplies become contaminated.

- Provisions must be established for proper siting of new wells to produce maximum water yield and reduce the potential for contamination as much as possible.

- Provisions must be included to ensure public participation in the process.

For a program to be successful, all levels of government must participate in the wellhead protection program. The federal government is responsible for approving state wellhead protection programs and for providing technical support to state and local governments. State governments must develop and implement wellhead protection programs that meet the requirements of the Safe Drinking Water Act.

Although the responsibilities of local governments depend on the specific requirements of their state's program, these governments often are in the best position (and have the greatest incentive) to ensure proper protection of wellhead areas. They have the most to lose if their ground-water becomes contaminated.

Although the Clean Water Act does not require states to develop ground-water protection strategies, the legislation does authorize states to take this action. As of 1989, all 50 states have at least begun to develop ground-water protection strategies, and some of these are in advanced stages. Proceeding at varying paces, the states are tailoring their efforts to fit their own perceived needs and budgets.

CHAPTER IV. Citizen and Community Roles

In the first three chapters of this guide, you learned how dependent our nation is on ground water to provide water for drinking and other household uses, agriculture, and industry. You also learned a little about the many substances that can contaminate our ground-water supplies, where they can come from, and how difficult and costly it is to try to clean up ground water once it has been contaminated. Finally, you were given some information about current national and state programs to protect ground water. This chapter will focus on what actions you and your community can take to protect your ground-water supplies.

What Information Do You and Your Community Need?

Because no two communities are exactly alike in terms of hydrogeologic conditions, resources, or problems, ground-water protection efforts should be tailored specifically to meet the needs of each community. Thus, before you can begin to help your community develop an effective program to manage its ground-water resources, you will need the answers to some very specific questions.

What Has Your State Done to Protect Ground Water?

As you saw in Chapter III, the Safe Drinking Water Act requires all states to develop programs to protect public water supply wells from contaminants that could be harmful to human health. Information on your state's wellhead protection program should be available from the agency in your state that is managing this program. (**Appendix 2** contains a list of the state agencies managing wellhead protection programs.)

Chapter III also mentioned that all 50 states are in the process of developing comprehensive ground-water protection strategies. Such a strategy can provide you with information on who has what ground-water responsibility in the state and on how any existing state programs fit together. A copy of your state's ground-water protection strategy should be available from the agency in your state that is managing this effort. (**Appendix 2** also contains a list of these state agencies.)

Does Your Community's Drinking Water Come from Ground Water, and What Information Is Available About Your Community's Wells?

If your community's drinking water comes from ground water, you will need some basic information about your community's hydrogeologic setting, including the types of soil conditions and geologic formations and the type, location, and depth of the aquifer that stores the ground water. In addition, information on the community's wells will be needed, including whether they are public or private, shallow or deep; their locations; and how they are constructed. It also could be important to know if sites have been identified for future wells.

Potential sources for this information include your local library, your local water supply agency, your state geological survey, a local office of the U.S. Geological Survey (USGS), a county agricultural extension agent, or even the geology or engineering department of a local university or college.

What Is the Current Quality of Your Ground-Water Supply, and What Actual or Potential Sources of Contamination Are Present in Your Community?

You will need to know if your water is currently free from bacterial and chemical pollution and what kinds of procedures are in place to test or monitor ground-water quality. Initial information on the quality of your community's ground water should be available from your local water supply agency or your local health department.

Closely related to the issue of ground-water quality is determining whether there are activities in the community that produce or use toxic or hazardous substances and where underground storage tanks are located. Information on activities using or producing toxic or hazardous materials may be more difficult to obtain, but the community right-to-know provisions in the 1986 Superfund amendments may give you a starting point. These provisions require the establishment of state planning commissions, emergency planning districts, and local emergency planning committees. They also require companies that use certain toxic or hazardous substances to report to these committees.

Companies also are required to report serious environmental releases immediately. All of this information is required to be available to the public.

Another source of information on environmental releases is available in a data base developed by EPA called the Toxic Chemical Release Inventory that is publicly accessible through the National Library of Medicine. The data include the names, addresses, and public contacts of plants manufacturing, processing, or using the reported chemicals; the maximum amount stored onsite; the estimated quantity emitted into the air, discharged into bodies of water, injected underground, or released to land; methods used in waste treatment and their efficiency; and information on the transfer of chemicals offsite for treatment and disposal.

(To obtain additional information on this data base, see **Appendix 2**.) On a local level, your community's fire department also may be helpful in providing information on both companies using toxic or hazardous materials and the location of underground storage tanks.

What Can Your Community Do to Protect Its Ground Water?
If your community relies on ground water for its water supplies, it has a strong incentive to protect that ground water. Before a plan or program can be developed to protect ground water, it is important to identify existing or potential threats to the ground water. This will generally mean conducting an inventory to learn the location of facilities using, manufacturing, or storing materials that have the potential to pollute ground water.

How your community conducts this inventory will depend largely on the resources available, particularly the number of people available to do the work and funds. A number of communities, however, have had great success in using groups of volunteers to conduct their inventories. For example, the city of El Paso, Texas, has mobilized its senior citizens with the help of the federally funded Retired Senior Volunteer Program (**RSVP**) and the Texas Water Commission.

The inventory of existing or potential threats to the community's ground water may be quite long, and it is unlikely that your community will have the resources to address all of these threats. How do community officials decide which threats are the most serious or set priorities? One way is to assess these threats on the basis of their relative risks to the community's ground water. This requires determining which of the specific pollutants are most likely to be released and reach the ground water in concentrations high enough to pose health risks.

In addition to having an incentive to protect its ground water, your community has a number of powers that can be used for that purpose. These include implementing zoning decisions; developing land-use plans; overseeing building and fire codes; implementing health requirements; supplying water, sewer, and waste disposal services; and using their police powers to enforce regulations and ordinances. A few communities have begun developing their own ground-water protection programs using a variety of management tools based on these powers.

These management tools include:

- **Zoning Ordinances** - To divide a municipality into land-use districts and separate incompatible land uses such as residential, commercial, and industrial; zoning also defines the type of activity that can occur within a district and specifies appropriate regulations that can be used prevent activities that could be harmful to the community's ground water.

- **Subdivision Ordinances** - Applied when a piece of land is actually being divided into lots for sale or development to ensure that growth does not outpace available local facilities such as roads, schools, and fire protection; subdivision ordinances also can be used to set density standards, require open space set asides, and regulate the timing of development, all of which can have significant impacts on ground-water quality.

- **Site Plan Review** - To determine if a proposed development project is compatible with existing land uses in the surrounding area and if existing community facilities will be able to support the planned development; this review also can be used to determine compatibility of the proposed project with any ground-water protection goals.

- **Design Standards** - To regulate the design, construction, and ongoing operation of various land-use activities by imposing specific physical requirements, such as the use of double-walled tanks to store chemicals underground.

- **Operating Standards** - To ensure the safety of workers, other parties, and the environment by specifying how an activity is to be conducted; these can take the form of best management practices (BMPs) that define a set of standard operating procedures for use in a particular activity to limit the threat to the environment (e.g., limits on pesticide applications or animal feedlot operations).

- **Source Prohibitions** - To prohibit the storage or use of dangerous materials in a defined area; these can take the form of prohibitions of certain activities or of restrictions on the use of certain materials.

- **Purchase of Property or Development Rights** - To guarantee community control over the activities on lands that feed water into an aquifer, this may involve outright purchase of the land or of a more limited interest, such as surface-use rights.

- **Public Education** - To build community support for regulatory programs, such as controls on pollution sources in special zoning districts, and to motivate voluntary ground-water protection efforts, such as water conservation or household hazardous waste management.

- **Ground-Water Monitoring** - To assess the quality of local aquifers by sampling public and private wells for selected contaminants.

- **Household Hazardous Waste Collection** - To alleviate the threat to ground water from the disposal in regular trash pick-ups, sewers, or septic systems of household products that contain hazardous substances or other materials that can be harmful to ground water, such as paints, solvents, or pesticides.

- **Water Conservation** - To reduce the total quantity of water withdrawn from ground-water aquifers and to protect against contamination by reducing the rate at which contaminants can spread in the aquifer (e.g., excessive withdrawals from an aquifer located near the ocean can draw salt water into the aquifer and contaminate wells).

How Can You Clean Up Your Own Act?
So far, the emphasis has been on how you can help your community to protect its ground water through the development of community-wide policies and programs. But ground-water protection also begins at home. How do your personal habits affect your community's ground water quality? What can you, as an individual, do to protect your community's ground water?

How Do You Dispose of the Polluting Materials Used in Your Home?
You may be surprised to learn that the way you dispose of products you use at home can contribute to the contamination of your community's ground water. You may be even more surprised to learn that a number of the products you use at home contain hazardous or toxic substances. The truth is, however, that products like motor oil, pesticides, left-over paints or paint cans, mothballs, flea collars, weedkillers, household cleaners, and even a number of medicines contain materials that can be harmful to ground water and to the environment in general. (See **Appendix 3** for a list of the types of products commonly found around homes and their potentially harmful components.) The average American disposes of approximately one pound of this type of waste each year. So, although the amount of any of these substances that you pour down your drain, put in your trash, or dump on the ground may seem insignificant to you, try multiplying it by the number of people in your community. That amount may not seem so insignificant.

Don't Pour It Down the Drain! Anything you pour down your drain or flush down your toilet will enter your septic system or your community's sewer system. Using this method to dispose of products that contain harmful substances can affect your septic system's ability to treat human wastes. Once in the ground, these harmful substances can eventually contaminate the ground water. In addition, most community wastewater treatment plants are not designed to treat many of these substances. Thus, they can eventually be discharged into bodies of surface water and cause contamination.

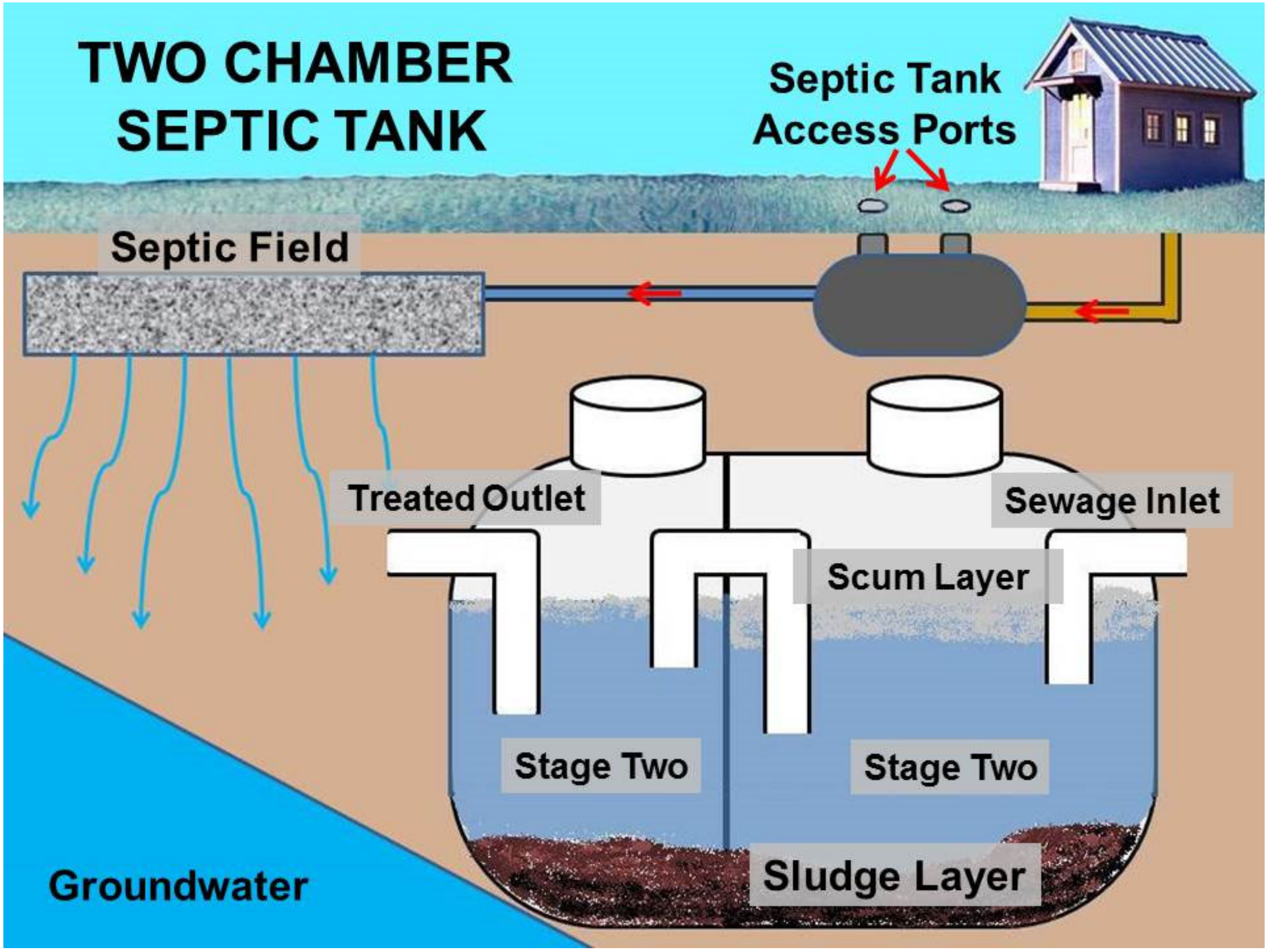
Don't Put It in the Trash! Community landfills also generally are not equipped to handle hazardous materials. As rain and snow pass through the landfill, the water can become contaminated by these products and eventually carry them into the ground water and surface water.

Don't Dump It on the Ground! Hazardous wastes that are dumped on or buried in the ground can contaminate the soil and either leach down into the ground water or be carried into a nearby body of surface water by runoff during rainstorms.

Do Use and Dispose of Harmful Materials Properly! There are very few options for disposing of hazardous products used in your home, so the first step may be to limit your use of such products. Whenever possible, substitute a nonhazardous product. When that is not possible, buy only as much as you need.

Larger quantities may be less expensive, but they leave you with the problem of disposing of them safely. Finally, urge community officials to sponsor periodic household hazardous waste collection days if they have not established this policy.

By helping your community to centralize collection of hazardous household wastes for appropriate disposal, you will be helping your community to make a major contribution toward protecting its ground water. The saying "Garbage in, garbage out" applies to more than computer data bases.



How Do You Take Care of Your Septic System?
Your septic system is designed to have its effluent discharge into a drainage field where it undergoes some decomposition by micro-organisms in the soil as it works its way down to the ground water. If your system is not pumped out frequently enough, solid materials can leave the tank and enter the drainage field. Any substances poured down your drains also will enter that drainage field and, eventually, the ground water.
To prevent ground-water contamination from your septic system:

- Have your septic system inspected annually and pumped out regularly; no chemical or other additive can be a substitute for this, and these septic system chemicals actually can prevent your septic system from functioning properly

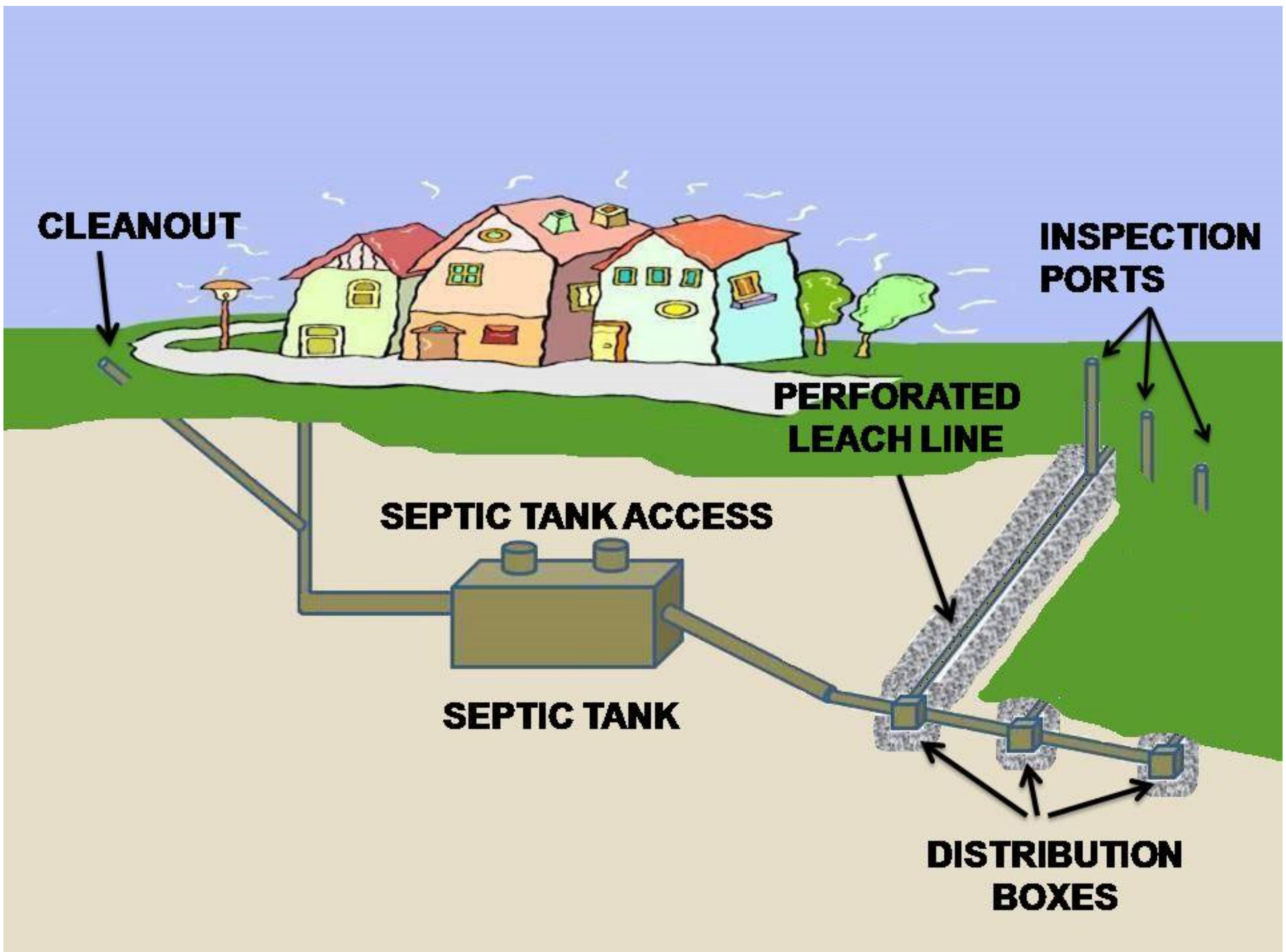
- Be cautious about what you put into your system; substances like coffee grounds, cigarette butts, sanitary items, or fats do not break down easily in septic systems, and chemicals like paints, solvents, oil, and pesticides will go from your septic system into the ground water.

- Limit the amount of water entering your system by using water-saving fixtures and appliances.

How Does Your Garden Grow?
If you are a homeowner, you probably take a lot of pride in your home and the yard surrounding it. You may apply fertilizers to make your grass thick and green, your flowers colorful, and your vegetable crop abundant. You also may use pesticides to keep bugs from ruining what the fertilizers have helped to produce. What you may not know, however, is that many of these fertilizers and pesticides contain hazardous chemicals that can travel through the soil and contaminate ground water.

If you feel you must use these chemicals, use them in moderation. This is not a case of "***more is better***." Your county extension agent can provide information on natural ways to control lawn, garden, and tree pests that can reduce reliance on chemicals.

What Else Can You Do?
Get informed and get involved! Around the country, citizens are getting involved in their communities, volunteering their time and energy, and making a difference. If you think one person can't change the system, help form a group. You, alone or as part of a group, can help to educate your family, friends, and neighbors about the importance of ground water to your community. And, after you've cleaned up your own act, you can help your community clean up its act.



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APPENDIX

NEW INFORMATION FOR THE 1999 REPRINTED EDITION
Appendices 1 and 2 are not included in this edition since they are outdated. The following information replaces them:

New Drinking Water Protection Information for Communities

As a result of new requirements in the 1996 amendments to the Safe Drinking Water Act, states are now implementing Source Water Assessment Programs, which build on existing wellhead protection programs. In these assessments, states will identify the most significant potential sources of contamination for each public water system - whether served by ground water or surface water. These assessments, which should be completed for all public water systems in each state by 2003 and made available to the public, will provide valuable information for communities on priority drinking water protection needs.

Contacts for more information

For additional information about the source water assessment and ground water protection programs in your state, contact the agency in your state that manages the environmental and/or the public health protection programs. These contacts and links to specific states and EPA regions can be found on the EPA's web page at www.epa.gov/safewater/protect.html or by calling the Safe Drinking Water Hotline at 1-800-426-4791.

For local information on ground water protection efforts in your community, contact your local environmental or public health office. Contact information can be found by looking in the government section of your telephone directory. If your drinking water comes from a water company or local government, contact them for information as well. Contact information can be found on your water bill or in the telephone directory.

APPENDIX 1. POTENTIALLY HARMFUL COMPONENTS OF COMMON HOUSEHOLD PRODUCTS

Product	**Toxic or Hazardous Components**
Antifreeze (gasoline or coolant systems)	methanol, ethylene glycol
Automatic transmission fluid	petroleum distillates, xylene
Battery acid (Electrolyte)	sulfuric acid petroleum solvents, alcohols, glycol
Degreasers for driveways and garages	ether
Degreasers for engines and metal	chlorinated hydrocarbons, toluene, phenols,
	dichloroperchloroethylene
Engine and radiator flushes	petroleum solvents, ketones, butanol, glycol
Hydraulic fluid (brake fluid)	ether
Motor oils; and waste oils	hydrocarbons, fluorocarbons
Gasoline and jet fuel	hydrocarbons
Diesel fuel, kerosene, #2 heating oil	hydrocarbons
Grease, lubes	hydrocarbons
Rustproofers	hydrocarbons
Car wash detergents	phenols, heavy metals
Car waxes and polishes	alkyl benzene sulfonates
Asphalt and roofing tar	petroleum distillates, hydrocarbons
Paints, varnishes, stains, dyes	hydrocarbons
Paint and lacquer thinner	heavy metals, toluene
	acetone, benzene, toluene, butyl, acetate, methyl
Paint and varnish removers, deglossers	ketones
	methylene chloride, toluene, acetone, xylene,
Paint brush cleaners	ethanol, benzene, methanol
	hydrocarbons, toluene, acetone, methanol, glycol
Floor and furniture strippers	ethers, methyl ethyl ketones
Metal polishes	xylene
Laundry soil and stain removers	petroleum distillates, isopropanol, petroleum
Spot removers arid dry cleaning fluid	naptha
	petroleum distillates, tetrachloroethylene
Other solvents	hydrocarbons, benzene, trichloroethylene, 1, 1, 1
Rock salt (Halite)	trichloroethane
Refrigerants	acetone, benzene
Bug and tar removers	sodium concentration
Household cleansers, oven cleaners	1, 1, 2 trichloro - 1, 2, 2 trifluoroethane
Drain cleaners	xylene, petroleum distillates
Toilet cleaners	xylenols, glycol ethers, isopropanol
Cesspool cleaners	1, 1, 1 trichloroethane
	xylene, sulfonates, chlorinated phenols
Disinfectants	tetrachloroethylene, dichlorobenzene, methylene
Pesticides (all types)	chloride
	cresol, xylenols
Photochemicals	napthalene, phosphorus, xylene, chloroform,
	heavy metals, chlorinated hydrocarbons
Printing ink	phenols, sodium sulfite, cyanine, silver halide,
Wood preservatives (creosote)	potassium bromide
Swimming pool chlorine	heavy metals, phenol-formaldehyde
Lye or caustic soda	pentachlorophenols
Jewelry cleaners	sodium hypochlorite
	sodium hydroxide
	sodium cyanide

Chapter 13 Exercise
GROUNDWATER PROTECTION

All of the groundwater protection questions will come from the Environmental Protection Agency's Citizen's Guide to Groundwater Protection. The booklet is in the front of the assignment.

