United States
Environmental Protection
Agency

Office of the
Administrator
(2131)

EPA 233-B-00-001
May 2000

ENVIRONMENTAL MANAGEMENT GUIDE FOR SMALL LABORATORIES

Environmental Management Guide for Small Laboratories

U.S. Environmental Protection Agency
Small Business Division
Washington, DC

May 2000

NOTICE

This document has been prepared to assist those responsible for administering or improving environmental management programs at small labs. To do this, the document outlines management and Federal regulatory issues for improving lab environmental performance, but does not prescribe in detail all required factors and considerations. For example, many important state, tribal or local requirements are *not addressed*.

The U.S. Environmental Protection Agency does not make any guarantee or assume any liability with respect to the use of any information contained in this document. It is recommended that users of this document requiring additional information or advice consult a qualified professional.

ACKNOWLEDGEMENT

This document was prepared for the Small Business Division of the U.S. Environmental Protection Agency (EPA). Important guidance was provided by numerous EPA staff in headquarters, regions, and lab facilities. Also providing valuable review and comments were representatives from: Radiation Safety Associates; Quest Diagnostics Inc.; and the University of Wisconsin System. The authors would also like to thank the dozens of experts who responded to the request for review during the "1999 Laboratory Safety and Environmental Management Conference." Your suggestions and assistance were greatly appreciated. Finally, the authors would like to thank those involved in the development and review of the first edition of the Guide, the success of which generated the interest in, and need for, this second edition.

SUGGESTED IMPROVEMENTS

This is the second edition of the Environmental Management Guide for Small Laboratories. Concentrated effort was made to ensure this document's usefulness to small labs and to address comments on the first edition, but additional improvements are always possible. Comments and suggested improvements are always welcome and should be directed to:

U.S. Environmental Protection Agency
Small Business Division
Ariel Rios Building, MC 2131
1200 Pennsylvania Avenue, NW
Washington, DC 20460

TABLE OF CONTENTS

LIST OF ACRONYMS

ASHRAE	American Society of Heating, Refrigeration and Air-Conditioning Engineers
ACM	Asbestos-Containing Material
ANSI	American National Standards Institute
CAAA	Clean Air Act Amendments
CDC	Centers for Disease Control
CERCLA	Comprehensive Environmental Response, Clean-up and Liability Act
CESQG	Conditionally Exempt Small Quantity Generator
CFC	Chlorofluorocarbons
CFR	Code of Federal Regulation
DOT	Department of Transportation
EMS	Environmental Management System
EPA	Environmental Protection Agency
EPCRA	Emergency Planning and Community Right-to-Know Act
EUP	Exceptional Use Permits
FIFRA	Federal Insecticide, Fungicide, and Rodenticide Act
GLPS	Good Laboratory Practice Standards
HAP	Hazardous Air Pollutant
HCFC	Hydrochlorofluorocarbon
HSWA	Hazardous and Solid Waste Amendments
ISO	International Organization for Standardization
LDR	Land Disposal Restrictions
LEPC	Local Emergency Planning Committee
LQG	Large Quantity Generator
LQHUW	Large Quantity Handlers of Universal Waste
LSF	Liquid Scintillation Fluid
MCL	Maximum Contaminant Level
MSDS	Material Data Safety Sheet
NESHAP	National Emission Standards for Hazardous Air Pollutants
NFPA	National Fire Protection Act
NIH	National Institute for Health
NORM	Naturally Occurring Radioactive Material
NPDES	National Pollution Discharge Elimination System
NRC	Nuclear Regulatory Commission, National Response Center, National Research Council
NSPS	New Source Performance Standards
ODS	Ozone Depleting Substances
OSHA	Occupational Safety and Health Administration

P2	Pollution Prevention
PBT	Persistent, Bioaccumulative, Toxic
PCB	Polychlorinated biphenyls
PEL	Permissible Exposure Limit
POTW	Publicly Owned Treatment Works
PPE	Personal Protective Equipment
RCRA	Resource Conservation and Recovery Act
RGD	Radiation-Generating Devices
RMP	Risk Management Plan
RQ	Reportable Quantity
RSO	Radiation Safety Officer
SBAP	Small Business Assistance Program
SBO	Small Business Ombudsman
SDWA	Safe Drinking Water Act
SERC	State Emergency Response Committee
SNM	Special Nuclear Material
SQG	Small Quantity Generator
SQHUW	Small Quantity Handlers of Universal Waste
SPCC	Spill Prevention, Control and Countermeasure
SSLA	Small Sealed Lead Acid
TAP	Toxic Air Pollutant
TCLP	Toxicity Characteristic Leaching Procedure
TPQ	Threshold Planning Quantity
TQ	Threshold Quantity
TRI	Toxic Release Inventory
TSCA	Toxic Substance Control Act
TSDF	Treatment, Storage, and Disposal Facility
UST	Underground Storage Tank

1.0 INTRODUCTION

The Environmental Management Guide for Small Laboratories (Guide) is designed to help staff in small labs better understand their responsibility for good environmental management. Its purpose is to improve environmental performance by assisting in the development and implementation of environmental management programs that meet important *Federal* regulatory requirements and prevent pollution. It is important to understand that for small lab environmental programs to be fully responsive, the information provided here *must* be supplemented by information contained in state, tribal or local regulations and by good management practices. This Guide is designed to be a good starting source.

Lab Challenges

Environmental management issues associated with small labs present a unique challenge. This challenge stems from the fact that most of today's environmental management requirements are based on regulations which were designed for relatively simple processes in manufacturing (e.g., printing) and service (e.g., dry cleaning) entities. Small lab operations, in general, are very different from those in manufacturing and services as the following table indicates. The uniqueness of small lab operations means that traditional approaches to environmental management, which may work well with other operations, need careful consideration, and possible adjustment, to work well.

WHAT MAKES A LAB DIFFERENT?		
Factor	**Manufacturing/ Services**	**Small Labs**
Variety of Substances Used	Low	High
Quantity of Substances Used	High	Low
Variability in Operations	Low	High
Likelihood of Creating New Substances	Low	High
Staff Education Level	Mixed	High
Centralized Management Control	High	Mixed

Adapted from LS&EM V7, No. 5, p. 4

With a focus on environmental management and emphasis on chemicals, it is important to understand that some critical related areas are not addressed in this Guide. For example, safety and health requirements administered by the Occupational Safety and Health Administration (OSHA) are not fully addressed nor are requirements for transporting hazardous materials (e.g., samples, supplies), which are implemented by the U. S. Department of Transportation (DOT). Both are very important to small labs. Also, the hazards associated with biologically active substances and radioactive materials are not fully addressed in this document. However, Section 4.0 indicates reliable sources of information that should be helpful in these areas.

In discussions of environmental management requirements for labs, there is often confusion between requirements applicable to the operation of the lab and requirements designed to meet specific lab analysis methods or protocols such as those for environmental media. One example is the requirement for managing toxic substances (e.g., storage, handling and disposal) versus how to sample them (e.g., Toxic Substances Control Act (TSCA) Good Laboratory Practice Standards (GLPS)). Although such specific sampling requirements for some media may be noted in this Guide, a detailed discussion of these requirements is not provided.

What is a "Small" Lab?

For the purpose of this document, a "small lab" is one that has no full-time position in environmental management. In small labs, environmental management is most likely a shared responsibility or administered by part-time staff or through collateral duty. Given this definition, most labs probably fall into this "small lab" category and will benefit from this document. Of course, many large labs should benefit from the information contained in this document as well. However, large labs are likely to have additional environmental management responsibility that is not fully addressed here. Air emissions management is one example where large labs, especially those involved in research and development may have additional responsibility because large lab air emissions may be greater.

Small labs are diverse in their settings and operations. Some small labs are affiliated with a larger organization, while others are independent operations. Given widespread use of the word "lab" many types of small labs exist; a few are listed below.

TYPICAL SMALL LAB TYPES	
Independent	• Contract Research in the Healthcare, Chemical, Natural Resources, Energy, or Manufacturing Industries • Commercial Testing Labs in the Environmental, Material Science, Healthcare, Industrial Hygiene, Food, and Engineering Sectors
Affiliated	• Teaching and Research Labs in Academia • Hospital Labs • Quality Assurance Labs in Manufacturing • Forensic Labs • Water and Wastewater Plant Labs • Government Research and Testing Labs • Private Research and Development Labs

All of these small lab types should benefit from the information in this Guide.

The remainder of this document is organized into four additional sections.

- Section 2.0 Environmental Management in Small Laboratories - Presents information on the overall environmental management system at a small lab including the implementation of pollution prevention and environmental training programs.
- Section 3.0 Key Environmental Management Issues - Provides descriptions of 15 key regulatory programs and media-based environmental management areas that impact the effective operation of small labs. These range from air pollution control to sustainable practices such as energy and water conservation.
- Section 4.0 Reliable Resources - Lists additional information sources on small lab environmental, health, and safety management.
- Section 5.0 Little Known but Allowable Ways to Manage Hazardous Waste - Provides a description of five ways EPA allows for the on-site treatment of hazardous wastes. Many labs should find these methods useful, but it is important to check state, local and tribal regulatory programs first.

2.0 ENVIRONMENTAL MANAGEMENT IN SMALL LABORATORIES

2.1 Environmental Management Systems

Like any other important business activity in a small lab, environmental issues must be carefully managed. For example, important business activities occurring in small labs address quality, finance, human resources, or safety – and have appropriate management systems.

What is an EMS?

The collection of activities undertaken to ensure that environmental issues are managed is called an environmental management system (EMS). An EMS is essential to:

- Consistently comply with environmental laws and regulations;
- Improve overall environmental performance;
- Address environmental liability from current or past practices;
- Maximize the investment, no matter how small, in environmental affairs;
- Integrate environmental objectives into overall business objectives; and
- Provide for an environmentally safe workplace.

Interest in environmental protection is growing steadily so small labs, like other organizations, may be increasingly challenged to demonstrate commitment to the environment. Implementing an EMS can help in a number of ways.

Why is an EMS Important?

First, an EMS makes good business sense. By identifying the causes of environmental problems, and then eliminating them, an EMS can help save money. The following questions demonstrate the point:

- Is it better to conduct chemical analyses right the first time or perform a lot of re-work later?
- Is it cheaper to prevent a spill in the first place or clean it up afterwards?
- Is it more cost-effective to prevent pollution or to manage it after it has been generated?

Second, an EMS can be an investment in the long-term viability of a small lab. An EMS helps the organization become more focused and, therefore, more effective in achieving environmental goals. This, typically, will result in higher staff job satisfaction and productivity. It also will help attract and retain new customers. More and more often, it is becoming necessary to prove a lab has an EMS to satisfy contract or other business terms.

EMS Elements The following are typically considered elements of an effective EMS.

Policy

- Develop an Environmental Policy that describes the lab organization's commitment to the environment.
- Use this policy as a framework for planning and implementation.

Planning

- Formulate objectives in line with the policy.
- Plan actions to achieve objectives.
- Ensure plan is in compliance with Federal, state, tribal and local regulations.

Implementation

- Establish roles and responsibilities and provide resources.
- Provide training to employees on their environmental responsibilities.
- Institute processes for communicating both internal and external environmental management issues.
- Develop written procedures and policies and ensure that documentation is maintained.
- Identify potential emergencies and develop procedures for prevention and response.