1. Ground water also is used for about half of the nation's agricultural irrigation and nearly one-third of the industrial water needs.
A. True
B. False

2. Actually ground water occurs as part of what can be called the oldest recycling program - the hydrologic cycle. The hydrologic cycle involves the continual movement of water between the earth and the atmosphere through evaporation and precipitation. As rain and snow fall to the earth, some of the water runs off the surface into lakes, rivers, streams, and the oceans; some evaporates; and some is absorbed by plant roots.
A.   True
B.   False

3. The rest of the water soaks through the ground's surface and moves downward through the unsaturated zone, where the open spaces in rocks and soil are filled with a mixture of air and water, until it reaches the water table.
A.   True
B.   False

4. The water table is the top of the saturated zone, or the area in which all interconnected spaces in rocks and soil are filled with water. The water in the saturated zone is called surface water.
A.   True
B.   False

5. Areas where ground water exists in sufficient quantities to supply wells or springs are called aquifers, a term that literally means "***water bearer***." Aquifers store water in the spaces between particles of sand, gravel, soil, and rock as well as cracks, pores, and channels in relatively solid rocks.
A.   True
B. False

6. An aquifer's storage capacity is controlled largely by its porosity, or the relative amount of open space present to hold water. Its ability to transmit water, or permeability, is based in part on the size of these spaces and the extent to which they are connected.
A.   True
B.   False

7. Ground water can move sideways as well as up or down. This movement is in response to friction, differences in elevation, and differences in pressure. The movement is usually quite slow, frequently as little as a few feet per year, although it can move as much as several feet per day in more permeable zones. ground water can move even more rapidly in Klein aquifers, which are areas in water soluble limestone and similar rocks where fractures or cracks have been widened by the action of the ground water to form sinkholes, tunnels, or even caves.
A.   True
B.   False

8. Approximately one-fourth of all fresh water used in the nation comes from ground water.
A.   True
B.   False

9. Ground-water use varies among the states, with some states, such as Hawaii, Mississippi, Florida, Idaho, and New Mexico, relying on ground water to supply considerably more than one-eight of their household water needs and other states, such as Colorado and Rhode Island, supplying more than 90% of their water needs with ground water.
A. True
B. False

10. About 10 percent of all ground-water public water supply systems are in violation of drinking water standards for biological contamination. In addition, approximately 74 pesticides, a number of which are known carcinogens, have been detected in the ground water of 38 states.
A. True
B. False

11. Ground-water contamination cannot originate on the surface of the ground, in the ground above the water table, or in the ground below the water table.
A. True
B. False

12. Substances that can contaminate ground water can be divided into five basic categories.
A. True
B. False

13. Leachates are liquids that have dripped through the landfill and carry dissolved substances from the waste materials, containing such substances as heavy metals and organic decomposition products; salt; bacteria; and viruses.
A. True
B. False

14. A major cause of ground-water contamination in many areas of the United States is effluent, or outflow, from septic tanks, cesspools, and privies.
A. True
B. False

15. Approximately one half of all homes in the United States rely on septic systems to dispose of their human wastes. If these systems are properly sited, designed, constructed, or maintained, they can allow contamination of the ground water by bacteria, nitrates, viruses, synthetic detergents, household chemicals, and chlorides. Although each system can make an insignificant contribution to ground-water contamination, the sheer number of such systems and their widespread use in every area that does not have a public sewage treatment system makes them serious contamination sources.
A. True
B. False

16. Agricultural activities also can make significant contributions to ground-water contamination with the millions of tons of fertilizers and pesticides spread on the ground and from the storage and disposal of livestock wastes. Homeowners, too, can contribute to this type of ground-water pollution with the chemicals they apply to their lawns, rosebushes, tomato plants, and other garden plants.
A. True
B. False

17. There are approximately 500 hazardous waste land disposal facilities and more than 16,000 municipal and other landfills nationwide. To protect ground water, these facilities are now required to be constructed with clay or synthetic liners and leachate collection systems.
A. True
B. False

18. Unfortunately, these requirements are comparatively recent, and thousands of landfills were built, operated, and abandoned in the past without such safeguards. A number of these sites have not caused serious ground-water contamination problems.
A. True
B. False

19. There are between five and six thousand underground storage tanks are used to store a variety of materials, including gasoline, fuel oil, and numerous chemicals.
A. True
B. False

20. The average life span of these tanks is 18 years, and over time, exposure to the elements causes them to corrode.
A. True
B. False

21. Now, hundreds of thousands of these tanks are estimated to be leaking, and many are contaminating ground water. Replacement costs for these tanks are estimated at $1 per gallon of storage capacity; a cleanup operation can cost considerably more.
A. True
B. False

22. Wells can be another source of ground-water contamination. In the years before there were community water supply systems, most people relied on bottled water to provide their drinking water. In rural areas this can still be the case. If a well is abandoned without being properly sealed, however, it cannot act as a direct channel for contaminants to reach ground water.
A. True
B. False

23. Given the importance of ground water as a source of drinking water for so many communities and individuals and the cost and difficulty of cleaning it up, common sense tells us that the best way to guarantee continued supplies of clean ground water is to prevent contamination.
A. True
B. False

24. The Safe Drinking Water Act, which authorizes OSHA to set standards for maximum levels of contaminants in drinking water, regulate the underground disposal of wastes in deep wells, designate areas that rely on a single aquifer for their water supply, and establish a nationwide program to discourage the states to develop programs to protect public water supply wells (i.e., wellhead protection programs).
A. True
B. False

25. The Resource Conservation and Recovery Act, which regulates the storage, transportation, treatment, and disposal of solid and hazardous wastes to prevent contaminants from leaching into ground water.
A. True
B. False

26. The Federal Insecticide, Fungicide, and Rodenticide Act, which authorizes DOT to control the availability of pesticides that have the ability to leach into ground water.
A. True
B. False

27. The Clean Water Act, which authorizes EPA to make grants to the states for the development of ground-water protection strategies and authorizes a number of programs to prevent water pollution from a variety of potential sources.
A. True
B. False

28. Wellhead protection is simply protection of all or part of the area surrounding a well from which the well's ground water is drawn. This is called a wellhead protection area (WHIPPY).
A. True
B. False

29. For a program to be successful, all levels of government must participate in the wellhead protection program. The federal government is responsible for approving state wellhead protection programs and for providing technical support to state and local governments.
A. True
B. False

30. Federal governments must develop and implement wellhead protection programs that meet the requirements of the Safe Drinking Water Act.
A. True
B. False

31. Source Prohibitions - To prohibit the storage or use of dangerous materials in a defined area; these can take the form of prohibitions of certain activities or of restrictions on the use of certain materials.
A. True
B. False

32. Purchase of Property or Development Rights - To guarantee community control over the activities on lands that feed water into a septic tank, this may involve outright purchase of the land or of a more limited interest, such as surface-use rights.
A. True
B. False

33. Household Hazardous Waste Collection - To alleviate the threat to ground water from the disposal in regular trash pick-ups, sewers, or septic systems of household products that contain hazardous substances or other materials that can be harmful to ground water, such as paints, solvents, or pesticides.
A. True
B. False

34. Water Constipation - To reduce the total quantity of water withdrawn from ground-water aquifers and to protect against contamination by reducing the rate at which contaminants can spread in the aquifer (e.g., excessive withdrawals from an aquifer located near the ocean can draw salt water into the aquifer and contaminate wells).
A. True
B. False

35. Public Education - To build community support for regulatory programs, such as controls on pollution sources in special zoning districts, and to motivate voluntary ground-water protection efforts, such as water conservation or household hazardous waste management.
A. True
B. False

RCRA Glossary

The terms below are defined as they pertain to the Resource Conservation and Recovery Act.

Abandoned For purposes of defining a material as a solid waste under RCRA Subtitle C, a material that is disposed of, burned, or incinerated.

Accumulated Speculatively Storage of a material in lieu of expeditious recycling. Materials are usually accumulated speculatively if the waste being stored has no viable market or if a facility cannot demonstrate that at least 75 percent of the material has been recycled in a calendar year.

Acknowledgment of Consent Notice sent by EPA to an exporter of hazardous waste, indicating that the importing country has agreed to accept such waste.

Action Levels For purposes of Subtitle C corrective action, risk-based concentrations of hazardous constituents in ground water, soil, or sediment that may trigger further investigation into possible contamination at a particular site.

Administrative Action Enforcement action taken by EPA or a state under its own authority, without involving a judicial court process.

Administrative Procedures Act The Act that establishes rulemaking procedures as well as site-specific licensing procedures, access to agency information, and procedures and standards for judicial review of agency actions. All environmental rulemakings proposed and finalized by EPA include public participation throughout the process.

Aggregation Points Centers that accept used oil only from places owned by the same owner and operator as the aggregation point, or from do-it- yourselfers.

Alternative Concentration Limits For purposes of TSDF ground water monitoring, hazardous constituent limits established by the EPA Regional Administrator that are allowed to be present in ground water.

Annual Aggregate For purposes of UST financial responsibility, the total amount of UST financial responsibility coverage required to cover all leaks that might occur in one year.

Applicable or Relevant and Appropriate Requirements Standards, criteria, or limitations under federal or more stringent state environmental laws, including RCRA, that may be required during a Superfund remedial action, unless site-specific waivers are obtained.

Authorized State A state that has been delegated the authority by EPA to implement and enforce its own regulations for hazardous waste management under RCRA. The state program must be at least as stringent as the federal standards.

Automatic Tank Gauging A release detection method for USTs that uses a probe in the tank that is wired to a monitor to provide information on product level and temperature.

Basel Convention The international treaty that establishes standards for global trade of hazardous waste, municipal waste, and municipal incinerator ash. Because the United States is not a party to the convention, U.S. businesses can only export waste to those countries with which the U.S. government has negotiated a separate waste trade agreement.

Bentsen Wastes Geothermal exploration, development, and production waste exempt from RCRA Subtitle C regulation.

Best Demonstrated Available Technology The technology that best minimizes the mobility or toxicity (or both) of the hazardous constituents for a particular waste.

Bevill Wastes Fossil fuel combustion wastes, mining and mineral processing wastes, and cement kiln dust wastes exempt from RCRA Subtitle C regulation.

Biennial Report A report submitted by hazardous waste LQGs and TSDFs to enable EPA and the states to track the quantities of hazardous waste generated and the movements of those hazardous wastes.

Boiler An enclosed device that uses controlled flame combustion to recover and deliver energy in the form of steam, heated fluid, or heated gases.

Bottom Ash Ash that collects at the bottom of a combustion chamber.

Burners Handlers who burn used oil for energy recovery in boilers, industrial furnaces, or hazardous waste incinerators.

Burning for Energy Recovery Burning hazardous waste for its heating value as a fuel, and using wastes to produce fuels or as ingredients in fuels.

By-Products Materials that are not one of the intended products of a production process and includes most wastes that are not spent materials or sludges.

California List Interim LDR treatment standards that ensured adequate protection of human health and the environment during the time EPA was promulgating final LDR treatment standards.

Capacity Assurance Plan A written statement which ensures that a state has hazardous waste treatment and disposal capacity. This capacity must be for facilities that are in compliance with RCRA Subtitle C requirements and must be adequate to manage hazardous wastes projected to be generated within the state over 20 years.

Cathode Ray Tubes Vacuum tubes made primarily of glass, which constitute the video display component of televisions and computer monitors. These tubes are generally hazardous for lead.

Cathodic Protection A form of corrosion protection for USTs that uses sacrificial anodes or a direct current source to protect steel by halting the naturally occurring electrochemical process that causes corrosion.

Cement Kiln Type of industrial furnace that receives hazardous waste to burn as fuel to run its cement process. Cement is produced by heating mixtures of limestone and other minerals or additives at high temperatures in a rotary kiln, followed by cooling, grinding, and finish mixing.

Change in Service Using a formerly regulated UST system to store a nonregulated substance.

Characteristic Waste Waste that is considered hazardous under RCRA because it exhibits any of four different properties: ignitability, corrosivity, reactivity, and toxicity.

Civil Action A formal lawsuit, filed in court, against a person who has either failed to comply with a statutory or regulatory requirement or an administrative order, or against a person who has contributed to a release of hazardous waste or hazardous constituents.

Clean Air Act The Act that regulates air emissions from area, stationary, and mobile sources. CAA limits the emission of pollutants into the atmosphere in order to protect human health and the environment from the effects of airborne pollution.

Clean Closure The process of completely removing all waste that was treated, stored, or disposed in a hazardous waste unit.

Clean Water Act The Act that sets the basic structure for regulating discharges of pollutants to surface waters of the United States. CWA imposes contaminant limitations or guidelines for all discharges of wastewater into the nation's waterways.

Closure The procedure that a solid or hazardous waste management facility undergoes to cease operations and ensure protection of human health and the environment in the future.

Codification The process by which final regulations are incorporated into the CFR, which is published annually.

Collection Centers Centers that accept used oil from multiple sources, including both businesses and private citizens.

Combustion The controlled burning in an enclosed area as a means of treating or disposing of hazardous waste.

Commercial Chemical Products Unused or off-specification chemicals, spill or container residues, and other unused manufactured products that are not typically considered chemicals. For the purposes of hazardous waste listings, CCPs include only unused, pure chemical products and formulations.

Compliance Monitoring For purposes of RCRA TSDF ground water monitoring, a program that seeks to ensure that the amount of hazardous waste that has leaked into the uppermost aquifer does not exceed acceptable levels.

Composting Processes designed to optimize the natural decomposition or decay of organic matter, such as leaves and food. The end product of composting is a humus-like material that can be added to soils to increase soil fertility, aeration, and nutrient retention.

Comprehensive Environmental Response, Compensation, and Liability Act The Act that authorizes EPA to clean up uncontrolled or abandoned hazardous waste sites and respond to accidents, spills and other emergency releases of hazardous substances. CERCLA provides EPA with enforcement authority to ensure that responsible parties pay the cleanup costs of remediating a site contaminated with hazardous substances.

Comprehensive Environmental Response, Compensation, and Liability Information System A computerized database used to track hazardous substance sites.

Comprehensive Performance Testing The initial and periodic evaluation procedure for demonstrating compliance with the national emission standards for hazardous air pollutants and establishes revised operating limits for hazardous waste combustors.

Comprehensive Procurement Guidelines A list, updated every two years, which designates items with recycled content that procuring agencies should aim to purchase. This list currently contains 54 items within 8 product categories.

Concentration Limits For purposes of TSDF ground water monitoring, the maximum levels of hazardous constituents allowed to be present in the ground water.

Conditionally Exempt Small Quantity Generators Facilities that produce less than 100 kg of hazardous waste, or less than 1 kg of acutely hazardous waste, per calendar month. A CESQG may only accumulate less than 1,000 kg of hazardous waste, 1 kg of acutely hazardous waste, or 100 kg of spill residue from acutely hazardous waste at any one time.

Construction Quality Assurance A program required by EPA to ensure that a landfill, surface impoundment, or waste pile meets all of the technological requirements.

Contained-In Policy An EPA policy that determines the health threats posed by contaminated environmental media and debris, and whether such materials must be managed as RCRA hazardous wastes.

Containers Portable devices, in which a material is stored, transported, treated, or otherwise handled.

Containment Building A completely enclosed structure used to store or treat noncontainerized waste.

Continuous Emission Monitoring Systems A system that directly and continuously measures one or more pollutants exiting a combustion unit.

Continuous Monitoring Systems A device which continuously samples the regulated parameter without interruption, evaluates the detector response at least once every 15 seconds, and computes and records the average value at least every 60 seconds.

Cooperative Agreement An agreement between a state and EPA which ensures that the state will spend money from the LUST Trust Fund for its intended purpose.

Corporate Guarantee The demonstration that a corporate grandparent, corporate parent, or sibling corporation can meet financial assurance requirements on behalf of a TSDF owner and operator, or the financial responsibility requirements on behalf of an UST owner and operator. Firms with a "***substantial business relationship***" with an UST owner and operator can also make this demonstration.

Corrective Action An EPA program to address the investigation and cleanup of contamination from solid waste facilities, hazardous waste facilities, and USTs.

Corrective Action Management Unit A physical, geographical area designated by EPA or states for managing remediation wastes during corrective action.

Corrosivity Characteristic The characteristic which identifies wastes that are acidic or alkaline (basic) and can readily corrode or dissolve flesh, metal, or other materials.

Counting Totaling the hazardous wastes at a given facility for a particular month in order to determine hazardous waste generator status.

Covered States States that participated in EPA's medical waste tracking program from June 22, 1989 to June 22, 1991, which included Connecticut, New Jersey, New York, Rhode Island, and the Commonwealth of Puerto Rico.

Cradle to Grave The time period referring to the initial generation of hazardous waste to its ultimate disposal.

Criminal Action Enforcement action reserved for the most serious violations, which can result in fines or imprisonment.

De minimis Very small amounts of hazardous waste that are discharged to wastewater treatment facilities and thus, are exempt from the mixture rule. De minimis also refers to small concentrations of regulated substances in an UST.

Debris A broad category of large manufactured and naturally occurring objects that are commonly discarded (e.g., construction materials, decommissioned industrial equipment, discarded manufactured objects, tree trunks, boulders).

Delisting A site-specific petition process whereby a handler can demonstrate to EPA that a particular wastestream generated at its facility that meets a listing description does not pose sufficient hazard to warrant RCRA regulation. Owners and operators can also use the delisting process for wastes that are hazardous under the mixture and derived-from rules that pose minimal hazard to human health and the environment.

Derived-From Rule A rule that regulates residues from the treatment of listed hazardous wastes.

Designated Facility A hazardous waste treatment, storage, or disposal facility which has received a RCRA permit (or interim status),or is a recycling facility regulated under 40 CFR Section 261.2(c)(2) or Subpart F, of Section 266,and has been designated on the manifest by the generator.

Destination Facilities Facilities that treat, dispose of, or recycle a particular category of universal waste.

Destruction and Removal Efficiency Standard which verifies that a combustion unit is destroying the organic components found in hazardous waste.

Detection Monitoring For purposes of RCRA TSDF ground water monitoring, the first step of monitoring at land disposal units, where the owner and operator monitors for indication of a leak from the unit, looking for potential changes in the ground water quality from normal (background)levels.

Dilution Prohibition The LDR requirement that prohibits the addition of soil or water to waste in order to reduce the concentrations of hazardous constituents instead of treatment by the appropriate LDR treatment standards.

Direct Discharges Discharges from point sources into surface water pursuant to a CWA NPDES permit.

Disposal The discharge, deposit, injection, dumping, spilling, leaking, or placing of any solid or hazardous waste on or in the land or water.

Disposal Prohibition The LDR requirement that prohibits the land disposal of hazardous waste that has not been adequately treated to reduce the threat posed by such waste.

Distillation Bottoms Residues that form at the bottom of a distillation unit.

Do-it-Yourselfers Individuals who generate used oil through the maintenance of their own personal vehicles and equipment and are not considered used oil generators.

Drip Pads Engineering structures consisting of a curbed, free-draining base, constructed of non-earthen materials, and designed to convey wood preservative chemical drippage from treated wood, precipitation, and surface water run-on to an associated collection system at wood preserving plants.

Elementary Neutralization Units Containers, tanks, tank systems, transportation vehicles, or vessels which neutralize wastes that are hazardous only for exhibiting the characteristic of corrosivity.

Emergency Planning and Community Right-to- Know Act The Act designed to help communities prepare to respond in the event of a chemical emergency and to increase the public's knowledge of the presence and threat of hazardous chemicals.

Environmental Justice The fair distribution of environmental risks across socioeconomic and racial groups.

Environmental Media Materials such as soil, surface water, ground water, and sediment.

EPA Identification Number A unique number assigned by EPA to each hazardous waste generator, transporter, or treatment, storage, and disposal facility.

Episodic Generation The situation in which a generator's status changes from one month to the next, as determined by the amount of waste generated in a particular month. If a generator's status does in fact change, the generator is required to comply with the respective regulatory requirements for that class of generators for the waste generated in that particular month.

Equipment Each valve, pump, compressor, pressure relief device, sampling connection system, open-ended valve or line, or flange or other connector, and any other control devices or systems.

Exception Report A report, submitted by LQGs and SQGs, detailing efforts to locate wastes when a signed copy of the manifest has not been received.

Existing USTs USTs that were in service, or for which installation had commenced on or before December 22, 1988.

Extended Product Responsibility An approach to environmental protection that strives to reduce the environmental impacts of products.

Federal Insecticide, Fungicide, and Rodenticide Act The Act that provides procedures for the registration of pesticide products to control their introduction into the marketplace.

Federal Procurement Program A program that sets minimum recycled content standards for certain designated items and requires procuring agencies to purchase those items composed of the highest percentage of recovered materials practicable.

Final Authorization Authorization by EPA that indicates that a state's program is equivalent to, or no less stringent than, as well as consistent with, federal hazardous waste regulations.

Financial Assurance Under RCRA Subtitle C, the requirements designed to ensure that TSDF owners and operators will have the financial resources to pay for closure, post-closure, and liability costs. Under RCRA Subtitle D, the requirements designed to ensure that MSWLF owners and operators will have the financial resources to pay for closure, post-closure, and corrective action costs.

Financial Test A test of self-insurance which demonstrates that an owner and operator has sufficient financial strength to satisfy TSDF financial assurance or UST financial responsibility requirements.

Float The lighter materials present in petroleum refinery wastewater. As components of oily waste, float rises to the surface in the first step of wastewater treatment.

Fly Ash Particles of ash, such as particulate matter which may also have metals attached them, that are carried up the stack of a combustion unit with gases during combustion.

Formal Action An enforcement action, frequently in the form of an administrative order, that is taken when a serious violation is detected, or when the owner and operator does not respond to an informal administrative action.

Freedom of Information Act The Act that grants private parties the right to obtain information in the government's possession. FOIA requires each federal agency to establish procedures for handling requests regarding government statutes, regulations, standards, permit conditions, requirements, orders, and policies.

Full Cost Accounting An accounting approach that helps local governments identify all direct and indirect costs, as well as the past and future costs, of a municipal solid waste management program.

Generator Any person whose act first creates or produces a hazardous waste, used oil, or medical waste, or first brings such materials into RCRA regulation.

Green Buildings Buildings that are designed, constructed, operated, and ultimately removed in such a way as to minimize their environmental impact.

Ground Water Monitoring Sampling and analysis of ground water for the purpose of detecting the release of contamination from a solid or hazardous waste land-based unit. Ground water monitoring is also a method of UST release detection which senses the presence of liquid product floating in ground water.

Hammer Provisions Requirements written directly into RCRA by Congress, as in the case of the Hazardous and Solid Waste Amendments of 1984, that would automatically become regulations if EPA failed to issue its own regulations by certain dates.

Hazard Communication Standard The OSHA standard that provides workers with access to information about the hazards and identities of the chemicals they are exposed to while working, as well as the measures they can take to protect themselves.

Hazard Ranking System A model devised under CERCLA that determines the relative risk to public health and the environment posed by hazardous substances in ground water, surface water, air, and soil. Only those sites with a score of 28.5 (on a scale of 0 to 100) are eligible for placement on the NPL.

Hazardous Constituents For purposes of RCRA, TSDF ground water monitoring, those constituents that have been detected in the uppermost aquifer and are reasonably expected to be in or derived from the waste contained in the unit.

Hazardous Substance A comprehensive designation under CERCLA for RCRA hazardous wastes as well as other toxic pollutants regulated by CAA, CWA, and TSCA. EPA has the authority under CERCLA to designate any additional element, compound, mixture, or solution as a hazardous substance. The definition of hazardous substance specifically excludes petroleum and natural gas.

Hazardous Waste A waste with properties that make it dangerous, or capable of having a harmful effect on human health and the environment. Under the RCRA program, hazardous wastes are specifically defined as wastes that meet a particular listing description or that exhibit a characteristic of hazardous waste.

Hazardous Waste Operations and Emergency Response Worker Protection Standard The OSHA standard that protects the health and safety of workers engaged in operations at hazardous waste sites, hazardous waste treatment facilities, and emergency response locations.

Ignitability characteristic The characteristic which identifies wastes that can readily catch fire and sustain combustion.

Incinerator An enclosed device that uses controlled flame combustion and does not meet the criteria for classification as a boiler, industrial furnace, sludge dryer (a unit that dehydrates hazardous sludge),or carbon regeneration unit (a unit that regenerates spent activated carbon).Incinerators also include infrared incinerators (units that use electric heat followed by a controlled flame afterburner)and plasma arc incinerators (units that use electrical discharge followed by a controlled flame afterburner).

Incorporation by Reference This occurs when the regulatory language in a state's regulation actually cite, or refer to, the federal regulations.

Indirect Discharges Wastewater that is first sent to a POTW, and then after treatment by the POTW, discharged pursuant to a NPDES permit.

Industrial Ecology The study of material and energy flows and their transformations into products, byproducts, and wastes throughout industrial and ecological systems.

Industrial Furnace An enclosed unit that is an integral part of a manufacturing process and uses thermal treatment to recover materials or energy from hazardous waste.

Informal Administrative Action Any communication from EPA or a state agency that notifies the handler of a problem.

Inherently Waste-Like For purposes of defining a material as a solid waste under RCRA Subtitle C, a material, such as dioxin-containing wastes, that is always considered a solid waste because of its intrinsic threat to human health and the environment.

Insurance A policy to cover the TSDF financial assurance or UST financial responsibility requirements.

Interim Authorization A temporary mechanism that is intended to promote continued state participation in hazardous waste management while encouraging states to develop programs that are fully equivalent to the federal program and will qualify for final authorization.

Interim Measures Under RCRA Subtitle C corrective action, short-term actions to control ongoing risks while site characterization is underway or before a final remedy is selected.

Interim Status Facilities TSDFs that were already in operation when the RCRA standards were established and that are operating under less stringent standards until they receive a permit.

Interstitial Monitoring UST release detection method that involves the use of secondary containment, such as a barrier, outer wall, vault, or liner around the UST or piping to prevent leaking product from escaping into the environment. If product escapes from the inner tank or piping, it will then be directed towards an interstitial monitor located between the walls.

Inventory Control An UST release detection method that involves taking measurements of tank contents, recording the amount of product pumped each operating day, and reconciling this data at least once a month to determine if a tank is leaking.

Jobs through Recycling A program EPA launched in 1994 to support recycling markets. The goal of the program is to foster markets for recycled goods by promoting and assisting the development of businesses using recovered materials, creating new
recycling jobs, and spurring innovative technologies.

Lab Packs Drums filled with many small containers packed in nonbiodegradable absorbent materials.

Land Disposal For purposes of RCRA Subtitle C regulation, placement in or on the land, except in a corrective action unit of hazardous waste, and includes, but is not limited to, placement in a landfill, surface impoundment, waste pile, injection well, land treatment facility, salt dome formation, salt bed formation, underground mine or cave, or placement in a concrete vault, or bunker intended for disposal purposes.

Land Treatment Units Also known as land farms, land treatment units involve the application of hazardous waste on the soil surface, or the incorporation of waste into the upper layers of the soil in order to degrade, transform, or immobilize hazardous constituents present in hazardous waste.

Landfill For purposes of RCRA Subtitle C, a disposal unit where nonliquid hazardous waste is placed in or on the land.

Large Quantity Generators Facilities that generate more than 1,000 kg of hazardous waste per calendar month, or more than 1 kg of acutely hazardous waste per calendar month.

Large Quantity Handlers of Universal Waste
Handlers that accumulate a total of 5000 kg or more of universal waste at any one time.

Leachate Any liquid, including any suspended components in the liquid, that has percolated through or drained from waste.

Leaking Underground Storage Tank Trust Fund A fund created by SARA that provides money for overseeing corrective action taken by a responsible party, and provides money for cleanups at UST sites where the owner and operator is unknown, unwilling, or unable to respond.

Letter of Credit A credit document issued to an owner and operator to cover TSDF financial assurance or UST financial responsibility requirements.

Liabilities Damages that may result from an unexpected release of contaminants into the environment.

Lightweight Aggregate Kiln Type of industrial furnace that produces lightweight aggregate and burns liquid hazardous waste as fuel to run its process. Lightweight aggregate refers to a wide variety of raw materials (such as clay, shale, or slate) which, after thermal processing, can be combined with cement to form concrete products. Lightweight aggregate is produced either for structural or thermal insulation purposes.

Listed Wastes Wastes that are considered hazardous under RCRA because they meet specific listing descriptions.

Manifest Paperwork that accompanies hazardous waste from the point of generation to the point of ultimate treatment, storage, or disposal. Each party involved in the waste's management retains a copy of the RCRA manifest, which contains specific
information about the waste.

Manual Tank Gauging A method of UST leak detection that requires keeping the tank undisturbed for at least 36 hours per week, during which time the contents of the tank are measured to determine if the tank is leaking.

Marine Protection, Research, and Sanctuaries Act This Act requires a permit for any material that is transported from a U.S. port or by a U.S. vessel for disposition at sea.

Marketers Used oil handlers who either 1) direct shipments of used oil to be burned as fuel in regulated devices, or 2) claim that used oil to be burned for energy recovery is on-specification.

Maximum Achievable Control Technology Process Technology-based concentration limits developed under CAA to limit emissions of individual constituents from hazardous waste combustion units.

Maximum Contaminant Levels For purposes of RCRA ground water monitoring, contaminant-specific levels borrowed from SDWA that are the maximum levels of hazardous waste or hazardous constituents allowed to be present in the groundwater.

Medical Waste Culture and stocks of infectious agents, human pathological wastes, human blood and blood products, used sharps, certain animal wastes, certain isolation wastes, and unused sharps.

Memorandum of Agreement An agreement between a state's director and its EPA Regional Administrator outlining the nature of the responsibilities to enforce a regulatory program and defining the level of coordination and oversight between EPA and the state agency.

Military Munitions For purposes of defining a material as a solid waste under RCRA Subtitle C, ammunition products and components produced for or used by the military for national defense and security.

Miscellaneous Units Hazardous waste treatment, storage, or disposal units regulated under RCRA that do not meet any of the other definitions of regulated units.

Mixed Waste Radioactive waste that is also a hazardous waste under RCRA. Such wastes are jointly regulated by RCRA and Atomic Energy Act.

Mixture Rule A rule that is intended to ensure the regulation of mixtures of listed wastes with nonhazardous solid wastes.

Municipal Solid Waste Durable goods (e.g., appliances, tires, batteries), nondurable goods (e.g., newspapers, books, magazines), containers and packaging, food wastes, yard trimmings, and miscellaneous or anic wastes from residential, commercial, and industrial nonprocess sources.

Municipal Solid Waste Landfill A discrete area of land or excavation that receives municipal solid waste.

National Ambient Air Quality Standards Regulations promulgated by EPA under the Clean Air Act for six criteria pollutants — sulfur dioxide,, particulate matter, nitrogen dioxide, carbon monoxide, ozone, and lead — in order to protect the public from toxic emissions to the atmosphere.

National Corrective Action Prioritization System A resource management tool by which EPA sets priorities for the Subtitle C corrective action program.

National Emission Standards for Hazardous Air Pollutants Standards set by EPA under the Clean Air Act to control emissions from specific industrial sources.

National Oil and Hazardous Substances Pollution Contingency Plan The NCP contains the regulations that implement the CERCLA response process. The NCP also provides information about the roles and responsibilities of EPA, other federal agencies, states, and private parties regarding releases of hazardous substances.

National Priorities List EPA's priority hazardous substance sites for cleanup. EPA only funds remedial actions at hazardous waste sites on the NPL.

New USTs USTs that are installed, or for which installation has commenced, after December 22, 1988.New USTs must be installed in compliance with all of the applicable technical standards.

Nonsudden Accidental Occurrences For purposes of TSDF financial assurance, events that take place over time and involve continuous or repeated exposure to hazardous waste.

Notice of Deficiency A notice requiring that a TSDF permit applicant supply more information for a complete permit application.

Notice of Intent to Deny A notice issued by a permitting agency which tells a TSDF permit applicant that the application does not demonstrate compliance with the RCRA standards.

Notice of Noncompliance An informal letter to a handler written as part of an informal administrative action.

Notice of Violation An informal letter to a handler written as part of an informal administrative action.

Occupational Safety and Health Act The Act that is designed to save lives, prevent injuries, and protect the health of employees in the workplace. OSHA accomplishes these goals through several regulatory requirements including the HCS and HAZWOPER standards.

OECD Council Decision A multilateral agreement by the Organization for Economic Cooperation and Development that establishes procedural and substantive controls for the import and export of recyclables between member nations. Because the United States is a member of the OECD, U.S. businesses can trade recyclables with other member nations.

Off-Specification Used Oil Used oil that is tested and does not meet given parameters for arsenic, cadmium, chromium, flash point, lead, and total halogens.

Omnibus Provision The authority which allows EPA to add conditions to a TSDF permit that are not specifically addressed by the RCRA regulations.

On-Specification Used Oil Used oil that meets all the given parameters for arsenic, cadmium, chromium, flash point, lead, and total halogens.

Open Dumps Solid waste disposal facilities that fail to comply with the Subtitle D criteria.

Operating Requirements Parameters established by a facility and written into a permit that will ensure a combustion unit meets numerical performance standards.

Operation and Maintenance The operation and maintenance phase of the CERCLA response process. Operation and maintenance may include activities such as ground water pump and treat, and cap maintenance. EPA conducts review of operation and maintenance activities to ensure that the remedy selected is still protective of human health and the environment.

Overfiling When a state fails to enforce its hazardous waste program properly, EPA can overfile, or enforce a provision for which a particular state has authorization.

Particulate Matter Small dust-like particles emitted from hazardous waste combustion units.

Payment Bond For purposes of TSDF financial assurance, a type of surety bond that will fund a standby trust fund in the amount equal to the value of the bond.

Per Occurrence For purposes of UST financial responsibility, the amount of money that must be available to pay for the costs from one leak.

Performance Bond For purposes of TSDF financial assurance, a type of surety bond that guarantees that an owner and operator will comply with their closure, post-closure, and liability requirements.

Performance Standards The numerical pollutant emission limits for hazardous waste combustion units developed by EPA.

Permanent Closure Closure of an UST that involves a number of steps designed to ensure that the tank will pose no threat to human health or the environment after it is closed.

Permit-as-a-Shield The provision which ensures that TSDF permittees will not be enforced against for violating new requirements that were not established in the original permit.

Permit-by-Rule A special form of a RCRA permit that is sometimes granted to facilities with permits for activities under other environmental laws.

Permitted Facilities Facilities that have obtained a TSDF permit from EPA or the state agency to engage in the treatment, storage, or disposal of hazardous waste.

Point of Compliance For purposes of RCRA TSDF ground water monitoring, the vertical point where a TSDF owner and operator must monitor the uppermost aquifer to determine if the leak exceeds the ground water protection standard.

Point Source Discharges Discharges of treated wastewater directly into a lake, river, stream, or other water body. Point source discharges are regulated under CWA.

Pollutants or Contaminants Any element, substance, compound, or mixture that, after release into the environment and upon exposure, ingestion, inhalation, or assimilation into any organism, will or may reasonably be anticipated to cause illness, death, or deformation in any organism. The definition of pollutant or contaminant specifically excludes petroleum and natural gas.

Post-Closure Period after closure during which owners and operators of solid or hazardous waste disposal units conduct monitoring and maintenance activities in order to preserve the integrity of the disposal system.

Potentially Responsible Party The person or persons who may be held liable for hazardous substance contamination under CERCLA. PRPs may include the owners and operators, generators, transporters, and disposers of the hazardous substances.

Precious Metals Reclamation The recycling and recovery of precious metals (i.e., gold, silver, platinum, palladium, iridium, osmium rhodium, and ruthenium) from hazardous waste.

Preliminary Assessment A review of all readily available site information such as maps, deeds, and other records to determine if further CERCLA response action is necessary. During the PA, EPA tries to determine what type of substances may have been released and the potential impacts to human health and the environment.

Principal Organic Hazardous Constituents Selected or anic constituents, which are high in concentration and difficult to burn, that are monitored to ensure a hazardous waste combustion unit's destruction and removal efficiency.

Process Vent Any open-ended pipe or stack that is vented to the atmosphere either directly, through a vacuum-producing system, or through a tank associated with hazardous waste distillation, fractionation, thin-film evaporation solvent extraction, or air or steam stripping operations.

Processors and Rerefiners Facilities that process used oil so that it can be burned for energy recovery or reused.

Procuring Agency Agencies that purchase $10,000 or more worth of an item designated under the federal procurement program during the course of a fiscal year. Procuring agencies include: federal government departments or agencies; state government agencies that use appropriated federal funds for procurement of a designated item; local government agencies that use appropriated federal funds for procurement of a designated item, and government contractors that work on a project funded by appropriated federal funds with respect to work performed under the contract.

Publicly Owned Treatment Works A municipal wastewater treatment plant that receives domestic sewage from households, office buildings, factories, and other places where people live and work. Treatment at a POTW is regulated by the CWA.

RCRAInfo A database that tracks RCRA Subtitle C facility-specific data (i.e., events and activities related to hazardous waste generators, transporters, and TSDFs), and hazardous waste activity reports, known as biennial reports, that are submitted by LQGs and TSDFs.

Reactivity Characteristic The characteristic which identifies wastes that readily explode or under violent reactions.

Rebuttable Presumption For purposes of RCRA, an objective test that focuses on the halogen level in used oil to determine whether the used oil has been mixed with a listed hazardous waste.

Reclaimed For purposes of defining a material as a solid waste under RCRA Subtitle C, a material is reclaimed if it is processed to recover a usable product, or regenerated by processing it in a way that restores it to usable condition.

Record of Decision A remedial action plan document that describes the remedy selected for a Superfund site.

Recovered Materials Advisory Notice A notice that provides suggested recycled content levels and other purchasing information for each item designated in the CPG. Procuring agencies can use these levels as guidelines, but are encouraged to exceed EPA's recommendations.

Recovered Materials Content Levels The minimum amount of recovered material that designated items under the federal procurement program should contain.

Recycled For purposes of defining a material as a solid waste under RCRA Subtitle C, a material is recycled if it is used or reused, or reclaimed.

Recycling The separation and collection of wastes, their subsequent transformation or remanufacture into usable or marketable products or materials, and the purchase of products made from recyclable materials.

Recycling Presumption The assumption that all used oil that is generated will be recycled.

Regulated Community The group of organizations, people, industries, businesses, and agencies that, because they perform certain activities, fall under the purview of RCRA.

Regulated Substance For purposes of UST regulation, any hazardous substance defined under CERCLA §101(14) and petroleum.

Regulations Rules issued by an agency, such as EPA, that translate the general mandate of a statute into a set of requirements that the regulated community and the agency must work within.

Remedial Action Longer-term CERCLA response actions that ultimately represent the final remedy for a site and generally are more expensive and of a longer duration than removals.

Remedial Action Plans Special form of RCRA permit that a facility may obtain to treat, store, or dispose of hazardous remediation waste at a remediation waste management site.

Remedial Design/Remedial Action Remedial design is a phase in the CERCLA response process in which technical drawings are developed for the chosen remedy, costs for implementing the remedy are estimated, and roles and responsibilities of EPA, states and contractors are determined. During their medial action phase, the remedy is implemented generally by a contractor, with oversight and inspection conducted by EPA or the state (or both).

Remedial Investigation/Feasibility Study A remedial investigation is a phase in the CERCLA response process that entails an in-depth examination of the nature and extent of contamination at a site and the associated risks to human health and the environment. The feasibility study entails an analysis of remedial action alternatives comparing the advantages and disadvantages of each.

Remediation Waste All solid and hazardous wastes, and all media (including ground water, surface water, soils, and sediments) and debris that are managed for implementing cleanup.

Removal Action Short-term cleanup action taken under CERCLA that usually addresses problems only at the surface of a site. A removal is conducted in response to an emergency, and generally is limited to 12 months duration or $2 million in expenditures.

Risk Retention Groups For purposes of UST financial responsibility, entities formed by businesses or individuals with similar risks to provide insurance coverage for those risks.

Risk-Based Decision-Making A process that uses risk and exposure assessment concepts to help UST implementing agencies establish enforcement priorities.

Rulemakings Rules issued by an agency, such as EPA, that translate the general mandate of a statute into a set of requirements that the regulated community and the agency must work within.

Safe Drinking Water Act The Act designed to protect the nation 's drinking water supply by establishing national drinking water standards (MCLs or specific treatment techniques),and by regulating UIC wells.

Scrap Metal Worn or extra bits and pieces of metal parts, such as scrap piping and wire, or worn metal items, such as scrap automobiles and radiators.

Secondary Materials The five categories of solid wastes regulated under Subtitle C, which include: spent materials, by-products, sludges, commercial chemical products, and scrap metal.

Sham Recycling Illegitimate activities executed under the guise of recycling in order to be exempt from or subject to lesser regulation.

Site Inspection An in-depth assessment of on-site conditions, conducted as part of the CERCLA response process, to rank the site's hazard potential by determining the site's hazard ranking system score. Activities to assess the site may include sampling, field reconnaissance, and examination of site records (e.g., topographical maps, logs).

Sludges Any solid, semisolid, or liquid wastes generated from a wastewater treatment plant, water supply treatment plant, or air pollution control device.

Small Quantity Generators Facilities that generate between 100 kg and 1,000 kg of hazardous waste per calendar month.

Small Quantity Handlers of Universal Waste Handlers that do not accumulate 5000 kg of all universal waste categories combined at their location at any one time.

Sole Active Ingredient For purposes of determining if a waste is P or U listed the only chemical ingredient serving the function of a commercial product formulation.

Solid Waste Any garbage, refuse, sludge from a wastewater treatment plant, water supply treatment plant, or air pollution control facility, and other discarded material, including solid, liquid, semisolid, or contained gaseous material, resulting from industrial, commercial, mining, and agricultural operations and from community activities. For the purposes of hazardous waste regulation, a solid waste is a material that is discarded by being either abandoned, inherently waste-like, a certain waste military munition, or recycled.

Solid Waste Management Units For purposes of Subtitle C corrective action, discernible units where solid or hazardous wastes have been placed at any times, or any area where solid wastes have been routinely and systematically released.

Source Reduction Maximizing or reducing the use of natural resources at the beginning of an industrial process, thereby eliminating the amount of waste produced by the process. Source reduction is EPA's preferred method of waste management.

Spent Materials Materials that have been used and can no longer serve the purpose for which they were produced without processing.

Spill Prevention Control and Countermeasures Regulations establishing spill prevention procedures and equipment requirements for nontransportation-related facilities with certain aboveground or underground storage capacities that could reasonably be expected to discharge oil into or upon the navigable waters of the United States or adjoining shorelines.

Staging Pile An accumulation of solid, non-flowing remediation waste that is not a containment building and that is used only during remedial operations for temporary storage at a facility.

State Assurance Funds For purposes of UST financial responsibility, state funds that are used to help pay for cleanup and third-party liability costs resulting from leaking USTs.

State Authorization Tracking System A tool used by EPA to chart those states that have been authorized to implement the RCRA hazardous waste program.

Statistical Inventory Reconciliation An UST release detection method that involves using sophisticated computer software to conduct a statistical analysis of inventory, delivery, and dispensing data in order to determine if a tank is leaking.

Storage Holding hazardous waste for a temporary period, after which the hazardous waste is treated, disposed of, or stored elsewhere.

Storage Prohibition LDR provision that prevents the indefinite storage of untreated hazardous waste for reasons other than the accumulation of quantities necessary for effective treatment or disposal.

Sudden Accidental Occurrences For purposes of TSDF financial assurance, events that are not continuous or repeated.

Superfund The common name for CERCLA. Superfund refers to the entire CERCLA program as well as the trust fund established to fund cleanup of contaminated sites where potentially responsible parties cannot be identified, or are unwilling or unable to pay.

Superfund Amendments and Reauthorization Act SARA, enacted in 1986, reauthorized and amended CERCLA to include additional enforcement authorities, technical requirements, community involvement requirements, and various clarifications. SARA Title III authorized EPCRA.

Supplemental Environmental Projects Environmentally beneficial projects which a defendant or respondent agrees to undertake in the settlement of a civil or administrative enforcement action, but which the defendant is not otherwise legally required to perform.

Surety Bond A guarantee which certifies that a surety company will cover TSDF financial assurance or UST financial responsibility requirements on behalf of the owner and operator.

Surface Impoundment A natural topographic depression, man-made excavation, or diked area formed primarily of earthen materials that is used to treat, store, or dispose of hazardous waste.

Tank Tightness Testing A variety of UST release detection methods used to determine if a tank is leaking; most of these methods involve monitoring changes in product level or volume in a tank over a period of several hours.

Tanks Stationary devices used to store or treat hazardous waste.

Technical Grade For purposes of determining if a waste is P or U listed, a commercial chemical product that is not 100 percent pure, but is of a grade of purity that is either marketed or recognized in general usage by the chemical industry.

Temporary Closure A method by which an UST owner and operator can close a tank temporarily and bring it back into service at a later date. The owner and operator must continue to operate and maintain the corrosion protection system and the leak detection system if any product remains in the tank.

Temporary Units Containers or tanks that are designed to manage remediation wastes during corrective action at permitted or interim status facilities.

Thermal Treatment The treatment of hazardous waste in a device that uses elevated temperatures as the primary means to change the chemical, physical, or biological character or composition of the waste.

Totally Enclosed Treatment Units Units that are designed and constructed to practically eliminate the potential for hazardous wastes to escape into the environment during treatment.

Toxic Substances Control Act The Act that controls the manufacture and sale of certain chemical substances.