Quality Assurance and Control

- Monitor key activities and track performance.
- Identify and correct problems.
- Keep adequate records of EMS performance.
- Conduct periodic environmental management system audits to verify that the EMS is operating as intended.

Management Review

- Periodically review the EMS to evaluate overall program effectiveness and institute improvements where needed.
- Annually review objectives to determine whether the lab is meeting them. Set new targets as needed.

Chances are that most small labs have already committed to a quality or safety program. In fact, much of what is needed in many small labs may already be in place. In these cases, it is useful to think of an EMS as a value-added component to these existing programs.

When first establishing an EMS, the process can seem overwhelming. Because the EMS process encourages continual improvement, however, it doesn't matter how complete an EMS is, or isn't. It is important to get started now.

Small labs have some advantages over larger labs for establishing an EMS. For example, lines of communication are generally shorter, organizational structures are less complex, people perform multiple functions, and access to management is simpler. Also, time and

resources are more scarce. This means management and staff are often motivated to spend time and resources wisely. An EMS helps promote and sustain such efficiency.

EMS Standards and Registration

Many lab organizations have already committed to quality certifications such as the International Organization for Standardization (ISO) Total Quality Management Standard, ISO 9000. A number of organizations and countries have developed similar "quality" standards devoted to EMS. One such standard is ISO 14001. A lab can review its organization against a standard such as ISO 14001 to identify gaps and opportunities for improvement in its EMS. If the lab meets all the required elements of the standard, the lab can "self-declare" conformance. Alternatively, the lab can go through a third-party "registration" process. Some customers may require a third party review. Regardless of whether the lab pursues formal registration or self-declares, the assessment and adjustment of the lab's operations using a standard such as ISO 14001 is likely to improve lab environmental management.

Typical EMS Registration Process

1. Application
2. EMS Documentation Review – Desk Audit
3. On-site EMS Readiness Review
4. Registration Audit
5. Registration Determination
6. Surveillance

ISO 14001 and other EMS standards should not be confused with lab certification and accreditation programs that demonstrate compliance with industry or government process or sample analysis protocols. Examples of these accreditations include EPA's National Environmental Laboratory Accreditation Program (NELAP) and the National Institutes of Standards and Testing (NIST) accreditation process for asbestos analysis. A properly designed EMS will consider conformance with such accreditation programs as a system objective but will go beyond the lab analysis process to consider all environmental aspects of the lab.

2.2 Pollution Prevention and Waste Minimization

Pollution prevention (P2) and waste minimization are terms that refer to practices that reduce or eliminate the amount and/or toxicity of pollutants which would have entered any waste stream or that would have been released into the environment prior to recycling, treatment, or disposal. P2 applies not only to the management of all types of waste, but also to the management of releases to air, water, and land. These practices are cross cutting and can be adopted in many environmental program areas.

The United States Congress issued national expectations for P2 in the Pollution Prevention Act of 1990. The U.S. Environmental Protection Agency (EPA) has developed a hierarchy for waste management alternatives that lists source reduction as the preferred option, followed by on-site and off-site recycling, treatment, and land disposal. The P2 approach is most effective if encouraged at the highest level of the lab organization and integrated into the organization's EMS. Some common P2 practices include equipment or process modifications, reformulation,

substitution with less toxic materials, and inventory control procedures.

Implementing a P2 Program

Implementing a comprehensive P2 program can benefit a lab organization in a number of ways. It may cut expenses by reducing waste treatment and disposal costs, raw material purchases, and other operating costs. It may also reduce potential environmental liabilities and help protect the environment.

Labs have unique waste disposal issues that are different from manufacturing operations because of the broad variety and small quantities of chemicals used and the rapid frequency with which processes can change. There are various methods lab personnel can employ to minimize the generation of hazardous wastes. To be effective, a P2 program should include the key elements outlined below:

1. ***Obtain Management Support***. Top management should instill and foster support by communicating the importance for such a program to staff. Management participation and compliance with the program is critical to its success.
2. ***Conduct a Waste Stream Assessment***. Evaluate each waste stream from every process to generate ideas and options for reducing waste.
3. ***Conduct a Feasibility Analysis***. This will help prioritize the order in which waste minimization options are selected and carried out. When performing a feasibility analysis, consider regulatory issues, costs, staffing, space requirements, and company policies.
4. ***Implement the Selected P2 or Waste Minimization Options***. Develop and disseminate a memo or policy to educate and train staff who will ultimately be involved in performing and/or implementing the selected options.
5. ***Evaluate the Program***. Periodically evaluate the program's performance to determine overall effectiveness. Then implement recommended changes for improvement.

P2 and Waste Minimization Opportunities

There are a variety of P2 and waste minimization opportunities that may be available to small labs. Specific examples are provided in each of the key environmental management issue subsections provided in Section 3 of this Guide.

2.3 Environmental Training

A critical element for the successful implementation of a lab EMS is the development and implementation of an environmental training program. Employees at small labs may encounter various types of hazards – chemical, physical, biological and radiological. A comprehensive training program provides:

- Employees with information to conduct their jobs in a safe manner;
- A process to assure compliance with regulatory-based training requirements; and
- A mechanism to: demonstrate management's commitment to improved environmental performance; communicate corporate environmental policies and goals; and elevate the environmental awareness of staff.

Developing and implementing a comprehensive environmental training program can be a daunting task when one considers the dozens of environmental, health and safety training classes that may be required for a lab. OSHA has developed voluntary training guidelines to assist employers in identifying and providing a training program. The guidelines consist of seven steps that follow the EMS process of planning, implementing, and measuring performance:

Developing the Training Program

1. ***Perform a Needs Assessment.*** Determine what training, if any is necessary, to meet the training program objectives. Training is generally required when there are new or transferred employees, changes in programs or procedures, new regulations or requirements, new equipment or materials, needs for improved performance, or simply to meet a periodic regulatory requirement.
2. ***Design the Training Program***. Design a program that includes:
   - Establishing training goals and objectives (e.g., education on specific lab procedures, compliance with regulation, general awareness, etc.); and
   - Determining effective training methods (e.g., case studies, video, practical exercises) and trainers.
3. ***Develop the Training Content.*** Prepare training courses and materials to meet the program goals and objectives. The materials may include commercially available products, training developed and presented by a contractor or developed internally.
4. ***Conduct the Training.*** Execute the training program.
5. ***Evaluate the Training Effectiveness.*** Assess individual training class effectiveness and the overall effectiveness of the training program to ensure that it is meeting the course/program goals.
6. ***Recordkeeping and Monitoring***. Maintain records of student evaluations, tests, and attendance rosters.

Effective Lab Training

Consider practical competency-based training that teaches the application of environmental, health and safety principles to daily work practices as an effective alternative to traditional classroom training.

Computer-based training is increasingly being applied as an effective teaching method. Stanford University reports a positive initial response to this training approach. Their on-line training program can be viewed at: http://somsafety.stanford.edu/bbp2/index.html.

Also, the Howard Hughes Medical Institute offers a web based training site at: http://info.med.yale.edu/CAIM/HHMI/Public/

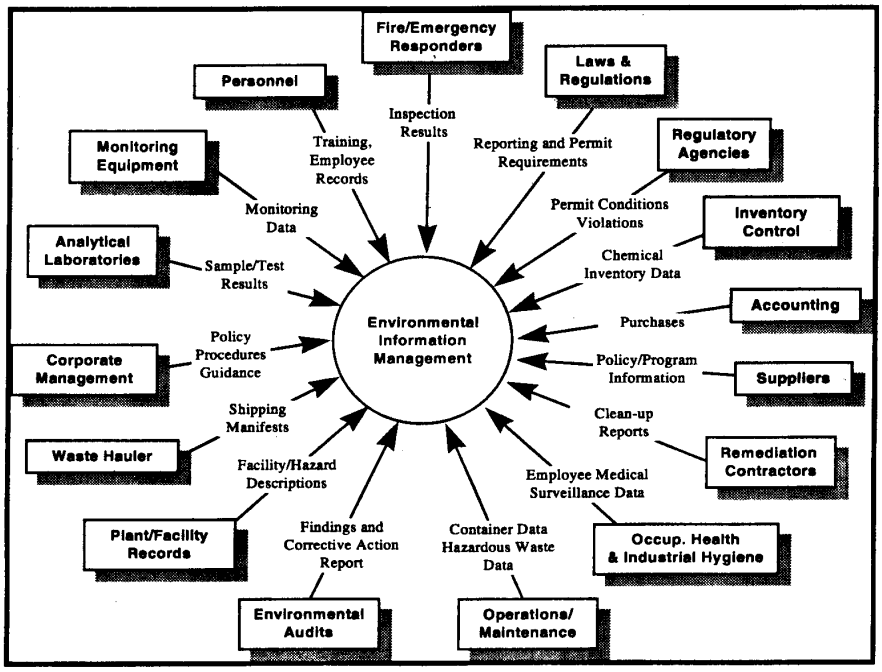
7. ***Improve the Training Program***. Based on the results of evaluations, revise the training classes and program to correct deficiencies.

Required Training

Lab personnel are subject to a variety of EPA, OSHA, DOT and Nuclear Regulatory Commission (NRC) training requirements. Requirements include hazard communication, chemical hygiene and hazardous waste training to name a few.

2.4 Information Management and Recordkeeping

"Buried in paperwork" is a term that is easily understood by environmental managers at small labs. The amount of environmental information that must be managed can be daunting. Consider the variety of information sources presented in the following figure.



Implementation Guide for the Code of Environmental Management Principles for Federal Agencies; Appendix A, Model Office/Facility Environmental Program

Maintaining accurate, up-to-date, and easily retrievable records of environmental management activities is essential for reducing future liability (e.g., fines for regulatory non-compliance, costly cleanup costs), facilitating inspections (internal and external), and responding to customer and other inquiries and information requests. Many environmental laws and regulations require comprehensive documentation to assure compliance and for regulatory agency reporting. Each reporting requirement has unique agencies to work with, reporting periods and submission dates, data reporting formats and record retention times. Documentation requirements are also required to demonstrate conformance with EMS standards such as ISO 14001. Many of these are described in the key environmental management issue subsections provided in Section 3 of the Guide.

Like most elements of a quality EMS, a good information and documentation management system should be designed to meet the specific needs of the small lab. The system should address not only regulatory reports but also such information as key regulations, guidance documents and other environmental management publications. The recordkeeping system should never rely on undocumented processes set up and maintained exclusively by a single individual. Inevitably, the individual is gone when key documents are needed and, therefore, cannot easily be retrieved.

3.0 KEY ENVIRONMENTAL MANAGEMENT ISSUES

The environmental management issues presented in this section either: (1) represent traditional areas with the most environmental management risk for small labs, or (2) are perceived to offer the greatest opportunity for environmental performance improvement. Not all issues may be of equal importance, but management of each is necessary to ensure continuously improving environmental performance.

3.1 Air Emissions

Often, air emissions from small labs appear to be subject to little or no regulation with some exceptions such as incinerators, large heating units, and lab processes emitting large quantities of hazardous air pollutants. Still, responsible lab staff should take steps to minimize emissions because even small, unregulated amounts of pollutants can be harmful to the environment. Many state, tribal, and local authorities regulate air emissions on a level at least as stringent as the Federal regulations. It is imperative that small labs check with the state, tribal or local authority to ensure the lab meets all applicable requirements and regulations.