Toxicity Characteristic The characteristic which identifies wastes that are likely to leach dangerous concentrations of toxic chemicals into ground water.

Toxicity Characteristic Leaching Procedure A lab procedure designed to predict whether a particular waste is likely to leach chemicals into ground water at dangerous levels.

Transfer Facilities Any transportation-related facility such as loading docks, parking areas, storage areas, or other similar areas where shipments of hazardous waste, used oil, or universal waste are held temporarily during the normal course of transportation.

Transporter Any person engaged in the off-site transportation of hazardous waste, used oil, universal waste, or medical waste.

Treatment Any method, technique, or process designed to physically, chemically, or biologically change the nature of a hazardous waste.

Treatment Standards LDR criteria that hazardous waste must meet before it is disposed.

Treatment, Storage, and Disposal Facilities Facilities engaged in the treatment, storage, or disposal of hazardous waste. These facilities are the last link in the cradle-to-grave hazardous waste management system.

Trial Burn Burn conducted to test the performance of a hazardous waste combustion unit over a range of conditions.

Trust Fund A financial mechanism by which a facility can set aside money in order to cover the TSDF financial assurance or UST financial responsibility requirements.

Underground Injection Control Well Units into which hazardous waste is permanently disposed of by injection 1/4 mile below an aquifer with an underground source of drinking water (as defined under SDWA).

Underground Storage Tanks A tank and any underground piping connected to the tank that is used to contain an accumulation of regulated substances and that has at least 10 percent of its combined volume under round.

Underlying Hazardous Constituents Constituents that must be treated in order to meet contaminant-specific levels for purposes of the LDR program.

Unit Pricing An economic incentive program used to achieve source reduction and recycling, also called variable rate refuse collection, where customers who dispose of more waste pay more for the collection and disposal services.

Universal Treatment Standards Contaminant-specific hazardous waste LDR treatment levels.

Universal Wastes Commonly recycled wastes with special management provisions intended to facilitate recycling. There are four categories of universal wastes: hazardous waste batteries, hazardous waste pesticides that have been recalled or collected in
waste pesticide collection programs, hazardous waste lamps, and hazardous waste thermostats.

Upgrading Retrofitting existing USTs to come into compliance with the UST regulations. The upgrading period expires on December 22,1998.

Use Constituting Disposal The direct placement of wastes or waste-derived products (e.g., asphalt with petroleum refining wastes as an ingredient) on the land.

Used Oil Any oil that has been refined from crude or synthetic oil that has been used and, as a result of such use, is contaminated by physical or chemical impurities.

USTfield Abandoned or underutilized industrial and commercial properties where redevelopment is complicated by real or perceived environmental petroleum contamination from federally-regulated USTs.

Vapor Monitoring An UST release detection method in which the equipment measures product fumes in the soil around the UST to check for leaks.

Violation The act or an instance of breaking or disregarding the law.

Waste Analysis Plan A plan that outlines the procedures necessary to ensure proper treatment, storage, or disposal of hazardous waste.

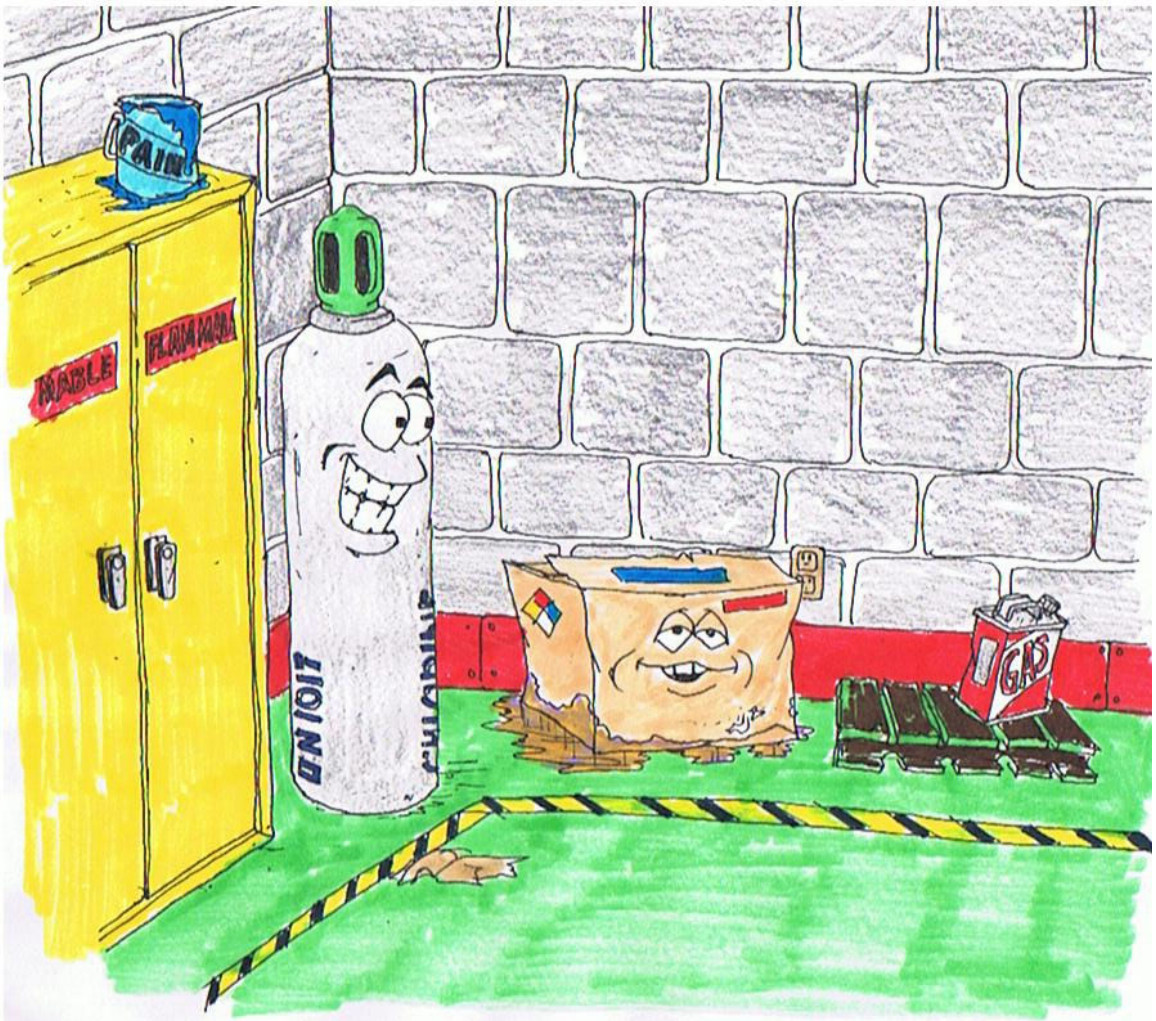
Waste Minimization The reduction, to the extent feasible, in the amount of hazardous waste generated prior to any treatment, storage, or disposal of the waste. Because waste minimization efforts eliminate waste before it is generated, disposal costs may be reduced, and the impact on the environment may be lessened.

Waste Pile An open pile used for treating or storing nonliquid hazardous waste.

Wastewater Treatment Units Tanks or tank systems that treat hazardous wastewaters and discharge them pursuant to CWA.

WasteWi$e A program designed to assist companies, states, local governments, Native American tribes, and other institutions in developing cost-effective practices to reduce solid waste.

Zero Discharges Wastewater that is not directly or indirectly discharged to a navigable water (e.g., wastewater that is land disposed through spray irrigation) under CWA. Zero discharge facilities are subject to federal or state regulatory limitations that are as strict as those that apply to direct and indirect dischargers under CWA.



Land Disposal Restrictions
LDR Glossary

Area of Contamination (AOC) Policy: EPA interprets RCRA to allow certain discrete areas of generally dispersed contamination to be considered RCRA units. Therefore consolidation of material within an AOC and treatment of material, in situ, within an AOC does NOT CREATE A POINT OF HAZARDOUS WASTE GENERATION FOR PURPOSES OF RCRA.

Best Demonstrated Available Technology (BDAT): The treatment technology that best minimizes the mobility or toxicity (or both) of the hazardous constituents for a particular waste.

Characteristic Waste: Waste that is considered hazardous under RCRA because it exhibits any four different properties: ignitability, corrosivity, reactivity, and toxicity.

Contained-in Determination for Soil: Granted by EPA or an authorized state that certifies that soil is no longer considered a hazardous waste. You can apply for a contained-in determination if soil should not be managed as a hazardous waste because:
(1) the soil does not exhibit a characteristic of hazardous waste when generated, or
(2) the soil contaminated with a listed hazardous waste has concentrations of hazardous constituents that are below health-based levels.

Contained-in Policy: The "***contained-in***" policy dates back to a 1986 memorandum which states that although groundwater is not a solid waste, it can be considered a hazardous waste if it "***contains***" a hazardous waste. This policy was then applied to soil and debris.

Debris: Any solid material exceeding a 60 mm particle size that is intended for disposal and that is a manufactured object, or plant or animal matter, or natural geologic material.

Decharacterize: Treat a characteristic waste so that it no longer exhibits a characteristic property. For characteristic wastes treated in Clean Water Act and Safe Drinking water Act systems, decharacterize means dilution.

Determination of Equivalent Treatment (DET): A type of variance from the treatment standards in 40 CFR 268.40; applicable when a technology is specified as the treatment standard. Allows an alternative technology to be used in lieu of the specified technology, if the petitioner can demonstrate that the alternative technology can achieve a measure of performance equivalent to that of the specified technology.

Generator: Any person whose act first creates or produces hazardous waste.

Hazardous and Solid Waste Amendments (HSWA): Amendments to RCRA, enacted in 1984.

Listed Waste: Wastes that are considered hazardous under RCRA because they meet specific listing descriptions.

Mixed Waste: Radioactive waste that is also a hazardous waste under RCRA. Such wastes are jointly regulated by RCRA and Atomic Energy Act.

Non-Analyzable Constituents: Constituents that lack appropriate test methods or chemical standards and therefore cannot be properly measured to determine compliance with LDR concentration-based standards in 268.40 and 268.48.

Nonwastewater (NWW): Wastes that do not meet the criteria for wastewaters defined below.

Point of generation (POG) of a Hazardous Waste: The point at which a waste is first determined to be hazardous. For listed wastes this is the point at which the waste first meets the listing description, and for characteristic wastes it is the point the waste first exhibits the characteristic.

Prohibited Wastes: Wastes that have to meet their treatment standards before land disposal.

Restricted Wastes: Wastes that have LDR treatment standards, but can be land disposed without treatment because of an exemption (e.g., a capacity variance).

Soil: Unconsolidated earth material composing the superficial geologic strata (material overlying bedrock) consisting of clay, silt, sand or gravel size particles as classified by the U.S. Soil Conservation Service, or a mixture of such materials with liquids, sludges or solids which is inseparable by simple mechanical removal processes and is made up primarily of soil by volume based on visual inspection.

Subtitle C Landfill: A landfill that accepts hazardous waste (including treated hazardous waste).

Subtitle D Landfill: A landfill that accepts nonhazardous waste.

Total Waste Analysis: Analytic test method used to measure compliance with most of the organic treatment standards. Carbon disulfide, cyclohexanone, and methanol treatment standards are measured using toxicity characteristic leaching procedure.

Toxicity Characteristic Leaching Procedure (TCLP): Analytic test method used to measure compliance with the metal treatment standards.

Transfer Facilities: Any transportation-related facility such as loading docks, parking areas, storage areas, or other similar areas where shipments of hazardous waste are temporarily held during the normal course of transportation.

Transporter: Any person engaged in the off-site transportation of hazardous waste by air, rail, highway, or water.

Treatability Group: A grouping of hazardous wastes that can be treated to similar concentrations using identical technologies.

Treatment, Storage, Disposal Facilities: Facilities engaged in the treatment, storage, or disposal of hazardous waste.

Underlying Hazardous Constituent (UHC): Any constituent listed in 40 CFR 268.48, "**Table UTS - Universal Treatment Standards**", except fluoride, selenium, sulfide, vanadium, and zinc, which can reasonably be expected to be present at the point of generation of the hazardous waste, at a concentration above the constituent-specific universal treatment standard.

Universal Treatment Standards (UTS): These are the constituent-specific treatment standards found in §268.48.

Use Constituting Disposal: The direct placement of recycled materials, that is wastes or waste derived-products, on the land. Note, remediation activities involving replacement of treated soils onto the land is not a type of use constituting disposal, in part, because it is a supervised remediation instead of an unsupervised recycling activity.

Waste Analysis Plan (WAP): A plan that outlines the procedures necessary to ensure proper treatment, storage, or disposal of hazardous waste.

Wastewater (WW): Wastes that contain less than 1% by weight total organic carbon (**TOC**) and less than 1% by weight total suspended solids (**TSS**).

ENVIRONMENTAL CONTACTS EPA INFORMATION SERVICES

Center for Environmental Research and Information (CERI),
Office of Research and Development (ORD))..(513)569-7562
www.epa.gov/ORD/publications

Clean Air Technology Center ....(919)541-0800
www.epa.gov/ttn/catc

Environmental Appeals Board (EAB)..(201)501-7060
www.epa.gov/eab

Environmental Justice Hotline ....(800)962-6215
www.epa.gov/compliance/environmentaljustice/index.html

Environmental Recycling Hotline/Earth 's 911.......................................(800)253-2687
www.earth911.org

Human Resources...(202)564-4606
www.epa.gov/epahrist

Indoor Air Quality Clearinghouse ....(800)438-4318
www.epa.gov/iaq

Information Resource Center (IRC)...(202)260-5922
www.epa.gov/natlibra/hqirc

Methods Information Communication Exchange
(MICE or Test Methods Hotline)..(703)676-4690
www.epa.gov/epaoswer/hazwaste/test/mice.htm

National Lead Information Center ....(800)424-5323
www.epa.gov/lead/nlic.htm

National Radon Hotline ....(800)767-7236
www.epa.gov/iaq/radon/

National Service Center for Environmental Publications.......................(800)490-9198
www.epa.gov/ncepihom/G-2

National Pesticides Information Center;
Federal Insecticide, Fungicide, and Rodenticide Act ....(800)858-7378
npic.orst.edu/

Office of Atmospheric Programs ....(202)564-9140
www.epa.gov/ozone

Office of Congressional &Intergovernmental Relations ....(202)564-5200
www.epa.gov/ocir

Pay-As-You-Throw Helpline ....(888)372-7298
www.epa.gov/payt

RCRA, Superfund & EPCRA Call Center ....(800)424-9346
www.epa.gov/epaoswer/hotline

Safe Drinking Water Hotline ....(800)426-4791
www.epa.gov/safewater

Toxic Substances Control Act Hotline ....(202)554-1404

WasteWise ....(800)372-9473
www.epa.gov/wastewise

Wetlands Protection Hotline ....(800)832-7828
www.epa.gov/owow/wetlands/wetline.html

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Office of Enforcement and Compliance Assurance ....(202)566-1514

Office of Solid Waste and Emergency Response
RCRA/UST ....(202)566-0270

Superfund/Oil ....(202)566-0276

Office of Environmental Information (Toxics Release Inventory)..............(202)566-1752

Office of Pollution, Prevention, and Toxics ....(202)566-0280

Office of Water ....(202)566-2426

FEDERAL GOVERNMENT INFORMATION SERVICES

Agency for Toxic Substances and Disease Registry TSDR).......................(888)422-8737
www.atsdr.cdc.gov/

Council for Environmental Quality; National Environmental Policy Act ....(202)395-5750
www.whitehouse.gov/ceq

Federal Consumer Information Center ....(800)333-4636
www.pueblo.gsa.gov

Federal Information Center ....(800)688-9889
www.info.gov

Government Printing Office..(202)512-1800
www.access.gpo.gov

Hazardous Materials Information Center ....(800)467-4922
hazmat.dot.gov

National Technical Information Service ....(800)553-6847
www.ntis.gov

National Institute for Occupational Safety and Health (NIOSH)..................(800)356-4647
www.cdc.gov/niosh

National Response Center ....(800)424-8802
www.nrc.uscg.mil

Nuclear Regulatory Commission ....(301)415-8200
www.nrc.gov

Occupational Safety and Health Administration (OSHA)
Compliance Guidance Group ....(301)515-6796


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Current EPA Rules and Regulations
PART 273 -- STANDARDS FOR UNIVERSAL WASTE MANAGEMENT

42 U.S.C. 6922, 6923, 6924, 6925, 6930, and 6937.

Subpart A -- General

§ 273.1 Scope.

(a) This part establishes requirements for managing the following:

(1) Batteries as described in 40 CFR 273.2;

(2) Pesticides as described in § 273.3;

(3) Thermostats as described in § 273.4; and

(4) Lamps as described in § 273.5.

(b) This part provides an alternative set of management standards in lieu of regulation under 40 CFR parts 260 through 272.

[60 FR 25543, May 11, 1995; 64 FR 36466, 36488, July 6, 1999]

[EFFECTIVE DATE NOTE: 64 FR 36466, 36488, July 6, 1999, revised paragraphs (a)(2) and (a)(3) and added paragraph (a)(4), effective Jan. 6, 2000.]

§ 273.2 Applicability -- batteries.

(a) Batteries covered under 40 CFR part 273. (1) The requirements of this part apply to persons managing batteries, as described in § 273.9, except those listed in paragraph (b) of this section.

(2) Spent lead-acid batteries which are not managed under 40 CFR part 266, subpart G, are subject to management under this part.

(b) Batteries not covered under 40 CFR part 273. The requirements of this part do not apply to persons managing the following batteries:

(1) Spent lead-acid batteries that are managed under 40 CFR part 266, subpart G.

(2) Batteries, as described in § 273.9, that are not yet wastes under part 261 of this chapter, including those that do not meet the criteria for waste generation in paragraph (c) of this section.

(3) Batteries, as described in § 273.9, that are not hazardous waste. A battery is a hazardous waste if it exhibits one or more of the characteristics identified in part 261, subpart C of this chapter.

(c) Generation of waste batteries. (1) A used battery becomes a waste on the date it is discarded (e.g., when sent for reclamation).

(2) An unused battery becomes a waste on the date the handler decides to discard it.

[60 FR 25543, May 11, 1995; 64 FR 36466, 36488, July 6, 1999]

[EFFECTIVE DATE NOTE: 64 FR 36466, 36488, July 6, 1999, revised paragraphs (a)(1), (b)(2) and (b)(3), effective Jan. 6, 2000.]

§ 273.3 Applicability -- pesticides.

(a) Pesticides covered under this part 273. The requirements of this part apply to persons managing pesticides, as described in § 273.9, meeting the following conditions, except those listed in paragraph (b) of this section:

(1) Recalled pesticides that are:

(i) Stocks of a suspended and canceled pesticide that are part of a voluntary or mandatory recall under FIFRA Section 19(b), including, but not limited to those owned by the registrant responsible for conducting the recall; or

(ii) Stocks of a suspended or cancelled pesticide, or a pesticide that is not in compliance with FIFRA, that are part of a voluntary recall by the registrant.

(2) Stocks of other unused pesticide products that are collected and managed as part of a waste pesticide collection program.

(b) Pesticides not covered under 40 CFR part 273. The requirements of this part do not apply to persons managing the following pesticides:

(1) Recalled pesticides described in paragraph (a)(1) of this section, and unused pesticide products described in paragraph (a)(2) of this section, that are managed by farmers in compliance with 40 CFR 262.70. (40 CFR 262.70 addresses pesticides disposed of on the farmer's own farm in a manner consistent with the disposal instructions on the pesticide label, providing the container is triple rinsed in accordance with 40 CFR 261.7(b)(3));

(2) Pesticides not meeting the conditions set forth in paragraph (a) of this section. These pesticides must be managed in compliance with the hazardous waste regulations in 40 CFR parts 260 through 272;

(3) Pesticides that are not wastes under part 261 of this chapter, including those that do not meet the criteria for waste generation in paragraph (c) of this section or those that are not wastes as described in paragraph (d) of this section; and

(4) Pesticides that are not hazardous waste. A pesticide is a hazardous waste if it is listed in 40 CFR part 261, subpart D or if it exhibits one or more of the characteristics identified in 40 CFR part 261, subpart C.

(c) When a pesticide becomes a waste. (1) A recalled pesticide described in paragraph (a)(1) of this section becomes a waste on the first date on which both of the following conditions apply:

(i) The generator of the recalled pesticide agrees to participate in the recall; and

(ii) The person conducting the recall decides to discard (e.g., burn the pesticide for energy recovery).

(2) An unused pesticide product described in paragraph (a)(2) of this section becomes a waste on the date the generator decides to discard it.

(d) Pesticides that are not wastes. The following pesticides are not wastes:

(1) Recalled pesticides described in paragraph (a)(1) of this section, provided that the person conducting the recall:

(i) Has not made a decision to discard (e.g., burn for energy recovery) the pesticide. Until such a decision is made, the pesticide does not meet the definition of "solid waste" under 40 CFR 261.2; thus the pesticide is not a hazardous waste and is not subject to hazardous waste requirements, including this part 273. This pesticide remains subject to the requirements of FIFRA; or

(ii) Has made a decision to use a management option that, under 40 CFR 261.2, does not cause the pesticide to be a solid waste (i.e., the selected option is use (other than use constituting disposal) or reuse (other than burning for energy recovery), or reclamation). Such a pesticide is not a solid waste and therefore is not a hazardous waste, and is not subject to the hazardous waste requirements including this part 273. This pesticide, including a recalled pesticide that is exported to a foreign destination for use or reuse, remains subject to the requirements of FIFRA.

(2) Unused pesticide products described in paragraph (a)(2) of this section, if the generator of the unused pesticide product has not decided to discard (e.g., burn for energy recovery) them. These pesticides remain subject to the requirements of FIFRA.

[60 FR 25543, May 11, 1995; 64 FR 36466, 36488, July 6, 1999]

[EFFECTIVE DATE NOTE: 64 FR 36466, 36488, July 6, 1999, revisedparagraph (a) introductory text, effective Jan. 6, 2000.]

§ 273.4 Applicability -- mercury thermostats.

(a) Thermostats covered under this part 273. The requirements of this part apply to persons managing thermostats, as described in § 273.9, except those listed in paragraph (b) of this section.

(b) Thermostats not covered under 40 CFR part 273. The requirements of this part do not apply to persons managing the following thermostats:

(1) Thermostats that are not yet wastes under part 261 of this chapter. Paragraph (c) of this section describes when thermostats become wastes.

(2) Thermostats that are not hazardous waste. A thermostat is a hazardous waste if it exhibits one or more of the characteristics identified in 40 CFR part 261, subpart C.

(c) Generation of waste thermostats. (1) A used thermostat becomes a waste on the date it is discarded (e.g., sent for reclamation).

(2) An unused thermostat becomes a waste on the date the handler decides to discard it.

[60 FR 25543, May 11, 1995; 64 FR 36466, 36488, July 6, 1999]

[EFFECTIVE DATE NOTE: 64 FR 36466, 36488, July 6, 1999, revised paragraph (a), effective Jan. 6, 2000.]

§ 273.5 Applicability -- Lamps.