Air emissions are also a potential occupational health issue. In 1991, OSHA recognized the unique nature of labs and established a separate lab standard (29 CFR 1910.1450) that requires a chemical hygiene plan that includes an assessment of potential personnel exposure to hazardous chemicals.

Regulatory Considerations

The Clean Air Act Amendments of 1990 (CAAA) established broad-reaching programs dealing with issues such as automobile emission standards, alternative fuels, and stratospheric ozone. But, of greatest potential concern to labs is Section 112 of the CAAA that addresses hazardous air pollutants (HAPs). Currently, 190 pollutants are listed as hazardous under Section 112, many of these are emitted from lab fume hoods. Common lab chemicals included on the list are benzene, formaldehyde, and methylene chloride.

Emission standards for many HAP source categories have been developed at the federal level and more are being added. Source categories include major industrial types (e.g., pharmaceutical manufacturing, synthetic organic chemical manufacturing) at which labs are often present. Interestingly, Congress also directed EPA to consider listing “research or lab facilities” as its own source category (CAA 112(c)(7)). EPA has not yet made a determination, but listing research or lab facilities as a separate source category would impact only large lab facilities which qualify as “major sources.” It is unlikely that a small lab would be a "major source."

The primary mechanisms regulating air pollutant emissions are state, tribal, and local air quality control regulations. These regulations normally follow the Federal guidelines and have similar features. However, depending on the type of air pollutant issues within the state, Indian Country, or local air quality district, individual regulations will vary. Because air quality

regulations vary from state to state and even within a state, it is imperative that the lab check with their state, tribal, or local air permitting authority to establish exactly what requirements apply to the lab.

Permits

Title V Operating Permits. Title V of the CAAA establishes a permitting program for "major sources" of air emissions and for sources subject to certain New Source Performance Standards (NSPS) or National Emissions Standards for Hazardous Air Pollutants (NESHAPs). Implementation of the program is delegated to authorized states and tribal governments.

Is my lab a major source?

Yes, if it has the potential to emit: a) 10 tons per year of any single HAP or 25 tons per year of a combination of HAPs from all sources at the lab combined; b) a threshold quantity of a criteria pollutant and is in a non-attainment area for NAAQS (threshold varies by pollutant and area classification); or c) 100 tons per year of any "air pollutant."

In some instances, small labs may be regulated under a Title V program because they are located in facilities with heating/cooling plants or other large emission points that qualify the entire facility as a major source.

State Permits to Construct and Operate. State air pollution control regulations may mandate that individual air pollution source and control devices (e.g., individual boilers, lab hood stacks, sterilizer, etc.) have permits to "construct" and permits to "operate."

State regulations governing permits for emissions from lab fume hoods vary widely. Many states clearly exempt lab emissions from permitting requirements, while other states have no special exemption. Further, some states have developed special registration requirements for lab fume hoods.

Permits may also be required for air pollutant emissions from facility heating equipment such as boilers. Permits are *typically* required for the operation of boilers with heat input capacities equal to or exceeding 1 million Btu/hour; however, some states require permits for smaller boilers. Also, sources such as incinerators and paint spray booths are often subject to air permitting requirements.

Other Potentially Important Air Pollution Control Regulations

In addition to the routine lab and building management operations which may be impacted by air pollution control regulations, labs may encounter the following non-routine or less common operations that will trigger air pollution control regulations:

Ozone Depleting Substances. Pursuant to the CAAA, EPA developed regulations that limit emissions of ozone-depleting substances (ODSs) such as chlorofluorocarbons (CFCs) and hydrochlorofluorocarbons (HCFCs) used in air conditioning and refrigeration equipment and halons used in fire suppressant systems. EPA regulations prohibit venting and

require recycling of these materials during equipment servicing, repair and disposal. Service personnel must be trained and certified by EPA or an EPA-approved organization.

Managing ODSs

- An inventory of all CFC containing equipment including quantity of CFC in each.
- Records of handling, certification, repair, recycling equipment usage, quantities of CFC.

Also require service technicians to provide records.

The production of CFCs was banned as of December 31, 1995. HCFCs will also be phased out over the next thirty years. The first HCFC phase out, for R-22 in new systems, will be in 2010. The final HCFC chemical phase out will be for the production of R-123 in 2030. Heating, ventilation and air conditioning equipment that use these CFC and HCHC refrigerants should be upgraded or replaced with "chlorine-free" refrigerant systems as alternative systems become available to avoid the high cost of obtaining these out-of-production chemicals. Certain lab analytical uses of CFCs have been permitted beyond the phase-out deadline set by the Montreal Protocol because the EPA has declared them as "essential use." As of January 1, 2000, however, EPA may no longer be able to allow lab essential use exemptions because the Act does not specifically list lab and analytical uses as an exemption in the phase out.

Chemical Accident Prevention. In response to the CAAA, EPA developed regulations that establish requirements to prevent or respond to accidental releases of extremely hazardous air pollutants (40 CFR 68). Facilities storing above threshold quantities (TQs) of designated toxic or flammable substances in one process area will have to identify the possible hazards and develop a Risk Management Plan (RMP). However, EPA generally excludes the chemicals used in labs from the requirements because small quantities are stored (40 CFR 68.115). Chemicals used outside the lab (e.g., chlorine chemical treatment system for building water supply), in specialty chemical production processes, or in pilot scale operations are not exempt from the RMP process.

Example
RMP TQs

Ammonia: 10,000 lb.
Chlorine: 2,500 lb.
HCl: 15,000 lb.
Toluene: 10,000 lb.
Propane: 10,000 lbs.

State Toxic Air Pollutant Regulations

Most States have toxic air pollutant (TAP) regulations. Even if not subject to RMP requirements or NESHAPS, State specific risk assessment and pollution control requirements may apply.

Air Pollution Episode Planning. The CAAA classifies non-attainment areas for the purpose of developing air emergency episode or contingency plans. Contingency plans require states to specify emission control actions and notification procedures that will occur when air pollution concentrations reach a certain level. Implementing the control

actions should prevent air pollution from reaching levels that would cause imminent and substantial damage to human health. Regions are classified separately for each of the following pollutants: sulfur oxides, nitrogen dioxide, particulate matter, carbon monoxide, and ozone. Requirements for a contingency plan vary depending on the region's classification. Lab facilities in non-attainment areas may be required to prepare a plan detailing steps the lab will take to comply with requirements on shutting down operations that produce air emissions and notifying personnel of the shut downs. Depending on the alert stage, labs may have to cease incineration operations, curtail motor vehicle operations, alter boiler operations, or shut down all lab activities. Labs that are part of a larger manufacturing operation are more likely to be affected by such requirements.

NSPS. Performance standards have been established (40 CFR 60) for new air pollution sources according to industry (e.g., chemical production plants, metal smelters, and manufacturing operations) and emission sources (e.g., steam generating unit such as boilers, incinerators). These sources often face stringent air pollution control regulations such as limitations on pollutant emissions, periodic or continuous emission monitoring, and installation of air pollution control equipment. Labs that install or have recently installed a particular type of equipment or are part of a large industrial facility covered under NSPS regulations may be subject to these more detailed requirements.

NESHAP. EPA has also promulgated stringent air pollution control requirements for emissions of certain HAPs (e.g., mercury beryllium, radionuclides), emissions from certain HAP sources (organic chemical manufacturer, sterilization facilities), and emissions from certain equipment (e.g., oil-water and organic-water separators) (40CFR 61 and 63). In addition, a lab's radionuclide emissions may be subject to NESHAP regulations if the lab does not have a Nuclear Regulatory Commission license and are a non-DOE Federal facility (owned or operated), (40 CFR 61, Subpart I). Furthermore, on-site demolition, renovation and removal of asbestos-containing materials (ACMs) in existing structures on-site may be subject to the NESHAP regulating asbestos (40 CFR 61, Subpart M).

Management Issues

Inventorying and Quantifying Emissions

In order to understand regulatory requirements, P2 opportunities and other management requirements, the lab must first identify its air emission sources and quantify actual and potential emission levels.

The lab should prepare and maintain a list of actual and potential air emissions in the lab (fume hoods, stacks, vents, etc.) including the source and location of emissions, and an estimate of the type and quantity of emissions. Potential emissions from such activities as cleaning, painting

and floor care should also be included in this inventory. The inventory should be updated at least annually.

Quantifying emissions from discrete equipment such as a boilers or incinerators is fairly straightforward. However, accurately quantifying small lab air emissions that consist of hood or area exhaust emissions of various chemicals is often difficult. For example:

- Some non-routine lab processes may have little or no records on chemical usage;
- Chemicals can change phase in the course of lab work. A liquid can become a part of a solid or a solid reactant can become a volatile gas;
- Researchers may purchase and use chemicals that are outside of a centralized management system; and
- Chemical volatility varies with temperature and pressure.

Common Lab Sources of Air Emissions

Point Sources:
- Exhaust from fume hoods, storage cabinets and rooms
- Boilers and generators
- Sterilizers

Area & Fugitive Sources:
- Breakage, spills, leaks
- Bench-top operations
- Glassware cleaning and rinsing
- Bench top chemical use

One way to estimate air emissions is based upon a simple mass balance model such as the one following. This model relies on accounting for all possible uses of the chemical so that the remainder that can not be accounted for is the maximum amount that could have actually been emitted to the air.

MAXIMUM SMALL LAB AIR EMISSION CALCULATION For each specific air volatile chemical, Fill in quantities known or estimated.	
Description	**Quantity**
(A) Amount of unused chemical in inventory today.	
(B) Amount of same unused chemical in a previous inventory. Note: A long period of time (i.e., one year) between (A) and (B) may yield more accurate results.	
(C) Subtract (A) from (B). This is the difference in inventory over the time period.	
(D) Amount of chemical purchased and received in the time period covered by the inventory records used in (A) and (B).	
(E) Add (C) and (D). This is the amount that needs to be accounted for.	
(F) Amount of chemical still in use in solutions and mixtures.	
(G) Amount of chemical disposed of as waste (all forms).	
(H) Amount (non-waste), shipped off-site, or other off-premise use.	
(I) Subtract (F) through (H) from (E). **This is the maximum amount of the chemical that could actually have been emitted to the air from the lab over the period of time between (A) and (B).**	

Although it might seem like an overwhelming task to make a calculation for all chemicals in a lab, this is probably not necessary. To start, the most air volatile and commonly used chemicals, such as organic solvents, should be addressed as well as any especially hazardous or stringently regulated chemicals. Thus, after making calculations for a small subset of chemicals, lab staff should have a good understanding of emission levels.

A second approach centers on evaluating a specific lab process instead of the entire lab. This approach will be easier and more reliable in labs where analyses are routine. For example, suppose a routine test mass balance calculation repetitively indicates a 10% "loss" of a chemical. "Loss" means the chemical is not part of the product or the solid waste stream. Thus, one assumes it is emitted to the air. This percentage can then be used to estimate the maximum total mass of chemical that could actually be emitted by multiplying the loss per test by the total number of tests.