(a) Lamps covered under this part 273. The requirements of this part apply to persons managing lamps as described in § 273.9, except those listed in paragraph (b) of this section.
(b) Lamps not covered under this part 273. The requirements of this part do not apply to persons managing the following lamps:

(1) Lamps that are not yet wastes under part 261 of this chapter as provided in paragraph (c) of this section.

(2) Lamps that are not hazardous waste. A lamp is a hazardous waste if it exhibits one or more of the characteristics identified in part 261, subpart C of this chapter.

(c) Generation of waste lamps. (1) A used lamp becomes a waste on the date it is discarded.

(2) An unused lamp becomes a waste on the date the handler decides to discard it.
[60 FR 25544, May 11, 1995; 64 FR 36466, 36488, July 6, 1999]

[EFFECTIVE DATE NOTE: 64 FR 36466, 36488, July 6, 1999, revised this section, effective Jan. 6, 2000.]

§ 273.8 Applicability -- household and conditionally exempt small quantity generator waste.

(a) Persons managing the wastes listed below may, at their option, manage them under the requirements of this part:

(1) Household wastes that are exempt under § 261.4(b)(1) of this chapter and are also of the same type as the universal wastes defined at § 273.9; and/or

(2) Conditionally exempt small quantity generator wastes that are exempt under § 261.5 of this chapter and are also of the same type as the universal wastes defined at § 273.9.

(b) Persons who commingle the wastes described in paragraphs (a)(1) and (a)(2) of this section together with universal waste regulated under this part must manage the commingled waste under the requirements of this part.
[64 FR 36466, 36488, July 6, 1999]

[EFFECTIVE DATE NOTE: 64 FR 36466, 36488, July 6, 1999, added this section, effective Jan. 6, 2000.]

§ 273.9 Definitions.

Battery means a device consisting of one or more electrically connected electrochemical cells which is designed to receive, store, and deliver electric energy. An electrochemical cell is a system consisting of an anode, cathode, and an electrolyte, plus such connections (electrical and mechanical) as may be needed to allow the cell to deliver or receive electrical energy. The term battery also includes an intact, unbroken battery from which the electrolyte has been removed.

Destination facility means a facility that treats, disposes of, or recycles a particular category of universal waste, except those management activities described in § 273.13 (a) and (c) and § 273.33 (a) and (c). A facility at which a particular category of universal waste is only accumulated, is not a destination facility for purposes of managing that category of universal waste.

FIFRA means the Federal Insecticide, Fungicide, and Rodenticide Act (7 U.S.C. 136-136y).

Generator means any person, by site, whose act or process produces hazardous waste identified or listed in part 261 of this chapter or whose act first causes a hazardous waste to become subject to regulation.

Lamp, also referred to as "universal waste lamp" is defined as the bulb or tube portion of an electric lighting device. A lamp is specifically designed to produce radiant energy, most often in the ultraviolet, visible, and infra-red regions of the electromagnetic spectrum. Examples of common universal waste electric lamps include, but are not limited to, fluorescent, high intensity discharge, neon, mercury vapor, high pressure sodium, and metal halide lamps.

Large Quantity Handler of Universal Waste means a universal waste handler (as defined in this section) who accumulates 5,000 kilograms or more total of universal waste (batteries, pesticides, thermostats, or lamps, calculated collectively) at any time. This designation as a large quantity handler of universal waste is retained through the end of the calendar year in which 5,000 kilograms or more total of universal waste is accumulated.

On-site means the same or geographically contiguous property which may be divided by public or private right-of-way, provided that the entrance and exit between the properties is at a cross-roads intersection, and access is by crossing as opposed to going along the right of way. Non-contiguous properties owned by the same person but connected by a right-of-way which he controls and to which the public does not have access, are also considered on-site property.

Pesticide means any substance or mixture of substances intended for preventing, destroying, repelling, or mitigating any pest, or intended for use as a plant regulator, defoliant, or desiccant, other than any article that:

(a) Is a new animal drug under FFDCA section 201(w), or

(b) Is an animal drug that has been determined by regulation of the Secretary of Health and Human Services not to be a new animal drug, or

(c) Is an animal feed under FFDCA section 201(x) that bears or contains any substances described by paragraph (a) or (b) of this section.

Small Quantity Handler of Universal Waste means a universal waste handler (as defined in this section) who does not accumulate 5,000 kilograms or more total of universal waste (batteries, pesticides, thermostats, or lamps, calculated collectively) at any time.

Thermostat means a temperature control device that contains metallic mercury in an ampule attached to a bimetal sensing element, and mercury-containing ampules that have been removed from these temperature control devices in compliance with the requirements of 40 CFR 273.13(c)(2) or 273.33(c)(2).

Universal Waste means any of the following hazardous waste that are subject to the universal waste requirements of this part 273:

(1) Batteries as described in § 273.2

(2) Pesticides as described in § 273.3

(3) Thermostats as described in § 273.4; and

(4) Lamps as described in § 273.5.

Universal Waste Handler:

(a) Means:

(1) A generator (as defined in this section) of universal waste; or

(2) The owner or operator of a facility, including all contiguous property, that receives universal waste from other universal waste handlers, accumulates universal waste, and sends universal waste to another universal waste handler, to a destination facility, or to a foreign destination.

(b) Does not mean:

(1) A person who treats (except under the provisions of 40 CFR 273.13 (a) or (c), or 273.33 (a) or (c)), disposes of, or recycles universal waste; or

(2) A person engaged in the off-site transportation of universal waste by air, rail, highway, or water, including a universal waste transfer facility.

Universal Waste Transfer Facility means any transportation-related facility including loading docks, parking areas, storage areas and other similar areas where shipments of universal waste are held during the normal course of transportation for ten days or less.

Universal Waste Transporter means a person engaged in the off-site transportation of universal waste by air, rail, highway, or water.

[60 FR 25544, May 11, 1995; 63 FR 71225, 71230, Dec. 24, 1998; redesignated and amended at 64 FR 36466, 36488, 36489, July 6, 1999]

[EFFECTIVE DATE NOTE: 64 FR 36466, 36488, 36489, July 6, 1999, redesignated and amended this section, effective Jan. 6, 2000.]

Subpart B -- Standards for Small Quantity Handlers of Universal Waste

§ 273.10 Applicability.

This subpart applies to small quantity handlers of universal waste (as defined in 40 CFR 273.9).
[60 FR 25544, May 11, 1995; 64 FR 36466, 36489, July 6, 1999]

[EFFECTIVE DATE NOTE: 64 FR 36466, 36489, July 6, 1999, revised this section (a), effective Jan. 6, 2000.]

§ 273.11 Prohibitions.

A small quantity handler of universal waste is:

(a) Prohibited from disposing of universal waste; and

(b) Prohibited from diluting or treating universal waste, except by responding to releases as provided in 40 CFR 273.17; or by managing specific wastes as provided in 40 CFR 273.13.
[60 FR 25544, May 11, 1995]

§ 273.12 Notification.

A small quantity handler of universal waste is not required to notify EPA of universal waste handling activities.
[60 FR 25544, May 11, 1995]

§ 273.13 Waste management.

(a) Universal waste batteries. A small quantity handler of universal waste must manage universal waste batteries in a way that prevents releases of any universal waste or component of a universal waste to the environment, as follows:

(1) A small quantity handler of universal waste must contain any universal waste battery that shows evidence of leakage, spillage, or damage that could cause leakage under reasonably foreseeable conditions in a container. The container must be closed, structurally sound, compatible with the contents of the battery, and must lack evidence of leakage, spillage, or damage that could cause leakage under reasonably foreseeable conditions.

(2) A small quantity handler of universal waste may conduct the following activities as long as the casing of each individual battery cell is not breached and remains intact and closed (except that cells may be opened to remove electrolyte but must be immediately closed after removal):

(i) Sorting batteries by type;
(ii) Mixing battery types in one container;
(iii) Discharging batteries so as to remove the electric charge;
(iv) Regenerating used batteries;
(v) Disassembling batteries or battery packs into individual batteries or cells;

(vi) Removing batteries from consumer products; or

(vii) Removing electrolyte from batteries.

(3) A small quantity handler of universal waste who removes electrolyte from batteries, or who generates other solid waste (e.g., battery pack materials, discarded consumer products) as a result of the activities listed above, must determine whether the electrolyte and/or other solid waste exhibit a characteristic of hazardous waste identified in 40 CFR part 261, subpart C.

(i) If the electrolyte and/or other solid waste exhibit a characteristic of hazardous waste, it is subject to all applicable requirements of 40 CFR parts 260 through 272. The handler is considered the generator of the hazardous electrolyte and/or other waste and is subject to 40 CFR part 262.

(ii) If the electrolyte or other solid waste is not hazardous, the handler may manage the waste in any way that is in compliance with applicable federal, state or local solid waste regulations.

(b) Universal waste pesticides. A small quantity handler of universal waste must manage universal waste pesticides in a way that prevent releases of any universal waste or component of a universal waste to the environment. The universal waste pesticides must be contained in one or more of the following:

(1) A container that remains closed, structurally sound, compatible with the pesticide, and that lacks evidence of leakage, spillage, or damage that could cause leakage under reasonably foreseeable conditions; or

(2) A container that does not meet the requirements of paragraph (b)(1) of this Section, provided that the unacceptable container is overpacked in a container that does meet the requirements of paragraph (b)(1) of this Section; or

(3) A tank that meets the requirements of 40 CFR part 265 subpart J, except for 40 CFR 265.197(c), 265.200, and 265.201; or

(4) A transport vehicle or vessel that is closed, structurally sound, compatible with the pesticide, and that lacks evidence of leakage, spillage, or damage that could cause leakage under reasonably foreseeable conditions.

(c) Universal waste thermostats. A small quantity handler of universal waste must manage universal waste thermostats in a way that prevents releases of any universal waste or component of a universal waste to the environment, as follows:

(1) A small quantity handler of universal waste must contain any universal waste thermostat that shows evidence of leakage, spillage, or damage that could cause leakage under reasonably foreseeable conditions in a container. The container must be closed, structurally sound, compatible with the contents of the thermostat, and must lack evidence of leakage, spillage, or damage that could cause leakage under reasonably foreseeable conditions.

(2) A small quantity handler of universal waste may remove mercury-containing ampules from universal waste thermostats provided the handler:

(i) Removes the ampules in a manner designed to prevent breakage of the ampules;

(ii) Removes ampules only over or in a containment device (e.g., tray or pan sufficient to collect and contain any mercury released from an ampule in case of breakage);

(iii) Ensures that a mercury clean-up system is readily available to immediately transfer any mercury resulting from spills or leaks from broken ampules, from the containment device to a container that meets the requirements of 40 CFR 262.34;

(iv) Immediately transfers any mercury resulting from spills or leaks from broken ampules from the containment device to a container that meets the requirements of 40 CFR 262.34;

(v) Ensures that the area in which ampules are removed is well ventilated and monitored to ensure compliance with applicable OSHA exposure levels for mercury;

(vi) Ensures that employees removing ampules are thoroughly familiar with proper waste mercury handling and emergency procedures, including transfer of mercury from containment devices to appropriate containers;

(vii) Stores removed ampules in closed, non-leaking containers that are in good condition;

(viii) Packs removed ampules in the container with packing materials adequate to prevent breakage during storage, handling, and transportation; and

(3)(i) A small quantity handler of universal waste who removes mercury-containing ampules from thermostats must determine whether the following exhibit a characteristic of hazardous waste identified in 40 CFR part 261, subpart C:

(A) Mercury or clean-up residues resulting from spills or leaks; and/or

(B) Other solid waste generated as a result of the removal of mercury-containing ampules (e.g., remaining thermostat units).

(ii) If the mercury, residues, and/or other solid waste exhibit a characteristic of hazardous waste, it must be managed in compliance with all applicable requirements of 40 CFR parts 260 through 272. The handler is considered the generator of the mercury, residues, and/or other waste and must manage it is subject to 40 CFR part 262.

(iii) If the mercury, residues, and/or other solid waste is not hazardous, the handler may manage the waste in any way that is in compliance with applicable federal, state or local solid waste regulations.

(d) Lamps. A small quantity handler of universal waste must manage lamps in a way that prevents releases of any universal waste or component of a universal waste to the environment, as follows:

(1) A small quantity handler of universal waste must contain any lamp in containers or packages that are structurally sound, adequate to prevent breakage, and compatible with the contents of the lamps. Such containers and packages must remain closed and must lack evidence of leakage, spillage or damage that could cause leakage under reasonably foreseeable conditions.

(2) A small quantity handler of universal waste must immediately clean up and place in a container any lamp that is broken and must place in a container any lamp that shows evidence of breakage, leakage, or damage that could cause the release of mercury or other hazardous constituents to the environment. Containers must be closed, structurally sound, compatible with the contents of the lamps and must lack evidence of leakage, spillage or damage that could cause leakage or releases of mercury or other hazardous constituents to the environment under reasonably foreseeable conditions.
[60 FR 25544, May 11, 1995; 64 FR 36466, 36489, July 6, 1999]

[EFFECTIVE DATE NOTE: 64 FR 36466, 36489, July 6, 1999, revised paragraph (d), effective Jan. 6, 2000.]

§ 273.14 Labeling arking.

A small quantity handler of universal waste must label or mark the universal waste to identify the type of universal waste as specified below:

(a) Universal waste batteries (i.e., each battery), or a container in which the batteries are contained, must be labeled or marked clearly with any one of the following phrases: "Universal Waste -- Battery(ies), or "Waste Battery(ies)," or "Used Battery(ies);"

(b) A container, (or multiple container package unit), tank, transport vehicle or vessel in which recalled universal waste pesticides as described in 40 CFR 273.3(a)(1) are contained must be labeled or marked clearly with:

(1) The label that was on or accompanied the product as sold or distributed; and

(2) The words "Universal Waste-Pesticide(s)" or "Waste-Pesticide(s);"

(c) A container, tank, or transport vehicle or vessel in which unused pesticide products as described in 40 CFR 273.3(a)(2) are contained must be labeled or marked clearly with:

(1)(i) The label that was on the product when purchased, if still legible;

(ii) If using the labels described in paragraph (c)(1)(i) of this section is not feasible, the appropriate label as required under the Department of Transportation regulation 49 CFR part 172;

(iii) If using the labels described in paragraphs (c)(1) (i) and (ii) of this section is not feasible, another label prescribed or designated by the waste pesticide collection program administered or recognized by a state; and

(2) The words "Universal Waste-Pesticide(s)" or "Waste-Pesticide(s)."

(d) Universal waste thermostats (i.e., each thermostat), or a container in which the thermostats are contained, must be labeled or marked clearly with any one of the following phrases: "Universal Waste -- Mercury Thermostat(s)," or "Waste Mercury Thermostat(s)," or "Used Mercury Thermostat(s)".

(e) Each lamp or a container or package in which such lamps are contained must be labeled or marked clearly with one of the following phrases: "Universal Waste -- Lamp(s)," or "Waste Lamp(s)," or "Used Lamp(s)."
[60 FR 25545, May 11, 1995; 64 FR 36466, 36489, July 6, 1999]

[EFFECTIVE DATE NOTE: 64 FR 36466, 36489, July 6, 1999, added paragraph (e), effective Jan. 6, 2000.]

§ 273.15 Accumulation time limits.

(a) A small quantity handler of universal waste may accumulate universal waste for no longer than one year from the date the universal waste is generated, or received from another handler, unless the requirements of paragraph (b) of this section are met.

(b) A small quantity handler of universal waste may accumulate universal waste for longer than one year from the date the universal waste is generated, or received from another handler, if such activity is solely for the purpose of accumulation of such quantities of universal waste as necessary to facilitate proper recovery, treatment, or disposal. However, the handler bears the burden of proving that such activity is solely for the purpose of accumulation of such quantities of universal waste as necessary to facilitate proper recovery, treatment, or disposal.

(c) A small quantity handler of universal waste who accumulates universal waste must be able to demonstrate the length of time that the universal waste has been accumulated from the date it becomes a waste or is received. The handler may make this demonstration by:

(1) Placing the universal waste in a container and marking or labeling the container with the earliest date that any universal waste in the container became a waste or was received;

(2) Marking or labeling each individual item of universal waste (e.g., each battery or thermostat) with the date it became a waste or was received;

(3) Maintaining an inventory system on-site that identifies the date each universal waste became a waste or was received;

(4) Maintaining an inventory system on-site that identifies the earliest date that any universal waste in a group of universal waste items or a group of containers of universal waste became a waste or was received;

(5) Placing the universal waste in a specific accumulation area and identifying the earliest date that any universal waste in the area became a waste or was received; or

(6) Any other method which clearly demonstrates the length of time that the universal waste has been accumulated from the date it becomes a waste or is received.

[60 FR 25546, May 11, 1995]

§ 273.16 Employee training.

A small quantity handler of universal waste must inform all employees who handle or have responsibility for managing universal waste. The information must describe proper handling and emergency procedures appropriate to the type(s) of universal waste handled at the facility.
[60 FR 25546, May 11, 1995]

§ 273.17 Response to releases.

(a) A small quantity handler of universal waste must immediately contain all releases of universal wastes and other residues from universal wastes.

(b) A small quantity handler of universal waste must determine whether any material resulting from the release is hazardous waste, and if so, must manage the hazardous waste in compliance with all applicable requirements of 40 CFR parts 260 through 272. The handler is considered the generator of the material resulting from the release, and must manage it in compliance with 40 CFR part 262.
[60 FR 25546, May 11, 1995]

§ 273.18 Off-site shipments.

(a) A small quantity handler of universal waste is prohibited from sending or taking universal waste to a place other than another universal waste handler, a destination facility, or a foreign destination.

(b) If a small quantity handler of universal waste self-transports universal waste off-site, the handler becomes a universal waste transporter for those self-transportation activities and must comply with the transporter requirements of subpart D of this part while transporting the universal waste.

(c) If a universal waste being offered for off-site transportation meets the definition of hazardous materials under 49 CFR parts 171 through 180, a small quantity handler of universal waste must package, label, mark and placard the shipment, and prepare the proper shipping papers in accordance with the applicable Department of Transportation regulations under 49 CFR parts 172 through 180;

(d) Prior to sending a shipment of universal waste to another universal waste handler, the originating handler must ensure that the receiving handler agrees to receive the shipment.

(e) If a small quantity handler of universal waste sends a shipment of universal waste to another handler or to a destination facility and the shipment is rejected by the receiving handler or destination facility, the originating handler must either:

(1) Receive the waste back when notified that the shipment has been rejected, or

(2) Agree with the receiving handler on a destination facility to which the shipment will be sent.

(f) A small quantity handler of universal waste may reject a shipment containing universal waste, or a portion of a shipment containing universal waste that he has received from another handler. If a handler rejects a shipment or a portion of a shipment, he must contact the originating handler to notify him of the rejection and to discuss reshipment of the load. The handler must:

(1) Send the shipment back to the originating handler, or

(2) If agreed to by both the originating and receiving handler, send the shipment to a destination facility.

(g) If a small quantity handler of universal waste receives a shipment containing hazardous waste that is not a universal waste, the handler must immediately notify the appropriate regional EPA office of the illegal shipment, and provide the name, address, and phone number of the originating shipper. The EPA regional office will provide instructions for managing the hazardous waste.

(h) If a small quantity handler of universal waste receives a shipment of non-hazardous, non-universal waste, the handler may manage the waste in any way that is in compliance with applicable federal, state or local solid waste regulations.
[60 FR 25546, May 11, 1995]

§ 273.19 Tracking universal waste shipments.

A small quantity handler of universal waste is not required to keep records of shipments of universal waste.
[60 FR 25546, May 11, 1995]

PART 243 -- GUIDELINES FOR THE STORAGE AND COLLECTION OF RESIDENTIAL, COMMERCIAL, AND INSTITUTIONAL SOLID WASTE

42 U.S.C. 6907(a)(3), 6912(a)(1), and 6944(a).

SUBPART A -- GENERAL PROVISIONS

§ 243.100 Scope.

(a) These guidelines are promulgated in partial fulfillment of section 209(a) of the Solid Waste Disposal Act, as amended (Pub. L. 89-272).

(b) The guidelines apply to the collection of residential, commercial, and institutional solid wastes and street wastes. Explicitly excluded are mining, agricultural, and industrial solid wastes; hazardous wastes; sludges; construction and demolition wastes; and infectious wastes.

(c) The "Requirement" sections contained herein delineate minimum levels of performance required of solid waste collection operations. Under section 211 of the Solid Waste Disposal Act, as amended, and Executive Order 12088, the "Requirement" sections of these guidelines are mandatory for Federal agencies. In addition, they are recommended to State, interstate, regional, and local governments for use in their activities.

(d) The "Recommended procedures" sections are presented to suggest additional actions or preferred methods by which the objectives of the requirements can be realized. The "Recommended procedures" are not mandatory for Federal agencies.

(e) The guidelines apply equally to Federal agencies generating solid waste whether the solid waste is actually collected by a Federally operated or non-Federally operated collection system, except in the case of isolated Federal facilities such as post offices, military recruiting stations, and other offices where local community solid waste collection systems are utilized, which are not within the managerial control of the Federal agency.

(f) The guidelines shall be implemented in those situations where the Federal agency is able to exercise direct managerial control over the collection system through operation of the system or by contracting for collection service. Where non-Federal collection systems are utilized, service contracts should require conformance with the guidelines requirements unless service meeting such requirements is not reasonably available. It is left to the head of the responsible agency to decide how the requirements of the guidelines will be met.

(g) The Environmental Protection Agency will give technical assistance and other guidance to Federal agencies when requested to do so under section 3(D)1 of Executive Order 12088.

(h) Within 1 year after the final promulgation of these guidelines, Federal agencies shall decide what actions shall be taken to adopt the requirements of these guidelines and shall, within 60 days of this decision, submit to the Administrator a schedule of such actions.

(i) Federal agencies that decide not to adopt the requirements contained herein, for whatever reason, shall make available to the Administrator a report of the analysis and rationale used in making that decision. The Administrator shall publish notice of availability of this report in the FEDERAL REGISTER. EPA considers the following reasons to be valid for purposes of non-compliance: costs so high as to render compliance economically impracticable, and the technical inhibitions to compliance specifically described in the guidelines.

(1) The following points are to be covered in the report.

(i) A description of the proposed or on-going practices which will not be in compliance with these guidelines. This statement should identify all agency facilities which will be affected by noncompliance including a brief description of how such facilities will be affected.

(ii) A description of the alternative actions considered with emphasis on those alternatives which, if taken, would be in compliance with these guidelines.

(iii) The rationale for the action chosen by the agency including technical data and policy considerations used in arriving at this decision.

In covering these points, agencies should make every effort to present the information succinctly in a form easily understood, but in sufficient detail so that the Administrator and the public may understand the factors influencing the decision not to adopt the requirements of these guidelines.

(2) The report shall be submitted to the Administrator as soon as possible after a final agency decision has been made not to adopt the requirements of these guidelines, but in no case later than 60 days after the final decision. The Administrator will indicate to the agency his concurrence/nonconcurrence with the agency's decision, including his reasons.

(3) Implementation of actions not in compliance with these guidelines shall be deferred, where feasible, in order to give the Administrator time to receive, analyze, and seek clarification of the required report.

(4) It is recommended that where the report on non-compliance concerns an action for which an Environmental Impact Statement (EIS) is required by the National Environmental Policy Act, that the report be circulated simultaneously with the EIS, since much of the information to satisfy the requirements of the report will be useful in the preparation of the EIS.

[41 FR 6769, Feb. 13, 1976; 64 FR 70602, 70606, Dec. 17, 1999]

[EFFECTIVE DATE NOTE: 64 FR 70602, 70606, Dec. 17, 1999, revised paragraphs (c) and (g), effective Mar. 17, 2000.]

§ 243.101 Definitions. As used in these guidelines:

(a) Alley collection means the collection of solid waste from containers placed adjacent to or in an alley.

(b) Agricultural solid waste means the solid waste that is generated by the rearing of animals, and the producing and harvesting of crops or trees.

(c) Bulky waste means large items of solid waste such as household appliances, furniture, large auto parts, trees, branches, stumps, and other oversize wastes whose large size precludes or complicates their handling by normal solid wastes collection, processing, or disposal methods.

(d) Carryout collection means collection of solid waste from a storage area proximate to the dwelling unit(s) or establishment.

(e) Collection means the act of removing solid waste (or materials which have been separated for the purpose of recycling) from a central storage point.

(f) Collection frequency means the number of times collection is provided in a given period of time.

(g) Commercial solid waste means all types of solid wastes generated by stores, offices, restaurants, warehouses, and other non-manufacturing activities, excluding residential and industrial wastes.

(h) Compactor collection vehicle means a vehicle with an enclosed body containing mechanical devices that convey solid waste into the main compartment of the body and compress it into a smaller volume of greater density.

(i) Construction and demolition waste means the waste building materials, packaging, and rubble resulting from construction, remodeling, repair, and demolition operations on pavements, houses, commercial buildings, and other structures.

(j) Curb collection means collection of solid waste placed adjacent to a street.

(k) Federal facility means any building, installation, structure, land, or public work owned by or leased to the Federal Government. Ships at sea, aircraft in the air, land forces on maneuvers, and other mobile facilities are not considered "Federal facilities" for the purpose of these guidelines. United States Government installations located on foreign soil or on land outside the jurisdiction of the United States Government are not considered "Federal facilities" for the purpose of these guidelines.

(l) Food waste means the organic residues generated by the handling, storage, sale, preparation, cooking, and serving of foods, commonly called garbage.

(m) Generation means the act or process of producing solid waste.

(n) Hazardous waste means a waste or combination of wastes of a solid, liquid, contained gaseous, or semisolid form which may cause, or contribute to, an increase in mortality or an increase in serious irreversible, or incapacitating reversible illness, taking into account the toxicity of such waste, its persistence and degradability in nature, its potential for accumulation or concentration in tissue, and other factors that may otherwise cause or contribute to adverse acute or chronic effects on the health of persons or other organisms.

(o) Industrial solid waste means the solid waste generated by industrial processes and manufacturing.

(p) Infectious waste means: (1) Equipment, instruments, utensils, and formites of a disposable nature from the rooms of patients who are suspected to have or have been diagnosed as having a communicable disease and must, therefore, be isolated as required by public health agencies; (2) laboratory wastes, such as pathological specimens (e.g., all tissues, specimens of blood elements, excreta, and secretions obtained from patients or laboratory animals) and disposable fomites (any substance that may harbor or transmit pathogenic organisms) attendant thereto; (3) surgical operating room pathologic specimens and disposable fomites attendant thereto, and similar disposable materials from outpatient areas and emergency rooms.

(q) Institutional solid waste means solid wastes generated by educational, health care, correctional, and other institutional facilities.

(r) Mining wastes means residues which result from the extraction of raw materials from the earth.

(s) Residential solid waste means the wastes generated by the normal activities of households, including, but not limited to, food wastes, rubbish, ashes, and bulky wastes.

(t) Responsible agency means the organizational element that has the legal duty to ensure compliance with these guidelines.

(u) Rubbish means a general term for solid waste, excluding food wastes and ashes, taken from residences, commercial establishments, and institutions.

(v) Satellite vehicle means a small collection vehicle that transfers its load into a larger vehicle operating in conjunction with it.

(w) Scavenging means the uncontrolled and unauthorized removal of materials at any point in the solid waste management system.

(x) Sludge means the accumulated semiliquid suspension of settled solids deposited from wastewaters or other fluids in tanks or basins. It does not include solids or dissolved material in domestic sewage or other significant pollutants in water resources, such as silt, dissolved materials in irrigation return flows or other common water pollutants.

(y) Solid waste means garbage, refuse, sludges, and other discarded solid materials, including solid waste materials resulting from industrial, commercial, and agricultural operations, and from community activities, but does not include solid or dissolved materials in domestic sewage or other significant pollutants in water resources, such as silt, dissolved or suspended solids in industrial wastewater effluents, dissolved materials in irrigation return flows or other common water pollutants. Unless specifically noted otherwise, the term "solid waste" as used in these guidelines shall not include mining, agricultural, and industrial solid wastes; hazardous wastes; sludges; construction and demolition wastes; and infectious wastes.

(z) Stationary compactor means a powered machine which is designed to compact solid waste or recyclable materials, and which remains stationary when in operation.

(aa) Storage means the interim containment of solid waste after generation and prior to collection for ultimate recovery or disposal.

(bb) Solid waste storage container means a receptacle used for the temporary storage of solid waste while awaiting collection.

(cc) Street wastes means materials picked up by manual or mechanical sweepings of alleys, streets, and sidewalks; wastes from public waste receptacles; and material removed from catch basins.

(dd) Transfer station means a site at which solid wastes are concentrated for transport to a processing facility or land disposal site. A transfer station may be fixed or mobile.

(ee) Vector means a carrier that is capable of transmitting a pathogen from one organism to another.
[41 FR 6769, Feb. 13, 1976]

SUBPART B -- REQUIREMENTS AND RECOMMENDED PROCEDURES

§ 243.200 STORAGE.

§ 243.200-1 Requirement.

(a) All solid wastes (or materials which have been separated for the purpose of recycling) shall be stored in such a manner that they do not constitute a fire, health, or safety hazard or provide food or harborage for vectors, and shall be contained or bundled so as not to result in spillage. All solid waste containing food wastes shall be securely stored in covered or closed containers which are nonabsorbent, leakproof, durable, easily cleanable (if reusable), and designed for safe handling. Containers shall be of an adequate size and in sufficient numbers to contain all food wastes, rubbish, and ashes that a residence or other establishment generates in the period of time between collections. Containers shall be maintained in a clean condition so that they do not constitute a nuisance, and to retard the harborage, feeding, and breeding of vectors. When serviced, storage containers should be emptied completely of all solid waste.

(b) Storage of bulky wastes shall include, but is not limited to, removing all doors from large household appliances and covering the item(s) to reduce the problems of an attractive nuisance, and the accumulation of solid waste and water in and around the bulky items.

(c) Reusable waste containers which are emptied manually shall not exceed 75 pounds (34.05 kg) when filled, and shall be capable of being serviced without the collector coming into physical contact with the solid waste.

(d) In the design of all buildings or other facilities which are constructed, modified, or leased after the effective date of these guidelines, there shall be provisions for storage in accordance with these guidelines which will accommodate the volume of solid waste anticipated, which may be easily cleaned and maintained, and which will allow for efficient, safe collection.

(e) Waste containers used for the storage of solid waste (or materials which have been separated for recycling) must meet the standards established by the American National Standards Institute (ANSI) for waste containers as follows: Waste Containers-Safety Requirements, 1994, American National Standards Institute, ANSI Z245.30-1994; and Waste Containers-Compatibility Dimensions, 1996, American National Standards Institute, ANSI Z245.60-1996.

(1) The Director of the Federal Register approves this incorporation by reference in accordance with 5 U.S.C. 552(a) and 1 CFR part 51.

(2) You may obtain a copy from American National Standards Institute, 11 W. 42nd Street, New York, NY 10036. You may inspect a copy at the Environmental Protection Agency's RCRA Information Center, 1235 Jefferson Davis Highway, Arlington, VA or at the Office of the Federal Register, 800 North Capitol Street, NW, Suite 700, Washington, DC.

[41 FR 6769, Feb. 13, 1976; 64 FR 70602, 70606, Dec. 17, 1999]

[EFFECTIVE DATE NOTE: 64 FR 70602, 70606, Dec. 17, 1999, added paragraph (e), effective Mar. 17, 2000.]

§ 243.200-2 Recommended procedures: Design.

(a) Reusable waste containers should be constructed of corrosion resistant metal or other material which will not absorb water, grease, or oil. The containers should be leakproof, including sides, seams, and bottoms, and be durable enough to withstand anticipated usage without rusting, cracking, or deforming in a manner that would impair serviceability. The interior of the container should be smooth without interior projections or rough seams which would make it difficult to clean or interfere with its emptying. The exterior of the container should be safe for handling with no cracks, holes, or jagged edges. Containers should be stored on a firm, level, well-drained surface which is large enough to accommodate all of the containers and which is maintained in a clean, spillage-free condition.

(1) Reusable waste containers which are emptied manually should have a capacity of no more than 35 gallons (132.51) in volume, unless they are mounted on casters and can be serviced by being rolled to the collection vehicle and tilted for emptying. The containers should be constructed with rounded edges and tapered sides with the larger diameter at the top of the container to facilitate discharge of the solid waste by gravity. Containers should have two handles or bails located directly opposite one another on the sides of the container. Containers should have covers which are tight-fitting to resist the intrusion of water and vectors, and should be equipped with a suitable handle. Containers should be designed so that they cannot be tipped over easily.

(2) Reusable waste containers which are emptied mechanically should be designed or equipped to prevent spillage or leakage during on-site storage, collection, or transport. The container should be easily cleanable and designed to allow easy access for depositing the waste and removing it by gravity or by mechanical means. The containers should be easily accessible to the collection vehicle in an area which can safely accommodate the dimensions and weight of the vehicle.

(b) Single-use plastic and paper bags should meet the National Sanitation Foundation Standard No. 31 for polyethylene refuse bags and Standard No. 32 for paper refuse bags, respectively. However, such bags do not need to have been certified by the National Sanitation Foundation. Single-use bags containing food wastes should be stored within the confines of a building or container between collection periods.

[41 FR 6769, Feb. 13, 1976]

§ 243.201 SAFETY.

§ 243.201-1 Requirement.

Collection systems shall be operated in such a manner as to protect the health and safety of personnel associated with the operation.

[41 FR 6769, Feb. 13, 1976]

§ 243.201-2 Recommended procedures: Operations.

(a) All solid waste collection personnel should receive instructions and training in safe container and waste handling techniques, and in the proper operation of collection equipment, such as those presented in Operation Responsible: Safe Refuse Collection.

(b) Personal protective equipment such as gloves, safety glasses, respirators, and footwear should be used by collection employees, as appropriate. This equipment should meet the applicable provisions of the Occupational Safety and Health Administration Standards for Subpart I--Personal Protective Equipment (29 CFR 1910.132 through 1910.137).

(c) Scavenging should be prohibited at all times to avoid injury and to prevent interference with collection operations.

(d) When conducting carryout collection, a leakproof and puncture-proof carrying container should be used to minimize the potential for physical contact between the collector and the solid waste or the liquids which may derive from it.

[41 FR 6769, Feb. 13, 1976]

§ 243.202 COLLECTION EQUIPMENT.

§ 243.202-1 Requirement.

(a) All vehicles used for the collection and transportation of solid waste (or materials which have been separated for the purpose of recycling) which are considered to be operating in interstate or foreign commerce shall meet all applicable standards established by the Federal Government, including, but not limited to, Motor Carrier Safety Standards (49 CFR Parts 390 through 396) and Noise Emission Standards for Motor Carriers Engaged in Interstate Commerce (40 CFR Part 202). Federally owned collection vehicles shall be operated in compliance with Federal Motor Vehicle Safety Standards (49 CFR Parts 500 through 580).

(b) All vehicles used for the collection and transportation of solid waste (or materials which have been separated for the purpose of recycling) shall be enclosed or adequate provisions shall be made for suitable cover, so that while in transit there can be no spillage.

(c) The equipment used in the compaction, collection, and transportation of solid waste (or materials which have been separated for the purpose of recycling) shall be constructed, operated, and maintained in such a manner as to minimize health and safety hazards to solid waste management personnel and the public. This equipment shall be maintained in good condition and kept clean to prevent the propagation or attraction of vectors and the creation of nuisances.

(d) Collection equipment used for the collection, storage, and transportation of solid waste (or materials which have been separated for recycling) must meet the standards established by the American National Standards Institute as follows: Mobile Refuse Collection and Compaction Equipment-Safety Requirements, 1992, American National Standards Institute, ANSI Z245.1-1992; and Stationary Compactors-Safety Requirements, 1997, American National Standards Institute, ANSI Z245.2-1997.

(1) The Director of the Federal Register approves this incorporation by reference in accordance with 5 U.S.C. 552(a) and 1 CFR part 51.

(2) You may obtain a copy from American National Standards Institute, 11 W. 42nd Street, New York, NY 10036. You may inspect a copy at the Environmental Protection Agency's RCRA Information Center, 1235 Jefferson Davis Highway, Arlington, VA or at the Office of the Federal Register, 800 North Capitol Street, NW, Suite 700, Washington, DC.

In the procurement of new collection equipment before the effective dates of ANSI Z245.1, equipment which meets the standards shall be obtained if available.

[41 FR 6769, Feb. 13, 1976; 64 FR 70602, 70606, Dec. 17, 1999]

[EFFECTIVE DATE NOTE: 64 FR 70602, 70606, Dec. 17, 1999, revised paragraph (d), effective Mar. 17, 2000.]

§ 243.202-2 Recommended procedures: Design.

(a) Whenever possible, enclosed, metal, leak-resistant compactor vehicles should be used for the collection of solid wastes.

(b) Safety devices, including, but not limited to, the following should be provided on all collection vehicles:

(1) Exterior rear-view mirrors.
(2) Back-up lights.
(3) Four-way emergency flashers.
(4) Easily accessible first aid equipment.
(5) Easily accessible fire extinguisher.
(6) Audible reverse warning device.

(c) If crew members ride outside the cab of the collection vehicle for short trips the vehicle should be equipped with handholds and platforms big enough to safeguard against slipping.

(d) Vehicle size should take into consideration: Local weight and height limits for all roads over which the vehicle will travel; turning radius; and loading height in the unloading position to insure overhead clearance in transfer stations, service buildings, incinerators, or other facilities.

(e) Engines which conserve fuel and minimize pollution should be used in collection vehicles to reduce fuel consumption and air pollution.

[41 FR 6769, Feb. 13, 1976]

§ 243.202-3 Recommended procedures: Operations.

(a) Collection vehicles should be maintained and serviced according to manufacturers' recommendations, and receive periodic vehicle safety checks, including, but not limited to, inspection of brakes, windshield wipers, taillights, backup lights, audible reverse warning devices, tires, and hydraulic systems. Any irregularities should be repaired before the vehicle is used. Vehicles should also be cleaned thoroughly at least once a week.

(b) Solid waste should not be allowed to remain in collection vehicles over 24 hours and should only be left in a vehicle overnight when this practice does not constitute a fire, health, or safety hazard.

[41 FR 6769, Feb. 13, 1976]

§ 243.203 COLLECTION FREQUENCY.

§ 243.203-1 Requirement.

Solid wastes (or materials which have been separated for the purpose of recycling) shall be collected with frequency sufficient to inhibit the propagation or attraction of vectors and the creation of nuisances. Solid wastes which contain food wastes shall be collected at a minimum of once during each week. Bulky wastes shall be collected at a minimum of once every 3 months.

[41 FR 6769, Feb. 13, 1976]

§ 243.203-2 Recommended procedures: Operations.

(a) The minimum collection frequency consistent with public health and safety should be adopted to minimize collection costs and fuel consumption. In establishing collection frequencies, generation rates, waste composition, and storage capacity should be taken into consideration.

(b) When solid wastes are separated at the point of storage into various categories for the purpose of resource recovery, a collection frequency should be designated for each waste category.

[41 FR 6769, Feb. 13, 1976]

§ 243.204 COLLECTION MANAGEMENT.

§ 243.204-1 Requirement.

The collection of solid wastes (or materials which have been separated for the purpose of recycling) shall

be conducted in a safe, efficient manner, strictly obeying all applicable traffic and other laws. The collection vehicle operator shall be responsible for immediately cleaning up all spillage caused by his operations, for protecting private and public property from damage resulting from his operations, and for creating no undue disturbance of the peace and quiet in residential areas in and through which he operates.
[41 FR 6769, Feb. 13, 1976]

§ 243.204-2 Recommended procedures: Operations.

(a) Records should be maintained detailing all costs (capital, operating, and maintenance) associated with the collection system. These records should be used for scheduling maintenance and replacement, for budgeting, and for system evaluation and comparison.

(b) The collection system should be reviewed on a regular schedule to assure that environmentally adequate, economical, and efficient service is maintained.

(c) Solid waste collection systems should be operated in a manner designed to minimize fuel consumption, including, but not limited to, the following procedures.

(1) Collection vehicle routes should be designed to minimize driving distances and delays.

(2) Collection vehicles should receive regular tuneups, tires should be maintained at recommended pressures, and compaction equipment should be serviced regularly to achieve the most efficient compaction.

(3) Compactor trucks should be used to reduce the number of trips to the disposal site.

(4) When the distance or travel time from collection routes to disposal sites is great, transfer stations should be used when cost effective.

(5) Residential solid waste containers which are serviced manually should be placed at the curb or alley for collection.

(6) For commercial wastes which do not contain food wastes, storage capacity should be increased in lieu of more frequent collection.
[41 FR 6769, Feb. 13, 1976]

APPENDIX TO PART 243 -- RECOMMENDED BIBLIOGRAPHY

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12. U.S. Environmental Protection Agency. Pesticides and pesticides containers; regulations for acceptance and recommended procedures for disposal and storage. Federal Register, 39 (85): 15235-15241, May 1, 1974.

13. U.S. Environmental Protection Agency. Pesticides and pesticides containers; proposed regulations for prohibition of certain acts regarding disposal and storage. Federal Register, 39 (200): 36847-36950, October 15, 1974.

41 FR 6769, Feb. 13, 1976.

Sec. 209(a) of the Solid Waste Disposal Act of 1965 (Pub. L. 89-272), as amended by the Resource Recovery Act of 1970 (Pub. L. 91-512).

PART 246 -- SOURCE SEPARATION FOR MATERIALS RECOVERY GUIDELINES

SUBPART A -- GENERAL PROVISIONS

§ 246.100 Scope.

(a) These guidelines are applicable to the source separation of residential, commercial, and institutional solid wastes. Explicitly excluded are mining, agricultural, and industrial solid wastes; hazardous wastes; sludges; construction and demolition wastes; infectious wastes; classified waste.

(b) The "Requirement" sections contained herein delineate minimum actions for Federal agencies for the recovery of resources from solid waste through source separation. Pursuant to section 211 of the Solid Waste Disposal Act, as amended, and Executive Order 11752 section 4(a), the "Requirement" sections of these guidelines are mandatory for all Federal agencies that generate solid waste. In addition, they are recommended to State, interstate, regional, and local governments for use in their activities.

(c) The "Recommended Procedures" sections are presented to suggest actions or preferred methods by which the objectives of the requirements can be realized. The "Recommended Procedures" are not mandatory for Federal agencies.

(d) The Environmental Protection Agency will render technical assistance in the form of sample cost analysis formats, sample bid specifications, implementation guidance documents and other guidance to Federal agencies when requested to do so, pursuant to section 3(d)1 of Executive Order 11752.

(e) Within one year after the effective date of these guidelines, agencies shall make a final determination as to what actions shall be taken to adopt the requirements of these guidelines and shall, within two months of such determination, submit to the Administrator a schedule of such actions.

(f) Federal agencies that make the determination not to source separate as described in §§ 246.200-1, 246.201-1, and 246.202-1, for whatever reason, shall make available to the Administrator the analysis and rationale used in making that determination. The Administrator shall publish notice of the availability of this report to the general public in the FEDERAL REGISTER. The following are considered to be valid reasons for not source separating under individual facts and circumstances: inability to sell the recovered materials due to lack of market, and costs so unreasonably high as to render source separation for materials recovery economically impracticable.

(1) The following points are to be covered in the report:

(i) A description of alternative actions considered with emphasis on those alternatives which involve source separation for materials recovery.

(ii) A description of ongoing actions which will be continued and new actions taken or proposed. This statement should identify all agency facilities which will be affected by these actions including a brief description of how such facilities will be affected.

(iii) An analysis in support of the action chosen by the agency including technical data, market studies, and policy considerations used in arriving at such a determination.

In covering the points above, agencies should make every effort to present information succinctly in a form easily understood, but in sufficient detail so that the factors influencing the decision not to source separate for materials recovery are clear.

(2) The above report shall be submitted to the Administrator as soon as possible after a final agency determination has been made not to adopt the requirements of these guidelines, but in no case later than sixty days after such final determination. The Administrator will indicate to the agency his concurrence/nonconcurrence with the agency's decision, including his reason therefor.

(3) Implementation of actions that would preclude source separation for materials recovery shall be deferred, for sixty days where feasible, in order to give the Administrator an opportunity to receive, analyze and seek clarification of the above required report.

(4) It is recommended that where the report required by § 246.100(f) concerns an action for which an Environmental Impact Statement (EIS) is required by the National Environmental Policy Act, that the report be circulated together with the EIS.

(g) The report required under § 246.100(e) and (f) shall be made on forms to be prescribed by the Administrator by notice in the Federal Register.
[41 FR 16952, Apr. 23, 1976, as amended at 47 FR 36603, Aug. 20, 1982]

Secs. 1008 and 6004 of the Solid Waste Disposal Act, as amended by the Resource Conservation and Recovery Act of 1976, as amended (42 U.S.C. 6907, 6964).

§ 246.101 Definitions.

As used in these guidelines:

(a) Agricultural solid waste means the solid waste that is generated by the rearing of animals, and the producing and harvesting of crops or trees.

(b) Baler means a machine used to compress solid wastes, primary materials, or recoverable materials, with or without binding, to a density or from which will support handling and transportation as a material unit rather than requiring a disposable or reuseable container. This specifically excludes briquetters and stationary compaction equipment which is used to compact materials into disposable or reuseable containers.

(c) Bulk container means a large container that can either be pulled or lifted mechanically onto a service vehicle or emptied mechanically into a service vehicle.

(d) Classified Waste means waste material that has been given security classification in accordance with 50 U.S.C. 401 and Executive Order 11652.

(e) Collection means the act of removing solid waste (or materials which have been separated for the purpose of recycling) from a central storage point.

(f) Commercial establishment means stores, offices, restaurants, warehouses and other non-manufacturing activities.

(g) Commercial solid waste means all types of solid wastes generated by stores, offices, restaurants, warehouses and other non-manufacturing activities, and non-processing wastes such as office and packing wastes generated at industrial facilities.

(h) Construction and demolition waste means the waste building materials, packaging, and rubble resulting from construction, remodeling, repair, and demolition operations on pavements, houses, commercial buildings and other structures.

(i) Compartmentalized vehicle means a collection vehicle which has two or more compartments for placement of solid wastes or recyclable materials. The compartments may be within the main truck body or on the outside of that body as in the form of metal racks.

(j) Corrugated container waste means discarded corrugated boxes.