Emission Changes-Requirements Change

Remember, changes in lab design or processes will change emissions and requirements. Review your inventory at least annually or whenever there is a significant process change.

Implementing the Air Quality Program

Once air pollutant sources are identified and emissions are quantified, the lab must:

- Assess the regulatory implications of these emissions;
- Assess P2 opportunities to eliminate or reduce air emission sources;
- Ensure that the sources are properly permitted;
- Maintain operation, monitoring and maintenance programs to comply with regulation or permit requirements; and
- Comply with recordkeeping requirements.

Ventilation

Ventilation is an integral part of controlling and removing particulates, vapors, gases, and other airborne chemicals from the lab and exhausting them to the atmosphere. Types of ventilation devices used in labs include fume hoods, biological safety cabinets, glove boxes, extraction hoods, benchtop slot hoods, and flexible ducting. Any ventilation device used must meet the design requirements set forth in EPA, OSHA, American Society of Heating, Refrigeration and Air-Conditioning Engineers (ASHRAE), and National Fire Protection Association (NFPA) regulations.

The lab should implement a regular inspection and monitoring program to ensure all ventilation devices are working properly to remove contaminants from inside the lab and exhaust them to the exterior of the building. All lab fume hoods must meet the ASHRAE 110 standards for testing the performance of lab fume hoods. Ventilation is measured in air changes per hour (ACH). OSHA recommends lab ventilation systems have a ventilation rate of 4–12 ACH, NFPA 45 recommends greater than 8 ACH, and ASHRAE recommends a

What Does a Monitoring Program Include?

- Daily visual inspections
- Quarterly testing
- Annual maintenance

rate of 6–10 ACH. The lab should ensure its ventilation rate meets the highest minimum recommendation as well as local code requirements.

In order for ventilation devices to be effective they must be used properly. Before any person uses a ventilation system, they should receive training in operating procedures as well as procedures for daily inspection. Good lab practices should be implemented to reduce the user's exposure to airborne hazards. For example, keep all containers at least six inches from the front of the hood, keep the hood sash closed as much as possible, do not obstruct the baffles in the rear of the hood, keep all containers tightly closed when not in use, and do not store unused chemicals in the fume hood.

Pollution Prevention and Air Emissions

Labs can eliminate or reduce air emissions through process change and engineering controls. In addition, a reduction in the scale of the experiment can reduce air emissions. Over the last decade, microscale chemistry has come to be considered a proven technology to reduce air emissions and P2 in other ways (see Hazardous Materials Handling and Storage, Section 3.14).

Other simple solutions such as ensuring the lids remain tightly closed on volatile solvents when not in use will also prevent air emissions. A good example is a high purity solvent delivery system being offered by some chemical suppliers that can accurately dispense solvents directly from the containers. The solvent is stored under inert gas and gas pressure drives solvent dispensing. When the container is empty, it is shipped back to the supplier to be refilled. This reduces the potential for emissions during chemical transfer.

SMALL LAB AIR EMISSIONS PROGRAM CHECKLIST	
Action	**Notes**
1. Determine if the facility is required to compile an air emissions inventory and if it is completed.	
2. Determine and record any changes in emission levels since the last inventory.	
3. Based on the inventory, determine if the facility is considered a “major source.”	
4. If the lab emits air contaminants to the outdoor atmosphere (through stacks, vents, and exhausts), make sure that a plan approval, operating permit, or exemption was obtained and documented if required.	
5. If an air emission permit is needed: • Ensure that all of the lab’s permits to operate sources of air emissions are up-to-date; and • Ensure that there is a system for timely renewal of air permits and associated fees.	
6. Regularly observe and document emissions from emission points to determine whether smoke or odors are produced.	
7. If the lab is part of a large industrial facility determine if more stringent air regulations must be followed.	
8. Determine if the facility triggers requirements under NESHAP.	
9. Determine if the lab properly services, repairs, and disposes of ozone depleting substances (e.g., CFCs and halons) and associated equipment.	
10. If lab storage exceeds threshold quantities of a regulated air pollutant, verify the facility developed and submitted a RMP and ensure there is a procedure in place to update the plan.	
11. Determine if lab ventilation is adequate for the associated hazards.	

SMALL LAB AIR EMISSIONS PROGRAM CHECKLIST	
Action	**Notes**
12. Verify that ventilation meets design requirements set by ASHRAE, EPA, OSHA, and NFPA regulations.	
13. Ensure the lab developed and implemented a ventilation monitoring program which includes: • Daily visual inspections; • Testing and certification at least annually; and • Annual maintenance (or sooner if necessary).	
14. Determine if the lab implemented any P2 measures such as engineering controls.	
15. Ensure the lab encourages personnel to tightly close all containers when not in use to minimize air emissions.	

3.2 Water Discharges

As a convenient way to dispose of chemical lab waste, sink drains can be very tempting. Disposal of chemicals in this manner is discouraged, however, since it may result in fire, chemical reactions, and corrosion within the plumbing system. In addition, drain disposal of chemicals may cause pH upsets and other environmental problems at the wastewater treatment plant.

If carefully controlled, some wastes (e.g., some acidic or basic wastewater that is neutralized before discharge) can be safely discharged via the sewer and it may be the most desirable disposal method because it minimizes waste sent off-site.

Federal, state, tribal and local regulations stipulate both acceptable and prohibited pollutants for discharge. Whether you are connected to a septic system, on-site wastewater treatment system, or local publicly owned treatment works (POTW) determines the specific regulations that you must follow.

Regulatory Considerations

The primary objective of the Clean Water Act, as amended in 1972, is to limit uncontrolled discharge of pollutants to the nation's navigable waterways. To achieve this objective, EPA introduced several regulatory programs, which are implemented and enforced on a state, tribal or local level.

Discharges to the Sewer

Regulations governing wastewater discharges to a POTW are sometimes referred to as "pretreatment standards," meaning that some wastes must be treated before being discharged to comply with the standards. The National Pretreatment Standards found in 40 CFR Part 403.5 contain specific standards prohibiting all users from discharging the pollutants listed below into a sewer system.

- Flammable or explosive pollutants including, but not limited to, waste streams with a closed cup flash point of < 140°F.
- Pollutants that will cause corrosive structural damage to the POTW, but in no case discharges with pH lower than 5.0, unless the POTW is specifically designed to accommodate such discharges.
- Solid or viscous pollutants that may cause an obstruction of flow in the POTW.
- Pollutants capable of releasing fumes or vapors in sufficient quantities to detrimentally affect the safety and health of treatment works personnel.
- Pollutants, including oxygen demanding pollutants (high biological oxygen demand), at a concentration and flow which may cause interference with the POTW.
- Wastewater with sufficient heat to inhibit biological activity in the POTW (must not exceed 104°F at the POTW).
- Petroleum, oil, non-biodegradable cutting oil or products of mineral oil origin in amounts that will cause interference or pass through.

The lab should review the “Effluent Guidelines” found in 40 CFR 403-471 to determine if there are additional specific requirements placed on the lab due to the nature of its work.

Several states have imposed pretreatment standards that are more stringent than the Federal standards. Additionally, most POTWs have local sewer ordinances that usually set even more stringent standards. Local sewer ordinances typically set discharge limits for metals, biological oxygen demand, and various organic pollutants. Many of these ordinances specify that an increase in the use of water in order to dilute pollutants to achieve compliance with the above limits is prohibited. Also, local ordinances often require "industrial users," as defined in the ordinance, to obtain discharge permits from the local wastewater authority.

Surface Water Discharge

Labs that discharge wastewater to surface water are likely to require a National Pollutant Discharge Elimination System (NPDES) permit. NPDES programs are usually maintained and enforced by state or tribal water pollution control agencies. Even effluents such as non-contact cooling water are often subject to NPDES requirements. Labs with their own wastewater treatment system that discharges to a nearby lake or stream are subject to NPDES requirements.

In the early 1990s, EPA implemented a program requiring NPDES permits for storm water runoff. In general, offices and the associated parking areas are not included by NPDES storm water requirements. However, some light industrial activities, such as outside storage of materials, may cause NPDES storm water runoff requirements to apply. Check with appropriate wastewater authorities to be certain.

Even though labs may not be required to apply for and receive a Federal NPDES permit, state or tribal governments may require the lab to apply for a similar permit based on the make up and quantity of the effluent. A Federal, state or tribal permit will generally require the lab to establish an operation and maintenance program to ensure proper operation of lab controls, training, and quality assurance. In addition, the permit will establish monitoring and recordkeeping requirements as well as notification of noncompliance, bypass or upsets.

Septic Systems

In most areas, labs no longer discharge wastewater to septic systems. Where public sewer systems are available, septic systems may be prohibited. Lab managers in facilities that discharge wastewater to a septic system should caution all personnel that any pollutant discharged down the drain has the potential to contaminate the environment. Facilities discharging to septic systems may be required to obtain a permit for discharge to groundwater. See Underground Injection Control, Section 3.12.

Management Issues

To completely understand and effectively manage its wastewater program, small labs should develop a wastewater management system which includes:

- An inventory of wastewater discharges;
- Programs and practices for preventing, controlling and minimizing wastewater;
- Operating and maintenance procedures for wastewater discharge systems (collection and treatment);
- Monitoring to check operations;
- Recordkeeping to document compliance with permits;
- Procedures to respond to emergencies;
- Training program to ensure operators meet regulatory requirements and operational requirements; and
- Procedures to assess planned changes in operations that may affect wastewater discharges.

> Where do my drains go?
>
> Dye tracing can easily be done on all drains leading out of a lab to ensure that discharges affected by Federal, state, tribal or local, regulations go to the appropriate location (e.g., POTW).

Wastewater Discharge Inventory

Labs should maintain a comprehensive listing of wastewater discharges that includes sources and locations of the discharges, analytical or other data characterizing the nature and volume of the discharge.

Designing and Implementing the Program

The lab should design and implement programs and practices for properly managing its discharges. Discharges must be properly routed based upon their discharge characteristics. Whenever feasible, the lab should consider P2 and waste minimization as a first step. When all feasible P2 and waste minimization opportunities have been explored, appropriate treatment technologies should be installed (e.g., acid neutralization, contaminate recovery units).

If, after careful consideration, management determines that limited drain disposal of nonhazardous substances is acceptable, the following general guidelines should be followed:

- Use drain disposal only if the drain system flows to a wastewater treatment plant and not into a septic tank system or a storm water sewer system that potentially flows directly into surface water.
- Make sure that the substances being disposed of are compatible with each other and with the piping system.
- Discharge only those compounds that are soluble in water (such as aqueous solutions), that are readily biodegradable, are low in toxicity, and contain no metals that can make the sludge toxic.

> Remember, the lab must obtain all the appropriate system design and discharge permits and approvals and institute procedures and practices prior to beginning to discharge.

Training is important to ensure lab personnel are properly disposing of their wastewater. Staff must be trained on what can and can not go down

the drain. In addition to formal training, periodic checks in the lab should be conducted to ensure that procedures are being carried out.

Wastewater Management Allowances for Hazardous Waste

The discharge of hazardous waste mixed with domestic sewage and the elementary neutralization of certain characteristically hazardous wastes are allowed under federal regulation. State allowance of these methods is variable. A detailed description of these methods is provided in Section 5.0 of this Guide. Some key considerations relate to these two methods are provided below.