(k) Corrugated box means a container for goods which is composed of an inner fluting of material (corrugating medium) and one or two outer liners of material (linerboard).

(l) Federal facility means any building, installation, structure, land, or public work owned by or leased to the Federal Government. Ships at sea, aircraft in the air, land forces on maneuvers, and other mobile facilities are not considered Federal facilities for the purpose of these guidelines. United States Government installations located on foreign soil or on land outside the jurisdiction of the United States Government are not considered Federal facilities for the purpose of these guidelines.

(m) Food waste means the organic residues generated by the handling, storage, sale, preparation, cooking, and serving of foods; commonly called garbage.

(n) Generation means the act or process of producing solid waste.

(o) High-grade paper means letterhead, dry copy papers, miscellaneous business forms, stationery, typing paper, tablet sheets, and computer printout paper and cards, commonly sold as "white ledger," "computer printout" and "tab card" grade by the wastepaper industry.

(p) Industrial solid waste means the solid waste generated by industrial processes and manufacturing.

(q) Infectious waste means: (1) Equipment, instruments, utensils, and fomites (any substance that may harbor or transmit pathogenic organisms) of a disposable nature from the rooms of patients who are suspected to have or have been diagnosed as having a communicable disease and must, therefore, be isolated as required by public health agencies; (2) laboratory wastes, such as pathological specimens (e.g. all tissues, specimens of blood elements, excreta, and secretions obtained from patients or laboratory animals) and disposable fomites attendant thereto; (3) surgical operating room pathologic specimens and disposable fomites attendant thereto and similar disposable materials from outpatient areas and emergency rooms.

(r) Institutional solid waste means solid wastes generated by educational, health care, correctional and other institutional facilities.

(s) Mining wastes means residues which result from the extraction of raw materials from the earth.

(t) Post-consumer waste (PCW) means a material or product that has served its intended use and has been discarded for disposal or recovery after passing through the hands of a final consumer.

(u) Recoverable resources means materials that still have useful physical, chemical, or biological properties after serving their original purpose and can, therefore, be reused or recycled for the same or other purposes.

(v) Recovery means the process of obtaining materials or energy resources from solid waste.

(w) Recycled material means a material that is used in place of a primary, raw or virgin material in manufacturing a product.

(x) Recycling means the process by which recovered materials are transformed into new products.

(y) Residential solid waste means the wastes generated by the normal activities of households, including but not limited to, food wastes, rubbish, ashes, and bulky wastes.

(z) Separate collection means collecting recyclable materials which have been separated at the point of generation and keeping those materials separate from other collected solid waste in separate compartments of a single collection vehicle or through the use of separate collection vehicles.

(aa) Sludge means the accumulated semiliquid suspension of settled solids deposited from wastewaters or other fluids in tanks or basins. It does not include solid or dissolved material in domestic sewage or other significant pollutants in water resources, such as silt, dissolved material in irrigation return flows or other common water pollutants.

(bb) Solid waste means garbage, refuse, sludge, and other discarded solid materials, including solid waste materials resulting from industrial, commercial, and agricultural operations, and from community activities, but does not include solids or dissolved materials in domestic sewage or other significant pollutants in water resources, such as silt, dissolved or suspended solids in industrial wastewater effluents, dissolved materials in irrigation return flows or other common water pollutants. Unless specifically noted otherwise, the term "solid waste" as used in these guidelines shall not include mining, agricultural, and industrial solid wastes; hazardous wastes; sludges; construction and demolition wastes; and infectious wastes.

(cc) Source separation means the setting aside of recyclable materials at their point of generation by the generator.

(dd) Specification means a clear and accurate description of the technical requirements for materials, products or services, identifying the minimum requirements for quality and construction of materials and equipment necessary for an acceptable product. In general, specifications are in the form of written descriptions, drawings, prints, commercial designations, industry standards, and other descriptive references.

(ee) Stationary compactor means a powered machine which is designed to compact solid waste or recyclable materials, and which remains stationary when in operation.

(ff) Storage means the interim containment of solid waste after generation and prior to collection for ultimate recovery or disposal.

(gg) Virgin material means a raw material used in manufacturing that has been mined or harvested and has not as yet become a product.

SUBPART B -- REQUIREMENTS AND RECOMMENDED PROCEDURES

§ 246.200 HIGH-GRADE PAPER RECOVERY.

§ 246.200-1 Requirements.

High-grade paper generated by office facilities of over 100 office workers shall be separated at the source of generation, separately collected, and sold for the purpose of recycling.
41 FR 16952, Apr. 23, 1976.

Secs. 1008 and 6004 of the Solid Waste Disposal Act, as amended by the Resource Conservation and Recovery Act of 1976, as amended (42 U.S.C. 6907, 6964).

§ 246.200-2 Recommended procedures: High-grade paper recovery from smaller offices.

The recovery of high-grade paper generated by office facilities of less than 100 office workers should be investigated in conformance with the following recommended procedures and implemented where feasible.
41 FR 16952, Apr. 23, 1976.

Secs. 1008 and 6004 of the Solid Waste Disposal Act, as amended by the Resource Conservation and Recovery Act of 1976, as amended (42 U.S.C. 6907, 6964).

§ 246.200-3 Recommended procedures: Market study.

An investigation of markets should be made by the organization responsible for the sale of recyclable materials in each Federal agency and should include at a minimum:

(a) Identifying potential purchasers of the recovered paper through standard market research techniques;

(b) Directly contacting buyers, and determining the buyers' quality specifications, the exact types of paper to be recycled, potential transportation agreements and any minimum quantity criteria; and

(c) Determining the price that the buyer will pay for the recovered paper and the willingness of the buyer to sign a contract for purchase of the paper at a guaranteed minimum price.

Secs. 1008 and 6004 of the Solid Waste Disposal Act, as amended by the Resource Conservation and Recovery Act of 1976, as amended (42 U.S.C. 6907, 6964).

§ 246.200-4 Recommended procedures: Levels of separation.

A two-level separation is recommended for most facilities. This separation should consist of (a) high-grade wastepaper and (b) all other waste. Facilities that produce large enough quantities of waste computer paper and cards to make their separation into a separate category cost effective may choose to implement three levels of separation: (1) Computer papers, (2) other high-grade papers, (3) all other wastes.
41 FR 16952, Apr. 23, 1976.

Secs. 1008 and 6004 of the Solid Waste Disposal Act, as amended by the Resource Conservation and Recovery Act of 1976, as amended (42 U.S.C. 6907, 6964).

§ 246.200-5 Recommended procedures: Methods of separation and collection.

(a) Systems designed to recover high grades of office paper at the source of generation, i.e., the desk, are the desktop system, the two-wastebasket system, and the office centralized container system.
(b) With the desk-top system, recyclable paper is placed by the generator in a container on his desk, while other waste is placed in a wastebasket. With the two-wastebasket system, recyclable paper is placed by the generator in one desk-side wastebasket, and all other waste is placed in another. In the

centralized container system, large containers for the collection of recyclables are placed in centralized locations within the office areas of the building. Nonrecyclable waste is placed in desk-side wastebaskets.
(c) The recommended system is the desk-top system because it is designed to maximize recovery of high value material in an economically feasible manner. While the two-wastebasket system and centralized container system have been implemented with success in isolated instances, data indicate that, on the whole, these systems have experienced high levels of contamination, low levels of participation, and low revenues. The desk-top system has been designed to minimize these problems.
(d) The precise method of separation and collection used to implement the desk-top system will depend upon such things as the physical layout of the individual facility, the ease of collection, and the projected cost effectiveness of using various methods. The recommended desk-top system is carried out in the following manner:
(1) Workers are to deposit high-grade paper into a desk-top tray or other small desk-top holder to be supplied by the agency. This holder should be designed in such a way as to prevent it holding contaminants, such as food or beverage containers.
(2) At the office worker's convenience or when the tray is filled, the worker carries the paper to a conveniently located bulk container within the office area. This large container should be located in an area the worker frequents in the normal course of business.
(3) In locations where computer cards and printouts are to be collected separately, the receptacle for these wastes should be near the computer terminal or in some other logical, centrally located place.
(4) Collection of the high-grade paper from the bulk containers in the office area should be performed by the janitorial or general maintenance service.
The number of locations and the frequency of collection of these containers will be determined by office size and maintenance staff capacity.
(e) Mixed paper and some high-grade office papers have also been recovered for recycling by hand-picking in an individual building's trash room or at a centralized facility serving several buildings. With these hand-picking systems, recyclable waste is not separated at the source of generation, but is mixed with other waste in the usual manner and removed to a centralized location where recyclable paper is picked out of the mixed waste by hand. Facilities may choose to use this method of high-grade paper recovery if it is shown by analysis to be economically preferable to source separation.
Secs. 1008 and 6004 of the Solid Waste Disposal Act, as amended by the Resource Conservation and Recovery Act of 1976, as amended (42 U.S.C. 6907, 6964).

§ 246.200-6 Recommended procedures: Storage.

Among the alternatives for paper storage are on-site bailing, the use of stationary compactors, or storage in corrugated boxes or normal waste containers. Stored paper should be protected from fire, inclement weather, theft, and vandalism.
41 FR 16952, Apr. 23, 1976.

Secs. 1008 and 6004 of the Solid Waste Disposal Act, as amended by the Resource Conservation and Recovery Act of 1976, as amended (42 U.S.C. 6907, 6964).

§ 246.200-7 Recommended procedures: Transportation.

Transportation to market may be supplied by the facility, by a private hauler, or by the purchaser. Collection of the recyclable paper should be on a regular, established schedule.
41 FR 16952, Apr. 23, 1976.

Secs. 1008 and 6004 of the Solid Waste Disposal Act, as amended by the Resource Conservation and Recovery Act of 1976, as amended (42 U.S.C. 6907, 6964).

§ 246.200-8 Recommended procedures: Cost analysis.

After potential markets have been located (but prior to initiation of formal bidding procedures), preliminary determinations of various separation methods, storage, and transportation costs have been made, and estimated tonnages of both recoverable high-grade paper and residual solid waste have been established, an analysis should be conducted which compares the costs of the present waste collection and disposal system with the proposed segregated systems. At a minimum, the study should include all capital, operating and overhead costs and take into account credits for revenue from paper sales and savings from diverting recycled materials from disposal. Potential costs to upgrade collection and disposal practices to comply with EPA's Guidelines for the Storage and Collection of Residential, Commercial and Institutional Solid Wastes (40 CFR Part 243) and Thermal Processing and Land Disposal Guidelines (40 CFR Parts 240 and 241) should be included in the analysis. In formulating a separation system and evaluating its costs, every effort should be made to use janitorial and waste collection resources efficiently. This cost analysis should enable the facility to determine the most cost effective method of implementing the requirement of this part.
41 FR 16952, Apr. 23, 1976.

Secs. 1008 and 6004 of the Solid Waste Disposal Act, as amended by the Resource Conservation and Recovery Act of 1976, as amended (42 U.S.C. 6907, 6964).

§ 246.200-9 Recommended procedures: Contracts.

Formal bids should be requested for purchase of the recovered materials, such bids being solicited in conformance with bidding procedures established for the responsible agency. Contracts should include the buyer's quality specifications, quantity and transportation agreements, a guarantee that the material will be accepted for one year or more, and a guaranteed minimum purchase price.
41 FR 16952, Apr. 23, 1976.

Secs. 1008 and 6004 of the Solid Waste Disposal Act, as amended by the Resource Conservation and Recovery Act of 1976, as amended (42 U.S.C. 6907, 6964).

§ 246.200-10 Recommended procedures: Public information and education.

A well-organized and well-executed public information and education program explaining the justification, goals, methods and level of separation should be conducted to inform and motivate office personnel and secure their cooperation in separating their waste. This public information and education program should precede the program and continue on a regular basis for its duration.
41 FR 16952, Apr. 23, 1976.

Secs. 1008 and 6004 of the Solid Waste Disposal Act, as amended by the Resource Conservation and Recovery Act of 1976, as amended (42 U.S.C. 6907, 6964).

§ 246.201 RESIDENTIAL MATERIALS RECOVERY.

§ 246.201-1 Requirement.

Separation of used newspapers at the source of residential generation in conjunction with separate collection shall be carried out at all facilities in which more than 500 families reside, and the newspapers shall be sold for the purpose of recycling.
41 FR 16952, Apr. 23, 1976.

Secs. 1008 and 6004 of the Solid Waste Disposal Act, as amended by the Resource Conservation and Recovery Act of 1976, as amended (42 U.S.C. 6907, 6964).

§ 246.201-2 Recommended procedures: Newsprint recovery from smaller residential facilities.

The recovery of newsprint generated by residential facilities of less than 500 families should be investigated in conformance with the following recommended procedures and implemented where feasible.
41 FR 16952, Apr. 23, 1976.

Secs. 1008 and 6004 of the Solid Waste Disposal Act, as amended by the Resource Conservation and Recovery Act of 1976, as amended (42 U.S.C. 6907, 6964).

§ 246.201-3 Recommended procedures: Glass, can, and mixed paper separation.

In areas where markets are available, it is recommended that glass, cans, and mixed paper be separated at the source of generation and separately collected for the purpose of recycling.
41 FR 16952, Apr. 23, 1976.

Secs. 1008 and 6004 of the Solid Waste Disposal Act, as amended by the Resource Conservation and Recovery Act of 1976, as amended (42 U.S.C. 6907, 6964).

§ 246.201-4 Recommended procedures: Market study.

An investigation of markets should be made for each material by the organization responsible for sale of recyclable materials in each agency and should include at a minimum:

(a) Identifying potential purchasers of the recovered material through standard market research techniques.

(b) Directly contacting buyers and determining the buyers' quality specifications, potential transportation agreements and any minimum quantity criteria.

(c) Determining the prices that the buyer will pay for the recovered material and the willingness of the buyer to sign a contract for the purchase of the material at guaranteed minimum prices.
41 FR 16952, Apr. 23, 1976.

Secs. 1008 and 6004 of the Solid Waste Disposal Act, as amended by the Resource Conservation and Recovery Act of 1976, as amended (42 U.S.C. 6907, 6964).

§ 246.201-5 Recommended procedures: Methods of separation and collection.

Following separation within the home, any of the following methods of collection may be used:

(a) Materials may be placed at the curbside by the resident and may be collected from each household using separate trucks or compartmentalized vehicles.

(b) For multi-family dwellings, separated materials may be placed in bulk containers located outside of the building and collected by trucks dispatched to collect recyclables.

(c) Collection stations may be set up at convenient locations to which residents bring recyclables. These stations should provide separate bulk containers for each item to be recycled. The size and type of container will depend on the volume and type of material collected, the method of transportation to be used in hauling the materials to market and the frequency of removal.
41 FR 16952, Apr. 23, 1976.

Secs. 1008 and 6004 of the Solid Waste Disposal Act, as amended by the Resource Conservation and Recovery Act of 1976, as amended (42 U.S.C. 6907, 6964).

§ 246.201-6 Recommended procedures: Transportation to market.

Transportation to market may be supplied by the facility or the community generating the waste, by a private hauler, or by the purchaser.
41 FR 16952, Apr. 23, 1976.

Secs. 1008 and 6004 of the Solid Waste Disposal Act, as amended by the Resource Conservation and Recovery Act of 1976, as amended (42 U.S.C. 6907, 6964).

§ 246.201-7 Recommended procedures: Cost analysis.

After potential markets have been located (but prior to initiation of formal bidding procedures), preliminary determinations of various separation methods, storage and transportation costs have been made, and estimated tonnages of both recoverable materials and residual solid waste have been established, an analysis should be conducted which compares the costs of the present waste collection and disposal system with the proposed segregated systems. At a minimum this study should include all capital, operating and overhead costs and take into account credits for revenue from paper sales and savings from diverting recycled materials from disposal. Potential costs to upgrade collection and disposal practices to comply with EPA's Guidelines for the Storage and Collection of Residential, Commercial and Institutional Solid Wastes (40 CFR Part 243) and Thermal Processing and Land Disposal Guidelines (40 CFR Parts 240 and 241) should be included in the analysis. In formulating a separate collection system and evaluating its costs, every effort should be made to use idle equipment and underutilized collection manpower to reduce separate collection costs. This cost analysis should enable the facility to determine the most cost effective method if implementing the requirements of this part.
41 FR 16952, Apr. 23, 1976.

Secs. 1008 and 6004 of the Solid Waste Disposal Act, as amended by the Resource Conservation and Recovery Act of 1976, as amended (42 U.S.C. 6907, 6964).

§ 246.201-8 Recommended procedures: Contracts.

Formal bids should be requested for purchase of the recovered materials, such bids being solicited in conformance with bidding procedures established for the responsible jurisdiction. Contracts should include the buyer's quality specifications, quantity and transportation agreements, a guarantee that the material will be accepted for one year or more and a guaranteed minimum purchase price.
41 FR 16952, Apr. 23, 1976.

Secs. 1008 and 6004 of the Solid Waste Disposal Act, as amended by the Resource Conservation and Recovery Act of 1976, as amended (42 U.S.C. 6907, 6964).

§ 246.201-9 Recommended procedures: Public information and education.

A well organized and well executed public information and education program explaining the justification, goals, methods and level of separation should be conducted to inform and motivate householders and to secure their cooperation in separating their waste. This public information and education program should precede the program and continue on a regular basis for its duration.
41 FR 16952, Apr. 23, 1976.

Secs. 1008 and 6004 of the Solid Waste Disposal Act, as amended by the Resource Conservation and Recovery Act of 1976, as amended (42 U.S.C. 6907, 6964).

§ 246.202 CORRUGATED CONTAINER RECOVERY.

§ 246.202-1 Requirement.

Any commercial establishment generating 10 or more tons of waste corrugated containers per month shall separately collect and sell this material for the purpose of recycling.
41 FR 16952, Apr. 23, 1976.

Secs. 1008 and 6004 of the Solid Waste Disposal Act, as amended by the Resource Conservation and Recovery Act of 1976, as amended (42 U.S.C. 6907, 6964).

§ 246.202-2 Recommended procedures: Corrugated container recovery from smaller commercial facilities.

The recovery of corrugated containers from commercial facilities generating less than 10 tons per month should be investigated in conformance with the following recommended procedures and implemented where feasible.
41 FR 16952, Apr. 23, 1976.

Secs. 1008 and 6004 of the Solid Waste Disposal Act, as amended by the Resource Conservation and Recovery Act of 1976, as amended (42 U.S.C. 6907, 6964).

§ 246.202-3 Recommended procedures: Market study.

An investigation of markets should be made by the organization responsible for sale of recyclable material in each Federal agency and should include at a minimum:

(a) Identifying potential purchasers of the recovered corrugated through standard market research techniques.

(b) Directly contacting buyers and determining the buyers' quality specifications, potential transportation agreements and any minimum quantity criteria.

(c) Determining the price that the buyer will pay for the recovered corrugated and the willingness of the buyer to sign a contract for purchase of the paper at a guaranteed minimum price.

41 FR 16952, Apr. 23, 1976.

Secs. 1008 and 6004 of the Solid Waste Disposal Act, as amended by the Resource Conservation and Recovery Act of 1976, as amended (42 U.S.C. 6907, 6964).

§ 246.202-4 Recommended procedures: Methods of separation and storage.

The method selected will depend upon such variables as the physical layout of the individual generating facility, the rate at which the corrugated accumulates, the storage capacity of the facility, and the projected cost-effectiveness of using the various methods. All of the following suggested modes of separation and storage presuppose that the corrugated boxes will be accumulated at a central location in the facility after their contents are removed and that the boxes are flattened.

(a) Balers of various sizes: Corrugated boxes are placed in balers and compacted into bales. These bales may be stored inside or outside of the facility. The bales should be protected from fire, inclement weather, theft, and vandalism.

(b) Stationary compactors or bulk containers: Corrugated boxes are placed in a stationary compactor or bulk containers outside of the facility. The containers should be protected from fire, inclement weather, theft and vandalism.

41 FR 16952, Apr. 23, 1976.

Secs. 1008 and 6004 of the Solid Waste Disposal Act, as amended by the Resource Conservation and Recovery Act of 1976, as amended (42 U.S.C. 6907, 6964).

§ 246.202-5 Recommended procedures: Transportation.

Transportation to market may be supplied by either the facility, a private hauler or the purchaser. In facilities to which goods are delivered from a central warehouse, corrugated may be backhauled by delivery trucks to the central facility and baled there for delivery to a user.

41 FR 16952, Apr. 23, 1976.

Secs. 1008 and 6004 of the Solid Waste Disposal Act, as amended by the Resource Conservation and Recovery Act of 1976, as amended (42 U.S.C. 6907, 6964).

§ 246.202-6 Recommended procedures: Cost analysis.

After potential markets have been identified (but prior to initiation of formal bidding), preliminary determinations of various separation methods, storage and transportation costs have been made, and estimated tonnages of both recoverable material and residual solid waste have been established, an analysis should be conducted which compares the costs of the present waste collection and disposal system with the proposed segregated systems. At a minimum, the study should include all capital, operating and overhead costs and take into account credits for revenue from paper sales and savings from diverting recycled materials from disposal. Potential costs to upgrade collection and disposal practices to comply with EPA's Guidelines for the Storage and Collection of Residential, Commercial and Institutional Solid Wastes (40 CFR Part 243) and Thermal Processing and Land Disposal Guidelines (40 CFR Parts 240 and 241) should be included in the analysis. This cost analysis should enable the facility to determine the most cost effective method of implementing these guidelines.

41 FR 16952, Apr. 23, 1976.

Secs. 1008 and 6004 of the Solid Waste Disposal Act, as amended by the Resource Conservation and Recovery Act of 1976, as amended (42 U.S.C. 6907, 6964).

§ 246.202-7 Recommended procedures: Establishment of purchase contract.

Formal bids should be requested for purchase of the recovered materials, such bids being solicited in conformance with bidding procedures established for the responsible agency. Contracts should include the buyer's quality specifications, transportation agreements, a guarantee that the material will be accepted for one year or more and a guaranteed minimum purchase price.
41 FR 16952, Apr. 23, 1976.

Secs. 1008 and 6004 of the Solid Waste Disposal Act, as amended by the Resource Conservation and Recovery Act of 1976, as amended (42 U.S.C. 6907, 6964).

§ 246.203 Reevaluation.

[NO TEXT IN ORIGINAL]
41 FR 16952, Apr. 23, 1976.

Secs. 1008 and 6004 of the Solid Waste Disposal Act, as amended by the Resource Conservation and Recovery Act of 1976, as amended (42 U.S.C. 6907, 6964).

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41 FR 16952, Apr. 23, 1976.

Secs. 1008 and 6004 of the Solid Waste Disposal Act, as amended by the Resource Conservation and Recovery Act of 1976, as amended (42 U.S.C. 6907, 6964).

PART 247 -- COMPREHENSIVE PROCUREMENT GUIDELINE FOR PRODUCTS CONTAINING RECOVERED MATERIALS

42 U.S.C. 6912(a) and 6962; E.O. 13101, 63 FR 49643, 3 CFR, 1998 Comp., p. 210.

SUBPART A -- GENERAL

§ 247.1 Purpose and scope.

(a) The purpose of this guideline is to assist procuring agencies in complying with the requirements of section 6002 of the Solid Waste Disposal Act, as amended by the Resource Conservation and Recovery Act of 1976 (RCRA), as amended, 42 U.S.C. 6962, and Executive Order 12873, as they apply to the procurement of the items designated in subpart B of this part.