Hazardous Waste Mixed with Domestic sewage. EPA's hazardous waste management regulations exclude from the definition of hazardous waste any wastes mixed with domestic sewage that enters a POTW (40 CFR 261.4(a)(1)). In most cases, however, lab staff should avoid discharging regulated hazardous waste down the drain. Generally, any lab that discharges more than 15 kg of hazardous waste per month (40 CFR 403.12(p)(2)), or acutely hazardous waste in any amount down the drain, is required to notify the EPA Regional Office, the state hazardous waste authorities, and the POTW of such discharges. Check with local authorities first. Notification usually must include the following information:

- Name of the hazardous constituents contained in the wastes;
- Estimate of the masses and concentrations of constituents in the wastestream discharges during that calendar month; and
- Estimate of the masses of such constituents that the lab can expect to be discharged during the following twelve-month period.

Track Your Discharges!

In order to document that you are compliant, keep logs at each discharge point and record all hazardous waste disposed down the drain.

Although it may be allowed, discharging limited amounts of hazardous waste with domestic sewage may not always be an environmentally sound choice. Lab staff should never allow discharges of hazardous waste into drains that lead to septic tanks or storm sewers.

Neutralization. In most states, it is acceptable to neutralize acidic and caustic solutions and then dispose of the neutralized solution down the drain if it has no other hazardous characteristics. Check with state, tribal or local authorities first however. Where permissible, it is important that only elementary neutralization occurs and that it is under a Resource Conservation and Recovery Act (RCRA) exemption for hazardous waste treatment without a permit. Non-exempted treatment, without a RCRA permit, is a serious RCRA violation. A neutralized solution should have a final pH value between 6 and 9 but check with your local or tribal POTW to make sure this pH range meets their requirements.

Refer to Section 5, Little Known but Allowable Ways to Manage Hazardous Waste, to determine state regulations on neutralization and mixing with domestic sewage.

Although many labs are equipped with neutralization tanks in wastewater lines, problems can result from their usage. For example, a limestone chip bed is commonly used as a passive in-line acid neutralization system. In theory, these systems should work but they often do not in practice because (1) they are flow dependent; and (2) system maintenance (e.g., cleaning) is often neglected. Also, limestone, though effective in neutralizing acid discharges, is not helpful in neutralizing caustic discharges. In general, it is not wise to rely on an in-line system until its effectiveness has been proven and can be monitored.

> At the University of Arizona a major environmental problem resulted from the improper use of a neutralization tank. For several years, in the chemical building, researchers discharged chlorinated and aromatic hydrocarbons into lab sinks. The discharges were collected into a large neutralization tank and bled off slowly into to the POTW. Wastewater monitoring detected these contaminants and caused closure of 8 lab buildings for up to 6 weeks. Extensive testing determined the neutralization tank to be the source of contamination. It was decontaminated at a significant cost.

Reportable Discharges of Oil and Hazardous Substances

Discharges of oil to a navigable waterway that cause a sheen or discoloration of the surface of the water must be reported to the National Response Center (NRC: 800/424-8802) or the U.S. Coast Guard (40 CFR 110). Navigable waters are defined broadly by EPA and include most lakes, rivers and streams. Discharges of hazardous substances, as designated in 40 CFR 116, to navigable waterways must be reported if they exceed the reportable quantities established in 40 CFR 117. Any person in charge of a vessel or an onshore facility shall, as soon as he/she has knowledge of any discharge of a designated hazardous substance, immediately notify the appropriate agency of the discharge.

Spill Prevention, Control and Counter-measure (SPCC)

In accordance with 40 CFR 112, a SPCC plan is required of facilities storing oil, which due to their location, could reasonably be expected to discharge oil in harmful quantities to navigable waters. SPCC requirements apply to facilities storing more than 42,000 gallons of oil underground, or 1,320 gallons total above ground, or any single container above ground exceeding 660 gallons. For example, SPCC planning activities would likely be triggered for a lab having an outdoor, aboveground heating oil tank with a capacity of 1,000 gallons.

Spill Containment

A discussion of water discharge would not be complete without mentioning spill containment. The need for spill protection applies to all areas where materials can be potentially damaging to the POTW or enter storm water systems. The following are some suggestions to prevent spills from entering drains.

- Floor drains should be eliminated from new construction. Where floor drains presently exist, they should be covered with properly fitting drain covers. Note that a lack of floor drains may make it more difficult to test emergency showers.
- Fume hood cup sinks should be guarded or closed off. If the sink

does not need to be used, then it should be sealed off. If the sink must remain in service, it can be protected from spills by installing a perimeter guard ring. Encircling it with a line of non-reactive caulk can make a simple cup sink guard.

- Have spill kits available where required (e.g., by SPCC plans) or where spills are likely to enter drains. Make sure appropriate spill kits are available. For example, there are special kits for acids, caustics, organics, and mercury. They are not interchangeable.

Special Wastes

Biologically active wastes and radioactive wastes require special handling. Specific disposal requirements for biologically active wastes and radioactive wastes are found in sections 3.5 and 3.6 respectively.

Pollution Prevention and Wastewater

Labs should review their processes and identify opportunities to reduce the amount of wastewater generated and reduce the amount of hazardous wastes in the lab's effluent. If the discharges cannot be eliminated the lab should consider applying appropriate technologies to minimize the quantity of wastewater generated. Minimizing discharges may eliminate recordkeeping requirements for the lab. An example of a substitution that can minimize harmful discharges is using organic dishwashing solutions instead of chromic-sulfuric acid mixtures when washing glassware. Check with the local POTW for information on P2 opportunities.

SMALL LAB WATER DISCHARGE PROGRAM CHECKLIST	
Action	**Notes**
1. Determine if the discharge meets with general pretreatment prohibitions for: • Fire or explosion hazards; • Corrosivity; • Viscous obstructions which could plug sewer; • Sludge discharges; and • Heat sufficient to inhibit biological activities (> 104°F).	
2. Verify the POTW is aware of the discharge.	
3. Ensure the lab has a sewer use discharge permit or letter of acknowledgment from the POTW.	
4. Ensure the lab has a copy of the POTW's sewer use discharge requirements.	
5. Verify there is a system in place to routinely monitor the discharge to the POTW.	
6. Determine when samples are taken: • A certified sampling/analytical lab handles them; • Proper sample containers, preservation techniques, holding times, and quality control are used; • There is a designated employee responsible for making sure that sampling is performed according to permit requirements; • Sampling results are reviewed and compared with permit requirements. Ensure that deviations are noted and investigated; and • Reports are maintained on site for three years.	
7. Verify that all lab personnel have been trained to understand the types of pollutants prohibited from discharge to the POTW.	
8. Verify that direct discharges to surface water are permitted.	
9. Ensure discharges to on-site waste disposal systems are permitted.	
10. Verify that copies of state, tribal or local water pollution regulations are available.	

3.3 Hazardous Wastes

Managing the generation and disposal of hazardous wastes is one of the most difficult environmental management challenges for staff in small labs. Common issues to address include classification, storage, labeling, treatment, and disposal of lab wastes as well as identifying opportunities to prevent its generation altogether.

Regulatory Considerations

The Resource Conservation and Recovery Act (RCRA), enacted in 1976, was written to provide "cradle to grave" tracking of hazardous waste. Pursuant to RCRA, EPA developed hazardous waste management regulations for generators and treatment, storage, and disposal facilities (TSDFs). In 1984, Congress expanded the scope of RCRA with passage of the Hazardous and Solid Waste Amendments (HSWA). HSWA directed EPA to adopt regulations governing small quantity hazardous waste generators (SQGs) such as many small labs.

Most labs routinely generate hazardous waste and, therefore, are subject to RCRA hazardous waste management regulations (40 CFR Parts 260 to 270). These regulations include requirements governing waste classification, accumulation, disposal, recordkeeping, and emergency preparedness.

EPA has delegated authority to implement and enforce hazardous waste management programs to the states and tribes. State and tribal regulations are at least as stringent as EPA's hazardous waste regulations. Still, it is important to keep up with the EPA regulations since EPA regularly publishes new hazardous waste management regulations that are enforceable in the states even though they may not yet be included in a given state's hazardous waste regulations.

Determine Which Hazardous Waste Requirements Apply

Hazardous waste management requirements are dependent upon the type and quantity of wastes the lab generates. In order to properly mange hazardous waste, the lab must identify and inventory its waste streams, characterize these wastes, and then determine and track its waste generator status.

STEP 1: Identify and Inventory Waste

Identify all waste streams generated within the lab or facility. Examples include unused chemicals, process wastes, discarded or spent solvents. Once waste streams are identified determine the volume or quantity of wastes generated in a typical month.

STEP 2: Characterize the Waste

Next, characterize the wastes to determine if they are subject to regulation as hazardous waste.

Is it a Solid Waste? Because hazardous waste is considered a subset of solid waste, a

Hazardous Waste Determination

To determine if a waste is a regulated hazardous waste, generators can use either knowledge or testing (40 CFR 262.11). If you don't know, then manage the waste as hazardous until you find out.

hazardous waste must first meet the EPA definition of solid waste. The term solid waste is used very broadly in RCRA and refers to both nonhazardous and hazardous waste including solids, liquids, semi-solids, sludges, and compressed gases. A solid waste may be abandoned (i.e., thrown away), inherently waste-like (e.g., certain dioxin containing wastes), unused or defective military munitions, or a material to be recycled.

Is it a Hazardous Waste? EPA defines hazardous waste in 40 CFR 261. A solid waste is considered hazardous if it:

1. ***Is Listed*** on one of the hazardous waste lists:
   - *F-list* (40 CFR 261.31): Commonly referred to as the non-specific source list. It contains spent solvents, electroplating wastes, wastes related to the production or treatment of chlorinated hydrocarbons, wood preserving waste, and certain landfill leachates. Labs often generate F-listed spent solvents such as methylene chloride.
   - *K-list* (40 CFR 261.32): Commonly referred to as the specific source list. It contains hazardous wastes from certain industries. Labs may manage K-listed waste if they accept waste samples from one of the 17 K-listed industrial processes such as pesticide manufacturing, inorganic chemical or pigment manufacturing and ink formulation.
   - *P-list and U-list* (40 CFR 261.33(e) and (f)): The list applies to unused, discarded, commercial chemical products that are 100 percent pure, technical grade or with a sole-active ingredient on the P-list. It can also apply to discarded chemical solutions that were made in the lab in lieu of purchasing a commercial product or a spilled product. P-list wastes are classified as acutely hazardous wastes. U-listed wastes are classified as toxic wastes. The list applies to unused, discarded, commercial chemical products that contain a sole-active ingredient that appears on the U-list.
   - *State Listed Waste*: State hazardous waste regulators often add wastes, such as waste oils and polychlorinated biphenyls, to their state lists of hazardous waste.

Multiple Codes

Hazardous waste may demonstrate more than one characteristic or be both listed and characteristically hazardous waste. Multiple codes then apply.

---or---

2. Demonstrates one of the following ***Characteristics***:
   - *Ignitability* (40 CFR 261.21): Ignitable wastes, denoted by the code D001, are generally liquids with flash points below 60°C (140°F). A non-liquid is considered ignitable if it is capable of causing fire through friction, absorption of moisture, or spontaneous chemical

changes, and burns in a manner that creates a hazard.

- *Corrosivity* (40 CFR 261.22): Corrosive wastes, denoted by the code D002, are generally aqueous solutions with a pH ≤2 or ≥12.5.
- *Reactivity* (40 CFR 261.23): Reactive wastes, denoted by the code D003, are those wastes that are generally unstable, explosive, capable of detonation when heated under confinement, or react violently with water. Also, wastes are reactive if they generate toxic cyanide or sulfide fumes when subjected to a pH between 2 and 12.5
- *Toxicity* (40 CFR 261.24): Toxic wastes, denoted by the codes D004-D0043, are wastes containing certain regulated constituents. To determine if wastes are toxic, they are subjected to the toxicity characteristic leaching procedure (TCLP). Wastes leaching contaminants at or above the regulated concentrations exhibit the toxicity characteristic and must be assigned the appropriate EPA hazardous waste code. Liquid wastes exhibit the toxicity characteristic if the waste itself contains contaminants above the regulated levels (TCLP doesn't need to be performed).

Characteristically Toxic? Check With Your State

Some states include materials in addition to those listed in 40 CFR 261.24. Check with your state or local regulators.

Is It an Excluded or Exempted Waste? Certain substances are excluded from the regulatory definition of solid and hazardous waste. Three exclusions that are particularly important to many labs are highlighted below.

- *Wastewater:* Mixtures of untreated sanitary waste and other (i.e., hazardous) waste discharged to a publicly-owned treatment works (POTW) are excluded from the definition of solid waste and, therefore, are not regulated hazardous waste (40 CFR 261.4(a)). This exemption also applies to on-site wastewater treatment systems with an NPDES permit. The discharges are subject to stringent water pollution control requirements (see Water Discharges, Section 3.2).
- *Samples*: Samples that are sent to the lab for analysis are not considered regulated waste while awaiting testing, while stored after testing for a specific purpose, or while being transported back to the sample collector (40 CFR 261.4(d)). However, once the samples are run and they are designated for disposal by the lab, they must be treated as a regulated waste.
- *Empty Containers*: Empty containers that once held hazardous materials are not regulated as hazardous waste if they meet the

Wastewater Treatment Residues

Even though wastewater may be excluded, sludges, residues and other recovered materials from your on-site wastewater treatments system are not excluded and may be hazardous waste.

definition of "empty." Empty means all possible materials removed from the container using common practices, and

- For containers 110 gal or less; residue is no more than 3% by weight of the total capacity;
- For containers greater than 110 gal, residue is no greater than 0.3% by weight of the total capacity.

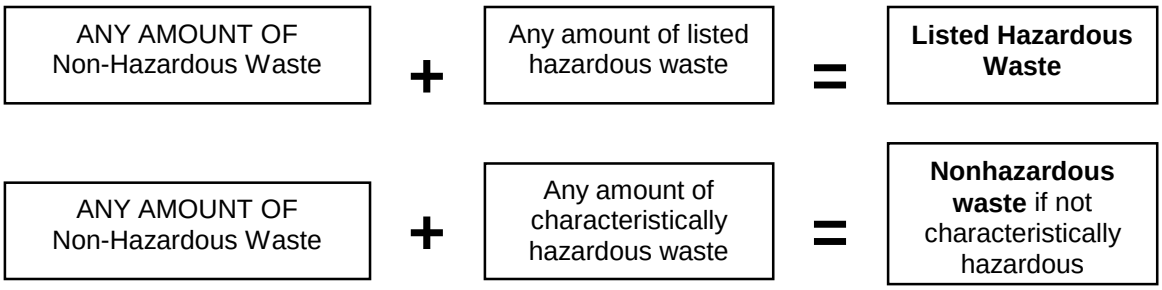
Containers that held acutely hazardous waste are considered empty only after being triple rinsed with a solvent capable of removing the acutely hazardous waste residue. The solvent rinseate then must be managed as acutely hazardous waste.

The Mixture Rule

What About Mixed Chemical Wastes? It is common for labs to generate waste streams that contain several chemicals mixed together. If this is the case, the Mixture Rule defines whether the waste is hazardous.

Remember, dilution is not allowed as treatment.

- If a listed hazardous waste is mixed with a nonhazardous waste the resulting mixture will remain regulated as the listed waste regardless of the quantity of the listed waste present in the mixture.
- If a characteristic hazardous waste is mixed with a nonhazardous waste the resulting mixture will be regulated as hazardous only if the resulting mixture still exhibits the characteristic.



Multi-Hazardous Wastes

Labs may generate waste streams that contain a combination of chemical, biological, or radioactive substances. Multi-hazardous wastes are defined as those that contain more than one hazard in the waste. Any wastestream that presents more than one type of hazard requires special management consideration because the selected treatment technology appropriate for one type of waste may not be appropriate for the other types. Multi-hazardous wastes must be evaluated on an individual basis and the constituent that poses the greatest hazard should be given priority.

Another term describing multi-hazardous waste that contains chemical hazards regulated by the EPA and radioactive substances regulated by the NRC only is "mixed waste." Some examples of lab mixed wastes include:

- Used flammable (e.g., toluene) liquid scintillation cocktails;

- Phenol-chloroform mixtures from extraction of radiolabeled nucleic acids;
- Aqueous solutions containing chloroform and radioactive material typically found in solutions generated by the neutralization of radioactive trichloracetic acid solutions;
- Certain gel electrophoresis waste (e.g., methanol or acetic acid containing radionuclides); and
- Lead contaminated with radioactivity.

STEP 3: Determine and Track Generator Status

Labs that generate hazardous waste are subject to varying requirements depending on how much hazardous waste they generate and accumulate in a month. (See Special Wastes, Section 3.7, for other used oil and universal waste.)

Generator Class. Under the Federal rules, there are three classes of generators.

Conditionally Exempt Small Quantity Generator (CESQG)

- Generate no more than 100 kg of hazardous waste, 1 kg of acutely hazardous waste, or 100 kg of contaminated waste from an acutely hazardous waste spill in a month.
- Accumulate no more than 1,000 kg of hazardous waste at any time.

Small Quantity Generator (SQG)

- Generate between 100 and 1,000 kg of hazardous waste and no more than 1 kg of acutely hazardous waste in one month.
- Accumulate no more than 6,000 kg of hazardous waste for up to 180 days (270 days if waste is to be transported over 200 miles).

Large Quantity Generator (LQG)

- Generate greater than 1,000 kg of hazardous waste or greater than 1 kg of acutely hazardous waste in one month.
- Accumulate greater than 6,000 kg of hazardous waste for up to 90 days.

Remember, states and tribes can define generators differently and set more stringent regulations. For example, the state of Maryland does not have a CESQG classification. Always be aware of and understand state generator requirements.

Hazardous Waste Log. In order to make an initial determination and then track and document the lab hazardous waste generator status from month to month, a facility wide hazardous waste log is

Oops, I'm Over This Month!

There are no exceptions. If you exceed the generation and/or accumulation limits in any given month, then you are subject to all the requirements of the larger class for that month. This even applies for episodic generation such as one time unused chemical round ups or spill cleanups. Plan ahead!

recommended. Good information to include in the log is:

For each waste:

- Description of the waste (e.g., waste solvents from labs);
- Type of waste (hazardous or acutely hazardous waste);
- Hazardous waste class;
- Method of characterization (e.g., lab test date, knowledge);
- Amount generated in the month; and
- Amount accumulated in the month.

Totals:

- Amount of all hazardous waste generated in the month;
- Amount of all acutely hazardous waste generated in the month; and
- Amount of all hazardous waste accumulated in the month.

Hazardous Waste Generator Requirements

Once generator status is determined, the lab must develop hazardous waste handling and storage practices and procedures based on all applicable requirements and regulations. The table on the next page presents an overview of hazardous waste requirements that apply to labs depending on their generator status. Some key considerations and differences for small labs are highlighted below.

CESQGs

CESQGs must comply with two basic provisions for managing their hazardous waste:

- Identify all hazardous wastes generated;
- Send all hazardous waste to a hazardous waste management facility, landfill or recycler that is permitted by a state to manage treatment, storage or disposal of hazardous waste; and

Many CESQGs labs opt to meet SQG requirements as a good management practice to help ensure that hazardous waste is properly managed.

RCRA REQUIREMENTS FOR LABS AS A FUNCTION OF GENERATOR STATUS*			
Requirement (40CFR)	**CESQG****	**SQG**	**LQG**
Waste Determination (262.11)	Applicable	Applicable	Applicable
Generation Rate Limits (261.5 and 262.34)	<100 kg/mo	100-1,000 kg/mo	1,000 kg/mo or greater
Accumulation Quantity Limit w/o Permit (261.5 and 262.34)	Not to exceed 1,000 kg at any time Not to exceed 1 kg acute at any time	not to exceed 6,000 kg at any time	No limit
Accumulation Time (261.5 and 262.34)	No limit	180 days or 270 if waste is to be transported over 200 miles.	90 days
EPA ID Number (262.12)	Not required***; possible state requirement	Required	Required
Mark Containers with Start Date (262.34)	Not applicable	Applicable	Applicable
Mark Containers “Hazardous Waste” (262.34(a))	Not applicable	Applicable	Applicable
Air Emission Standards 40 CFR 265 Subpart CC	Not applicable	Not applicable	Applicable
Satellite Accumulation (262.34(c))	Not applicable	Applicable	Applicable
Use Manifests (262, Subpart B)	Not required***; possible state requirement	Required	Required
Exception Reporting (262.42)	Not required	Required after 45 days	Required after 35 days
Biennial Report (262.41)	Not required	Not required; possible state requirement	Required
Contingency Plan (265, Subpart D)	Not required, but OSHA (29 CFR 1910.38) requires emergency planning	Basic planning required in accordance with the standards in 262.34(d)(4) and (5) and 265, Subpart C as well as OSHA regulations	Full written plan in accordance with 265 Subpart D, is required by 262.34(a)(4) and OSHA regulations
RCRA Personnel Training (262.34 and 265.16)	Not required, but recommended	Basic training required by 262.34(d)(5)(iii)	Full compliance with the training requirements in 265.16 is required by 262.34(a)(4)
Storage Requirements (without permit) (262.34 and 265)	None, but OSHA regulations under 29 CFR 1910, Subparts H and N, apply, particularly 29 CFR 1910.106	Compliance with technical standards in Part 265, Subparts I and J; for containers and tanks is required by 262.34(d)(2) and (3) and OSHA regulations	Compliance with technical standards in Part 265, Subparts I, J, W, and DD, is required by 262.34(a)(1) and OSHA regulations
Recordkeeping Requirements (262.40)	Waste determinations and generation log required (notification of regulated waste activity, training records, manifests, and land disposal restriction notifications recommended)	Notification of regulated waste activity, waste determinations, generation log, manifests, land disposal restriction notifications, exception reports, and correspondence with local emergency responders (written contingency plan, weekly container inspection & periodic equipment maintenance logs, and RCRA training records recommended)	Notification of regulated waste activity, waste determinations, generation log, manifests, land disposal restriction notifications, exception reports, biennial reports, correspondence with local emergency responders, RCRA training records, and written contingency plan required (weekly container inspection is required & periodic equipment maintenance logs is recommended)
Waste “Designated Facility”	State-approved or RCRA permitted facility or legitimate recycler	RCRA-permitted facility or legitimate recycler	RCRA-permitted facility or legitimate recycler
Land Disposal Restrictions (268.7)	Possible state requirement	Applicable	Applicable

* Adapted from *Laboratory Safety & Environmental Management,* Vol. 5, No. 6.