(b) This guideline designates items that are or can be made with recovered materials and whose procurement by procuring agencies will carry out the objectives of section 6002 of RCRA. EPA's recommended practices with respect to the procurement of specific designated items are found in the companion Recovered Materials Advisory Notice(s).

(c) EPA believes that adherence to the recommendations in the Recovered Materials Advisory Notice(s) constitutes compliance with RCRA section 6002. However, procuring agencies may adopt other types of procurement programs consistent with RCRA section 6002.

[60 FR 21381, May 1, 1995]

§ 247.2 Applicability.

(a)(1) This guideline applies to all procuring agencies and to all procurement actions involving items designated by EPA in this part, where the procuring agency purchases $ 10,000 or more worth of one of these items during the course of a fiscal year, or where the cost of such items or of functionally equivalent items purchased during the preceding fiscal year was $ 10,000 or more.

(2) This guideline applies to Federal agencies, to State and local agencies using appropriated Federal funds to procure designated items, and to persons contracting with any such agencies with respect to work performed under such contracts. Federal procuring agencies should note that the requirements of RCRA section 6002 apply to them whether or not appropriated Federal funds are used for procurement of designated items.

(3) The $ 10,000 threshold applies to procuring agencies as a whole rather than to agency subgroups such as regional offices or subagencies of a larger department or agency.

(b) The term "procurement actions" includes:

(1) Purchases made directly by a procuring agency and purchases made directly by any person (e.g., a contractor) in support of work being performed for a procuring agency, and

(2) Any purchases of designated items made "indirectly" by a procuring agency, as in the case of procurements resulting from grants, loans, funds, and similar forms of disbursements of monies.

(c)(1) This guideline does not apply to purchases of designated items which are unrelated to or incidental to Federal funding, i.e., not the direct result of a contract or agreement with, or a grant, loan, or funds disbursement to, a procuring agency.

(2) This guideline also does not apply to purchases made by private party recipients (e.g., individuals, non-profit organizations) of Federal funds pursuant to grants, loans, cooperative agreements, and other funds disbursements.

(d) RCRA section 6002(c)(1) requires procuring agencies to procure designated items composed of the highest percentage of recovered materials practicable, consistent with maintaining a satisfactory level of competition, considering such guidelines. Procuring agencies may decide not to procure such items if

they are not reasonably available in a reasonable period of time; fail to meet reasonable performance standards; or are only available at an unreasonable price.
[60 FR 21381, May 1, 1995; 62 FR 60962, 60973, Nov. 13, 1997]

[EFFECTIVE DATE NOTE: 62 FR 60962, 60973, Nov. 13, 1997, added paragraph (d), effective Nov. 13, 1997.]

§ 247.3 Definitions.

As used in this procurement guideline and the related Recovered Materials Advisory Notice(s):

Act or RCRA means the Solid Waste Disposal Act, as amended by the Resource Conservation and Recovery Act, as amended, 42 U.S.C 6901 et seq;

Awards and plaques refers to free-standing statues and boardlike products generally used as wall-hangings.

Blanket insulation means relatively flat and flexible insulation in coherent sheet form, furnished in units of substantial area. Batt insulation is included in this term;

Board insulation means semi-rigid insulation preformed into rectangular units having a degree of suppleness, particularly related to their geometrical dimensions;

Building insulation means a material, primarily designed to resist heat flow, which is installed between the conditioned volume of a building and adjacent unconditioned volumes or the outside. This term includes but is not limited to insulation products such as blanket, board, spray-in-place, and loose-fill that are used as ceiling, floor, foundation, and wall insulation;

Carpet cushion, also known as carpet underlay, is padding placed beneath carpet to reduce carpet wear caused by foot traffic or furniture indentation, enhance comfort, and prolong appearance.

Cellulose fiber loose-fill means a basic material of recycled wood-based cellulosic fiber made from selected paper, paperboard stock, or ground wood stock, excluding contaminated materials which may reasonably be expected to be retained in the finished product, with suitable chemicals introduced to provide properties such as flame resistance, processing and handling characteristics. The basic cellulosic material may be processed into a form suitable for installation by pneumatic or pouring methods;

Channelizers means highly visible barrels or drums that can be positioned to direct traffic through detours;

Compost made from yard trimmings, leaves, grass clippings, and/or food wastes is a thermophilic converted product with high humus content. Compost can be used as a soil amendment and can also be used to prevent or remediate pollutants in soil, air, and storm water run-off.

Delineator means a highly visible pavement marker that can be positioned to direct traffic or define boundaries;

Engine lubricating oils means petroleum-based oils used for reducing friction in engine parts;

Federal agency means any department, agency, or other instrumentality of the Federal government; any independent agency or establishment of the Federal government including any government corporation; and the Government Printing Office;

Fiberglass insulation means insulation which is composed principally of glass fibers, with or without binders;

Flexible delineator means a highly visible marker that can be positioned to direct traffic or define boundaries and that will flex if struck by a vehicle to prevent damage to the vehicle or the delineator;

Flowable fill is a low strength material that is mixed to a wet, flowable slurry and used as an economical fill or backfill material in place of concrete, compacted soils, or sand.

Foam-in-place insulation is rigid cellular foam produced by catalyzed chemical reactions that hardens at the site of the work. The term includes spray-applied and injected applications such as spray-in-place foam and pour-in-place;

Garden hose means a flexible tubing that conducts water to a specific location;

Gear oils means petroleum-based oils used for lubricating machinery gears;

Hydraulic fluids means petroleum-based hydraulic fluids;

Hydraulic mulch means a mulch that is a cellulose-based (paper or wood) protective covering that is mixed with water and applied through mechanical spraying in order to aid the germination of seeds and to prevent soil erosion;

Hydroseeding means the process of spraying seeds mixed with water through a mechanical sprayer (hydroseeder). Hydraulic mulch, fertilizer, a tacking agent, or a wetting agent can also be added to the water/seed mix for enhanced performance;

Industrial drums are cylindrical containers used for shipping and storing liquid or solid materials.

Laminated paperboard means board made from one or more plies of kraft paper bonded together, with or without facers, that is used for decorative, structural, or insulating purposes;

Latex paint means a water-based decorative or protective covering having a latex binder;

Lawn edging means a barrier used between lawns and landscaped areas or garden beds to prevent grass roots or weeds from spreading to the landscaped areas;

Loose-fill insulation means insulation in granular, nodular, fibrous, powdery, or similar form, designed to be installed by pouring, blowing or hand placement;

Manual-grade strapping refers to straps of material used with transport packaging to hold products in place on pallets or in other methods of commercial, bulk shipment. Strapping can also prevent tampering and pilferage during shipping.

Mats are temporary or semipermanent protective floor coverings used for numerous applications, including home and office carpet protection, car and truck floor board protection, traction on slippery surfaces, cushion from floor hardness, and reduction of injury risk during athletic events.

Mineral fiber insulation means insulation (rock wool or fiberglass) which is composed principally of fibers manufactured from rock, slag or glass, with or without binders;

Pallet means a portable platform for storing or moving cargo or freight;

Paper means one of two broad subdivisions of paper products, the other being paperboard. Paper is generally lighter in basis weight, thinner, and more flexible than paperboard. Sheets 0.012 inch or less in thickness are generally classified as paper. Its primary uses are for printing, writing, wrapping, and sanitary purposes. However, in this guideline, the term paper is also used as a generic term that includes both paper and paperboard.

Paper product means any item manufactured from paper or paperboard. The term paper product is used in this guideline to distinguish such items as boxes, doilies, and paper towels from printing and writing papers.

Park benches and picnic tables are recreational furniture found in parks, outdoor recreational facilities, and the grounds of office buildings and other facilities.

Parking stop means a barrier used to mark parking spaces and keep parked vehicles from rolling beyond a designated parking area;

Perlite composite board means insulation board composed of expanded perlite and fibers formed into rigid, flat, rectangular units with a suitable sizing material incorporated in the product. It may have on one or both surfaces a facing or coating to prevent excessive hot bitumen strike-in during roofing installation;

Person means an individual, trust, firm, joint stock company, corporation (including a government corporation), partnership, association, Federal agency, State, municipality, commission, political subdivision of a State, or any interstate body;

Phenolic insulation means insulation made with phenolic plastics which are plastics based on resins made by the condensation of phenols, such as phenol or cresol, with aldehydes;

Plastic fencing means a barrier with an open-weave pattern that can be used to control drifting snow or sand by restricting the force of wind and to provide a warning or barrier in construction and other areas;

Plastic lumber landscaping timbers and posts are used to enhance the appearance of and control erosion in parks, highways, housing developments, urban plazas, zoos, and the exteriors of office buildings, military facilities, schools, and other public use areas.

Playground equipment includes many components, like slides, merry-go-rounds, hand rails, etc., and is found in parks, schools, child care facilities, institutions, multiple family dwellings, restaurants, resort and recreational developments, and other public use areas.

Polyisocyanurate insulation means insulation produced principally by the polymerization of polymeric polyisocyanates, usually in the presence of polyhydroxyl compounds with the addition of cell stabilizers, blowing agents, and appropriate catalyst to produce a polyisocyanurate chemical structure;

Polystyrene insulation means an organic foam composed principally of polymerized styrene resin processed to form a homogenous rigid mass of cells;

Polyurethane insulation means insulation composed principally of the catalyzed reaction product of polyisocyanates and polyhydroxyl compounds, processed usually with a blowing agent to form a rigid foam having a predominantly closed cell structure;

Postconsumer material means a material or finished product that has served its intended use and has been diverted or recovered from waste destined for disposal, having completed its life as a consumer item. Postconsumer material is a part of the broader category of recovered materials.

Postconsumer recovered paper means:

(1) Paper, paperboard and fibrous wastes from retail stores, office buildings, homes and so forth, after they have passed through their end-usage as a consumer item including: Used corrugated boxes; old newspapers; old magazines; mixed waste paper; tabulating cards and used cordage; and

(2) All paper, paperboard and fibrous wastes that enter and are collected from municipal solid waste;

Practicable means capable of being used consistent with: Performance in accordance with applicable specifications, availability at a reasonable price, availability within a reasonable period of time, and maintenance of a satisfactory level of competition;

Printer ribbon means a nylon fabric designed to hold ink and used in dot matrix and other types of impact printers;

Procurement item means any device, good, substance, material, product, or other item, whether real or personal property, which is the subject of any purchase, barter, or other exchange made to procure such item;

Procuring agency means any Federal agency, or any State agency or agency of a political subdivision of a State, which is using appropriated Federal funds for such procurement, or any person contracting with any such agency with respect to work performed under such contract;

Purchasing means the act of and the function of responsibility for the acquisition of equipment, materials, supplies, and services, including: Buying, determining the need, selecting the supplier, arriving at a fair and reasonable price and terms and conditions, preparing the contract or purchase order, and follow-up;

Railroad grade crossing surfaces are materials placed between railroad tracks, and between the track and the road at highway and street railroad crossings, to enhance automobile and pedestrian safety.

Recovered materials means waste materials and byproducts which have been recovered or diverted from solid waste, but such term does not include those materials and byproducts generated from, and commonly reused within, an original manufacturing process;

Recovered materials, for purposes of purchasing paper and paper products, means waste material and byproducts that have been recovered or diverted from solid waste, but such term does not include those materials and byproducts generated from, and commonly reused within, an original manufacturing process. In the case of paper and paper products, the term recovered materials includes:

(1) Postconsumer materials such as --

(i) Paper, paperboard, and fibrous wastes from retail stores, office buildings, homes, and so forth, after they have passed through their end-usage as a consumer item, including: Used corrugated boxes; old newspapers; old magazines; mixed waste paper; tabulating cards; and used cordage; and

(ii) All paper, paperboard, and fibrous wastes that enter and are collected from municipal solid waste, and

(2) Manufacturing, forest residues, and other wastes such as --

(i) Dry paper and paperboard waste generated after completion of the papermaking process (that is, those manufacturing operations up to and including the cutting and trimming of the paper machine reel in smaller rolls of rough sheets) including: Envelope cuttings, bindery trimmings, and other paper and paperboard waste, resulting from printing, cutting, forming, and other converting operations; bag, box, and carton manufacturing wastes; and butt rolls, mill wrappers, and rejected unused stock; and

(ii) Finished paper and paperboard from obsolete inventories of paper and paperboard manufacturers, merchants, wholesalers, dealers, printers, converters, or others;

(iii) Fibrous byproducts of harvesting, manufacturing, extractive, or wood-cutting processes, flax, straw, linters, bagasse, slash, and other forest residues;

(iv) Wastes generated by the conversion of goods made from fibrous material (that is, waste rope from cordage manufacture, textile mill waste, and cuttings); and

(v) Fibers recovered from waste water which otherwise would enter the waste stream.

Re-refined oils means used oils from which the physical and chemical contaminants acquired through previous use have been removed through a refining process;

Restroom divider/partition means a barrier used to provide privacy in public restroom facilities;

Retread tire means a worn automobile, truck, or other motor vehicle tire whose tread has been replaced;

Rock wool insulation means insulation which is composed principally from fibers manufactured from slag or natural rock, with or without binders;

Shower divider/partition means a water-proof barrier used to provide privacy in public shower facilities;

Signage (including sign posts and supports) is used for identification and directional purposes for public roads and highways, and inside and outside office buildings, museums, parks, and other public places.

Soaker hose means a perforated flexible tubing that is used to deliver gentle irrigation to plants;

Sorbents (i.e., absorbents and adsorbents) are materials used to retain liquids and gases in a diverse number of environmental, industrial, agricultural, medical, and scientific applications. Absorbents incorporate a substance while adsorbents gather substances on their surfaces.

Specification means a description of the technical requirements for a material, product, or service that includes the criteria for determining whether these requirements are met. In general, specifications are in the form of written commercial designations, industry standards, and other descriptive references;

Spray-in-place insulation means insulation material that is sprayed onto a surface or into cavities and includes cellulose fiber spray-on as well as plastic rigid foam products;

Spray-in-place foam is rigid cellular polyurethane or polyisocyanurate foam produced by catalyzed chemical reactions that hardens at the site of the work. The term includes spray-applied and injected applications;

State means any of the several states, the District of Columbia, the Commonwealth of Puerto Rico, the Virgin Islands, Guam, American Samoa, and the Commonwealth of the Northern Mariana Islands;

Structural fiberboard means a fibrous-felted, homogenous panel made from lignocellulosic fibers (usually wood, cane, or paper) and having a density of less than 31 lbs/ft 3n but more than 10 lbs/ft 3n. It is characterized by an integral bond which is produced by interfelting of the fibers, but which has not been consolidated under heat or pressure as a separate stage of manufacture;

Tire means the following types of tires: Passenger car tires, light- and heavy-duty truck tires, high-speed industrial tires, bus tires, and special service tires (including military, agricultural, off-the-road, and slow-speed industrial);

[60 FR 21381, May 1, 1995; 62 FR 60962, 60973, Nov. 13, 1997; 65 FR 3070, 3080, Jan. 19, 2000]

[EFFECTIVE DATE NOTE: 65 FR 3070, 3080, Jan. 19, 2000, amended this section, effective Jan. 19, 2001.]

§ 247.4 Contracting officer requirements.

Within one year after the effective date of each item designation, contracting officers shall require that vendors:

(a) Certify that the percentage of recovered materials to be used in the performance of the contract will be at least the amount required by applicable specifications or other contractual requirements, and

(b) Estimate the percentage of total material utilized for the performance of the contract which is recovered materials.

[60 FR 21383, May 1, 1995]

§ 247.5 Specifications.

(a) RCRA section 6002(d)(1) required Federal agencies that have the responsibility for drafting or reviewing specifications for procurement items procured by Federal agencies to revise their specifications by May 8, 1986, to eliminate any exclusion of recovered materials and any requirement that items be manufactured from virgin materials.

(b) RCRA section 6002(d)(2) requires that within one year after the publication date of each item designation by the EPA, each procuring agency must assure that its specifications for these items require the use of recovered materials to the maximum extent possible without jeopardizing the intended end use of these items.

[60 FR 21383, May 1, 1995]

§ 247.6 Affirmative procurement programs. [Effective

RCRA section 6002(i) provides that each procuring agency which purchases items designated by EPA must establish an affirmative procurement program, containing the four elements listed below, for procuring such items containing recovered materials to the maximum extent practicable:

(a) Preference program for purchasing the designated items;

(b) Promotion program;

(c) Procedures for obtaining estimates and certifications of recovered materials content and for verifying the estimates and certifications; and

(d) Annual review and monitoring of the effectiveness of the program.

[60 FR 21383, May 1, 1995]

SUBPART B -- ITEM DESIGNATIONS

§ 247.10 Paper and paper products.

Paper and paper products, excluding building and construction paper grades.
[60 FR 21383, May 1, 1995]

§ 247.11 Vehicular products.

(a) Lubricating oils containing re-refined oil, including engine lubricating oils, hydraulic fluids, and gear oils, excluding marine and aviation oils.

(b) Tires, excluding airplane tires.

(c) Reclaimed engine coolants, excluding coolants used in non-vehicular applications.

[60 FR 21383, May 1, 1995]

§ 247.12 Construction products.

(a) Building insulation products, including the following items:

(1) Loose-fill insulation, including but not limited to cellulose fiber, mineral fibers (fiberglass and rock wool), vermiculite, and perlite;

(2) Blanket and batt insulation, including but not limited to mineral fibers (fiberglass and rock wool);

(3) Board (sheathing, roof decking, wall panel) insulation, including but not limited to structural fiberboard and laminated paperboard products, perlite composite board, polyurethane, polyisocyanurate, polystyrene, phenolics, and composites; and

(4) Spray-in-place insulation, including but not limited to foam-in-place polyurethane and polyisocyanurate, and spray-on cellulose.

(b) Structural fiberboard and laminated paperboard products for applications other than building insulation, including building board, sheathing, shingle backer, sound deadening board, roof insulating board, insulating wallboard, acoustical and non-acoustical ceiling tile, acoustical and non-acoustical lay-in panels, floor underlayments, and roof overlay (coverboard).

(c) Cement and concrete, including concrete products such as pipe and block, containing coal fly ash or ground granulated blast furnace (GGBF) slag.

(d) Carpet made of polyester fiber for use in low- and medium-wear applications.

(e) Floor tiles and patio blocks containing recovered rubber or plastic.

(f) Shower and restroom dividers/partitions containing recovered plastic or steel.

(g)(1) Consolidated latex paint used for covering graffiti; and

(2) Reprocessed latex paint used for interior and exterior architectural applications such as wallboard, ceilings, and trim; gutter boards; and concrete, stucco, masonry, wood, and metal surfaces.

(h) Carpet cushion made from bonded polyurethane, jute, synthetic fibers, or rubber containing recovered materials.

(i) Flowable fill containing coal fly ash and/or ferrous foundry sands.

(j) Railroad grade crossing surfaces containing coal fly ash, recovered rubber, or recovered steel.

[60 FR 21383, May 1, 1995; 62 FR 60962, 60973, Nov. 13, 1997; 65 FR 3070, 3081, Jan. 19, 2000]

[EFFECTIVE DATE NOTE: 65 FR 3070, 3081, Jan. 19, 2000, added paragraphs (h), (i), and (j), effective Jan. 19, 2001.]

§ 247.13 Transportation products.

(a) Traffic barricades and traffic cones used in controlling or restricting vehicular traffic.

(b) Parking stops made from concrete or containing recovered plastic or rubber.

(c) Channelizers containing recovered plastic or rubber.

(d) Delineators containing recovered plastic, rubber, or steel.

(e) Flexible delineators containing recovered plastic.

[60 FR 21383, May 1, 1995; 62 FR 60962, 60974, Nov. 13, 1997]

§ 247.14 Park and recreation products.

(a) Playground surfaces and running tracks containing recovered rubber or plastic.

(b) Plastic fencing containing recovered plastic for use in controlling snow or sand drifting and as a warning/safety barrier in construction or other applications.

(c) Park benches and picnic tables containing recovered steel, aluminum, plastic, or concrete.

(d) Playground equipment containing recovered plastic, steel, or aluminum.

[60 FR 21384, May 1, 1995; 62 FR 60962, 60974, Nov. 13, 1997; 65 FR 3070, 3081, Jan. 19, 2000]

[EFFECTIVE DATE NOTE: 65 FR 3070, 3081, Jan. 19, 2000, added paragraphs (c) and (d), effective Jan. 19, 2001.]

§ 247.15 Landscaping products.

(a) Hydraulic mulch products containing recovered paper or recovered wood used for hydroseeding and as an over-spray for straw mulch in landscaping, erosion control, and soil reclamation.

(b) Compost made from yard trimmings, leaves, grass clippings, and/or food waste for use in landscaping, seeding of grass or other plants on roadsides and embankments, as a nutritious mulch under trees and shrubs, and in erosion control and soil reclamation.

(c) Garden and soaker hoses containing recovered plastic or rubber.

(d) Lawn and garden edging containing recovered plastic or rubber.

(e) Plastic lumber landscaping timbers and posts containing recovered materials.

[60 FR 21384, May 1, 1995; 62 FR 60962, 60974, Nov. 13, 1997; 65 FR 3070, 3081, Jan. 19, 2000]

[EFFECTIVE DATE NOTE: 65 FR 3070, 3081, Jan. 19, 2000, revised paragraph (b) and added paragraph (e), effective Jan. 19, 2001.]

§ 247.16 Non-paper office products.

(a) Office recycling containers and office waste receptacles.
(b) Plastic desktop accessories.
(c) Toner cartridges.
(d) Plastic-covered binders containing recovered plastic; chipboard and pressboard binders containing recovered paper; and solid plastic binders containing recovered plastic.
(e) Plastic trash bags.
(f) Printer ribbons.
(g) Plastic envelopes.
(h) Plastic clipboards containing recovered plastic.
(i) Plastic file folders containing recovered plastic.
(j) Plastic clip portfolios containing recovered plastic.
(k) Plastic presentation folders containing recovered plastic.
[60 FR 21384, May 1, 1995; 62 FR 60962, 60974, Nov. 13, 1997; 65 FR 3070, 3081, Jan. 19, 2000]

[EFFECTIVE DATE NOTE: 65 FR 3070, 3081, Jan. 19, 2000, revised paragraph (d) and added paragraphs (h) through (k), effective Jan. 19, 2001.]

§ 247.17 Miscellaneous products.

(a) Pallets containing recovered wood, plastic, or paperboard.
(b) Sorbents containing recovered materials for use in oil and solvent clean-ups and as animal bedding.
(c) Industrial drums containing recovered steel, plastic, or paper.
(d) Awards and plaques containing recovered glass, wood, paper, or plastic.
(e) Mats containing recovered rubber and/or plastic.
(f)(1) Non-road signs containing recovered plastic or aluminum and road signs containing recovered aluminum.
(2) Sign supports and posts containing recovered plastic or steel.
(g) Manual-grade strapping containing recovered steel or plastic.
[62 FR 60962, 60974, Nov. 13, 1997; 65 FR 3070, 3081, Jan. 19, 2000]

[EFFECTIVE DATE NOTE: 65 FR 3070, 3081, Jan. 19, 2000, added paragraphs (b) through (g), effective Jan. 19, 2001.]

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