** Although these items are not legally required under RCRA, most transporters and TSDFs will not handle hazardous waste without them.

SQGs

SQGs are required to meet registration, collection and storage area, emergency planning, and other requirements. SQGs must:

- Register with the appropriate (usually state) environmental regulatory agency using the Notification of Hazardous Waste Generator Activity;
- Comply with hazardous waste container requirements in 40 CFR 265, Subpart I except for air emission standards and a requirement to locate ignitable or reactive waste greater than 60 feet from the property line;
- Meet collection and storage requirements for satellite accumulation and accumulation areas;
- Provide at least one employee on the premises or on-call to respond to any emergency and act as the emergency response coordinator. The emergency coordinator must respond to any emergencies that arise;
- Post the following information next to the telephone in the area:
  - Name and phone number of the emergency coordinator and backup emergency coordinator,
  - Location of the spill control material, fire alarm, and fire extinguishers, and
  - Telephone number of the local fire department unless there is a direct alarm;
- Ensure that all employees are familiar with responding to emergencies and proper waste handling procedures in their work area; and
- Establish and implement recordkeeping procedures for waste characterizations, documentation on generator status, registration, manifests, exception reports, container inspection, land disposal restrictions (LDRs), and correspondence with local emergency responders.

LOGs

Although not common, it is possible for small labs to be LQGs, particularly as a result of episodic generation (e.g. during spring cleaning) or if they manage acutely hazardous waste. LQGs must:

- Register with the appropriate (usually state) environmental regulatory agency using the Notification of Hazardous Waste Generator Activity;
- Comply with hazardous waste container requirements in 40 CFR 265, Subpart I including air emission standards and a requirement to locate ignitable or reactive waste greater than 60 feet from the property line;
- Meet collection and storage requirements for satellite accumulation and accumulation areas;
- Prepare a Contingency Plan that documents the lab preparedness and prevention measures in accordance with 40 CFR 265, Subpart D;
- Develop and implement a formal training program; and
- Establish and implement the same recordkeeping procedures as for SQGs as well as training records, contingency plan and a biannual report.

SQGs and LQGs must register with the EPA (40 CFR 262.12) and obtain an EPA identification number. The registration form, EPA form 8700-12,

tilted Notification of Hazardous Waste Activity, requires the facility to list all types of hazardous waste activity and a description of all hazardous wastes.

> How to Get an EPA ID Number
>
> Call your state or tribal hazardous waste office and ask for EPA Form 8700-12.

Although Federal regulations do not require a CESQG to obtain an EPA identification number or follow SQG storage requirements, states may require it. In addition, most hazardous waste transporters and TSDFs may not accept waste from a facility without an EPA identification number.

States & Tribes Remember that individual states and tribes may have additional requirements.

Hazardous Waste Collection and Storage

Federal regulations allow for two types of storage areas for SQGs and LQGs, satellite accumulation areas and accumulation areas.

> OSHA Limits
>
> Remember, regardless of satellite accumulation thresholds, OSHA standards limit the quantities of flammable materials such as waste solvent that can be stored in one lab room.

Satellite Accumulation Areas

A satellite accumulation area is an area at or near the process that generates the waste. The area must be under the control of the operator of that process (40 CFR 262.34(c)). A common example for labs is the hazardous waste collection area in the individual lab. Federal regulations allow generators to store up to 55 gallons of hazardous waste or 1 quart of a particular acutely hazardous waste in a satellite accumulation area.

There is no limit on accumulation time. Once a container is full or more than 55 gallons of hazardous waste or 1 quart of acutely hazardous waste is accumulated, the full container or excess waste must be moved to an accumulation area within 72 hours. This is a common compliance challenge for labs.

> What if I have more than one type of waste in my lab satellite accumulation area?
>
> The 55-gallon threshold under the federal regulation applies to the maximum quantity of waste allowed in a Satellite Accumulation Area (SAA) regardless of the number of waste streams.
>
> The EPA does not limit the number of SAAs in a location.
>
> However, having large amounts of waste in one location is not recommended.

Waste in satellite accumulation areas must be managed as follows:

- ***Closed Containers***. All hazardous waste containers must be kept closed except when it is necessary to add or remove waste. Evaporation of wastes in fume hoods is prohibited.
- ***Labeling***. Federal satellite area rules only require labels listing the container contents, but many states require that the contents, the

hazard and the actual words “Hazardous Waste” be on the container. Prudent practice would be to mark all hazardous waste containers in the lab with the words “Hazardous Waste” and other words that identify the containers contents (e.g., “waste hexane with trace pesticide contamination”).

- ***Container Condition and Compatibility***. Containers must be maintained in good condition (i.e., no rust, dents, or leaks, etc.) and must be compatible with the hazardous wastes they contain.

Accumulation Area Requirements

Once hazardous waste leaves the satellite accumulation area and it enters an accumulation area “the clock starts.” The container is dated, and the lab must ship the waste off-site to a permitted hazardous waste TSDF within the allowable time for the generator class. For LQGs, waste must be disposed of within 90 days. For SQGs, the waste must be disposed of within 180 days or 270 days if the waste must be transported 200 miles or more for treatment, storage or disposal. If waste is not sent off-site within the required time frame, then the lab is subject to fines and in some cases, very cumbersome and costly RCRA storage permit requirements.

Unlike satellite areas, there is no volume threshold for container size and accumulation amount (provided the generator monthly accumulation thresholds are not exceeded).

Different Containers, Different Dates

A lab generates waste isopropyl alcohol and waste formaldehyde. The wastes are collected in separate 5-gallon containers in satellite accumulation areas located in several labs. When the 5-gallon containers are full, they are carried to the accumulation area within 72 hours. The formaldehyde is accumulated in 55-gallon drums and the isopropyl alcohol is accumulated in a 250-gallon tank. The hazardous waste manager puts the start date on the drum and tank when they start to be used (when the first waste is poured in the empty container/tank). Therefore, two different wastes, generated concurrently in a lab process, may have different start dates in the accumulation area. Regardless of when additional waste is poured into each container, all the waste accumulated in the container must be disposed of within the allowable time based on that start date for a SQG or LQG whether or not the containers are full.

Accumulation areas have specific design and operational requirements that must be followed.

- ***Labeling***. All containers must be marked with the words “Hazardous Waste” or with an EPA hazardous waste label. The date accumulation begins must also be marked clearly on each container. (Remember, for unknown wastes undergoing sampling, the accumulation start date is when the waste is

Hazardous Waste Tanks and Buildings

There are special requirements for accumulating waste in a tank. 40 CFR 265.201 outlines the specific requirements for tank storage.

Additional requirements also apply to containment buildings. These requirements can be found in 40 CFR 264.175.

generated not when the lab results are returned. Therefore, it is wise to manage all unknown wastes as hazardous).

- ***Closed Containers***. All containers must remain closed unless adding or removing waste.
- ***Container Condition and Compatibility***. Containers must be maintained in good condition (i.e., no rust, dents, or leaks, etc.) and must be compatible with the hazardous wastes they contain.
- ***Incompatibles Storage***. Incompatible wastes must be separated to the greatest extent possible using distance, berms, or containment pans.
- ***Inspections***. The area must be inspected weekly to look for any signs of corrosion, dents, bulges, or other signs of deterioration.
- ***Preparedness and Prevention***. The generator must comply with 40 CFR 265, Subpart C that requires maintenance and operations of the facility to minimize the potential for release to the environment. The following emergency equipment and procedures must be maintained for the accumulation area and periodically tested to ensure it is in working order:
  - A communications device or alarm system capable of informing facility personnel and local emergency response authorities in the event of an emergency (i.e., phone, two-way radio);
  - Portable fire extinguishers (including special extinguishers, foam, and dry chemical, necessary for the waste), spill control equipment, and decontamination equipment;
  - Water at adequate volume and pressure to supply water hose streams, foam producing equipment, or automatic sprinklers;
  - Waste containers must be arranged in the accumulation area so that there is adequate aisle space to allow access for emergency personnel and equipment; and
  - The following information must be posted next to the telephone in the area:
    - Name and phone number of the emergency coordinator, and
    - Location of the spill control material, fire alarm, and fire extinguishers and telephone number of the local fire department unless there is a direct alarm.

<u>Hazardous Waste Container Inspection Logs</u>

Inspections should be documented for SQGs and LQGs. Make up an inspection log that staff can use to document that everything has been inspected and checks out OK or that if not OK, action has been taken to correct the deficiency.

Even though documented inspections are not required by Federal regulations for satellite accumulation areas, a simple inspection procedure and log can help lab staff maintain a safer working area.

Hazardous Waste Transportation and Disposal

If a lab facility is not a permitted TSDF, the facility must transfer its hazardous waste to a regulated TSDF or recycling facility. The state or EPA permits TSDFs and recycling facilities, so it is important to ensure the company chosen to receive the labs waste has an EPA identification number. Because hazardous waste generators bear the burden for the compliant transfer and disposal of their hazardous wastes, it is important to understand all Federal, state and tribal regulations concerning the transfer and disposal of the lab's hazardous waste. The EPA requires generators to follow strict procedures for shipping hazardous waste to ensure it is handled properly.

Packing Up the Waste

Before transporting hazardous wastes the generator must ensure the containers are properly packaged, labeled, marked, and the transporting vehicle is properly placarded.

- ***Packaging***. Packaging must be done in accordance with all Department of Transportation (DOT) regulations. See 49 CFR 173, 178, and 179 for specifications.
- ***Labeling and Marking***. Before transporting the hazardous waste packages, the generator must label each package in accordance with DOT labeling requirements (49 CFR 172). The generator must mark all containers of 110 gallons or less used in transportation with: "HAZARDOUS WASTE – Federal Law Prohibits Improper Disposal. If found, contact the nearest police or public safety authority or the U.S. Environmental Protection Agency," the generator's name and number, and the manifest document number.
- ***Placarding***. According to 49 CFR 172 subpart F, the generator must placard or offer the initial transporter the appropriate placards and ensure they are used.

Hazardous Waste Manifesting

In accordance with 40 CFR 262 subpart B, all hazardous waste shipments being sent off-site to be managed at a TSDF must be accompanied by a hazardous waste manifest. Wastes may only be manifested to appropriate designated facilities, such as a permitted TSDF or a recycling facility.

Often, the hazardous waste contractor completes the manifests. However, lab personnel must review the manifest to ensure it is completed accurately and sign the manifest certifying that it is accurate.

CESQGs Need a Manifest Too!

RCRA does not require CESQGs to use manifests. However, some states agencies may require a manifest.

DOT regulations also require a manifest for hazardous waste transport regardless of generator class . Therefore, hazardous waste transporters may also require CESQGs to use manifests. When the CESQG does not have an EPA ID number, the transporter may accept the notation of "Conditionally Exempt" in place of the ID number.

The manifest is designed to document the hazardous waste disposal process from cradle to grave as follows:

- ***Obtaining the Proper Manifest***. The generator must obtain the manifest from the state receiving the waste. If that state does not supply the manifest then the generator should use the manifest of the state in which they are located. If neither state supplies a manifest then the generator may obtain a manifest from the EPA.
- ***Number of Copies***. The manifest must have at least as many copies as required by the generator, each transporter, the TSDF, and one to return to the generator.
- ***The Manifest Process***. The generator and transporter sign and date the completed manifest. The generator retains one copy and gives the transporter the remaining copies. A designated representative from the TSDF signs the manifest when the waste is delivered and returns a signed copy to the lab within 35 days for a LQG and within 60 days for a SQG.
- ***The Exception Report***. If the generator does not receive the signed manifest within the specified time period he/she must submit an exception report to the EPA.

Hauling Your Own Waste?

EPA allows transportation of hazardous waste on public or private right-of-ways, or along the border of contiguous properties under the control of the same person without a manifest to allow generators to consolidate waste in a central accumulation area (i.e., labs in campus settings & military installations).

If you haul waste off the property you need a manifest.

Land Disposal Restriction Notices

EPA regulations require that nearly all hazardous waste be treated prior to land disposal (40 CFR 268). Hazardous waste generators are required to notify the receiving TSDF when they ship land disposal restricted (LDR) wastes. LDR notices accompany the hazardous waste manifest and include the generator's identification number, the appropriate treatment standards, and the accompanying manifest number.

Lab Packing

Because lab waste typically includes a diverse array of chemicals in small quantities, they present special disposal concerns. In general, chemicals can either be consolidated into bulk waste streams that meet specific characteristics or "lab-packed". The term "lab-pack" describes the most common method for packaging small quantities of lab waste. Small containers of compatible waste materials are placed intact into a larger packaging unit; usually a steel or fiber drum that contains an absorbent material, such as vermiculite, to cushion the containers and absorb spilled or leaked waste. An inventory is made as the containers are added to the drum. The drum is then sealed and a copy of the inventory sheet is attached to the drum. The drum is then shipped off-site for disposal accompanied by a hazardous waste manifest.

There are advantages and disadvantages to lab packing. This packaging method eliminates the need to transfer wastes and also reduces the occurrence of dangerous reactions resulting from mixing incompatible

materials. However, this method is often the most expensive. The decision to consolidate or lab-pack should be made by those who are knowledgeable about the makeup of each waste stream and in consultation with the selected hazardous waste contractor. Note that only individuals who have successfully completed DOT "HAZMAT" training can prepare lab-packs. (49 CFR 173.12 (regulations governing lab-packs), 49 CFR 173 Subpart B (regulations governing packaging of hazardous materials) and 49 CFR 172 Subpart H (DOT training regulations)).

The Best Waste Disposal Option

It is important to decide on the best recycling or disposal method for that waste. Reputable hazardous waste transporters or hazardous waste management facilities can provide advice on the options that are most cost-effective and environmentally preferred to specific situations. Remember, however, that it is always the generator's responsibility to understand and be in compliance with the regulations. Typical disposal options for chemical wastes include incineration for toxic materials, and landfill for nonhazardous materials. Hazardous waste transporters can also assist labs in meeting DOT shipping and RCRA transportation requirements and help prepare hazardous waste manifest forms.

Hazardous Waste Training

Lab staff should be trained annually in hazardous waste management and emergency procedures relevant to their positions. Obviously, since hazardous waste management responsibilities differ for various staff, so do training requirements. Labs should fashion training programs so that they are appropriate for their operations. RCRA regulations require that this training be formalized and documented for LQGs (40 CFR 262.34 and 265.16). While not explicitly required for SQGs or CESQGs it is a good management practice.

P2 and Hazardous Waste

P2 and waste minimization can reduce or eliminate the amount and/or toxicity of hazardous waste that must be recycled, treated, or disposed. Implementing a comprehensive hazardous waste P2 program may reduce the generator status of the lab and therefore reduce compliance requirements. Lab P2 also demonstrates good faith in compliance and this can be an asset when dealing with regulators and other community stakeholders. It can reduce potential environmental liabilities and help protect the environment through more efficient resource utilization. For example, automated analyzers generate less waste, often use smaller amounts of

Universities Demonstrate Pollution Prevention Success

The University of Texas Medical Branch (UTMB) at Galveston implemented a solvent distillation waste minimization program for nonhalogenated solvents generated by histopathology. In one year, more than 6,200 L of alcohol, xylene, and formalin were reclaimed for reuse and reduced the facility's hazardous waste disposal volume by 29% and generated over $100,000 in avoided costs for purchases and disposal. UTMB is expanding the program and adding equipment for distillation of acetonitrile wastes generated by HPLC and biomolecular synthesis.

The University of Wyoming found that it dramatically reduced its disposal costs as a result of its hazardous waste minimization plan. In 1994, the University collected 24,264 kg of waste and had disposal invoices totaling $103,000 and by 1997 these numbers were reduced to 9,035 kg at a disposal cost of $27,000.

reagents and samples which means there are reduced air emissions, less water use and reduced energy consumption as well.

P2 increases hazardous waste awareness and the staff's adaptability and openness to new technology. In addition, it can improve housekeeping in a lab by leading to better tracking, better labeling and more timely use of chemical stocks. It may also cut expenses by reducing waste treatment and disposal costs, raw materials purchases, and other operating costs and usually increases productivity and safety in a lab.

As noted in Section 2.2, an effective lab P2 program should include a number of key elements, these are: obtaining management support, conducting a waste stream assessment, conducting a feasibility analysis, implementing the selected P2 or waste minimization options, and evaluating the program periodically and implementing recommended changes for improvement. The environmental health and safety (EHS) staff at a number of universities and company labs emphasize P2 in their training sessions to encourage waste minimization from the beginning for a lab employee and to demonstrate its importance to the institution.

There are many ways to prevent or minimize hazardous waste generation. The list below provides some ideas but is not exhaustive.

- Maintain a limited inventory of chemicals on hand so those chemicals do not expire or deteriorate and necessitate disposal and employ other front-end purchasing controls (e.g., purchasing solvents in automatic dispensers to minimize waste due to overages). Only mix what is needed.
- Develop a running inventory of unused chemicals for use by other departments.
- Reduce or eliminate the use of highly toxic chemicals in lab experiments.
- Centralize the waste management function to better track waste generation rates and management costs.
- Establish waste minimization goals.
- Perform routine self-audits and P2 opportunity assessment.
- Perform experiments on a microscale whenever feasible.
- Include in the experiment plan the reaction work-up steps that deactivate hazardous materials or reduce toxicity.
- Treat or destroy hazardous waste products as the last step in experiments. Use caution because a RCRA permit may be necessary.
- Reuse/recycle spent solvents.
- Recover metal from catalyst.
- Use procedures to reduce metallic mercury use (e.g., replace mercury-bearing instruments with alternatives, work with researchers to identify reagent substitutes for mercury salts, and develop a procedure for work on plumbing fixtures in old lab facilities).
- Keep individual hazardous waste streams segregated: hazardous from non-hazardous and recyclable from non-recyclable.
- Polymerize epoxy waste to a safe solid.
- Keep solvent containers closed when not in use.
- Reuse solvents after rotary evaporation.
- Replace chromic acid cleaning solutions with Alconox or a similar detergent and make other product substitutions that can save money and are less harmful to the environment. (e.g., Albany Medical Center (Albany, NY) reports that xylene, which is recycled by

distillation, is substituted for limonene in all processes and this avoids 8.8 tons of hazardous chemical wastes, saves $25,000 in waste disposal costs and avoids $73,500 in purchase costs (at $35 per gallon)).

- Examine the waste/excess chemicals to determine if there are other uses within the organization before discarding or other back-end inventory management options to employ (e.g., special tracking of chemicals that quickly destabilize to cull them out before they pose risks and are more costly to dispose.) While many lab facilities have chemical exchanges within their institutions, Bowling Green University operates a regional chemical exchange program and successfully worked out liability considerations.
- Examine opportunities for recycling computers.

Thomas Jefferson University (Philadelphia, PA) and Albany Medical Center (AMC, Albany, NY) and other institutions have instituted programs to recycle computer and EDP equipment. AMC reports in its first year an estimated $160,000 was saved by removing from the wastestream and recycling 186 units of computers and EDP equipment.

To minimize the generation of multi-hazardous waste streams, consider the following points:

- Use P2 strategies to reduce multi-hazardous waste to a waste that presents a single hazard. By taking measures to limit the types of hazard in a specific wastestream the waste may be managed by standards methods only for that category; and
- When possible select a single management option. Some waste management methods are appropriate for more than one waste hazard. For example low-level radioactive animal tissue (radioactive-biological waste) can often be incinerated on-site in compliance with NRC regulations, which may be a satisfactory disposal option for both the radioactive and the biological characteristics of the waste. Some multi-hazardous waste can be disposed of safely in the sanitary sewer when allowed by the local POTW (see Water Discharges, Section 3.2).

The problems presented by managing mixed wastes can be reduced by applying waste minimization techniques such as:

- Substitution of non-ignitable liquid scintillation fluid (LSF) for toluene-based LSF to reduce a chemical-radioactive waste to a radioactive waste. By substituting a biodegradable scintillation fluid (Escscint) for toluene based fluors and substituting luminescence assays for radioisotopes, scintallation vial disposal decreased by 667 pounds per year at Albany Medical Center and avoided disposal costs totaled $16,000 for 5,000 pounds of radioactive hazardous wastes (scintillation vials);
- Substitution of shorter half-life radionuclides such as ^{32}P for ^{33}P and ^{131}I for ^{125}I to shorten the hazard period;
- Use of 2.5ml scintillation vials (mini-vials) instead of 10ml vials to reduce waste scintillation fluid;
- Elimination of methanol/acetic acid and radioactive mixed hazards in gel electrophoresis work by skipping the gel fixing step if it is not required; and
- Prevention of radioactive contamination of lead by lining lead containers with disposable plastic or by using alternative shielding materials.

In-Lab Treatment

Although not P2 or waste minimization, there are many benefits to undertaking appropriate waste treatment techniques in the lab. Federally allowable on-site treatment includes:

- Elementary neutralization;

- Treatment in accumulation containers;
- Onsite Recycling; and
- Burning in Boilers and industrial furnaces.

Section 5 provides additional details on these treatment methods and provides information on state specific allowances and requirements.

If it is acceptable to incorporate treatment steps, suitable options for waste minimization (e.g., In-lab treatment) should be considered when planning experiments. Often steps can be added at the end of the experiment or procedure to eliminate hazardous byproducts and wastes. Some typical examples include oxidizing organic chemicals with sodium hypochlorite to produce nonhazardous waste, using phase separation of organics from aqueous solutions and liquids from solids. Other in-lab treatment methods include precipitation of toxic metals, oxidation of inorganic cyanides and sulfides, and treatment of organic peroxides and hydro-peroxides. Ideally, every lab procedure should be reviewed to determine whether acceptable waste treatment steps should be developed and included. Some specific recommendations include:

- Destroy ethidium bromide using $NaNO_2$ and hydrophosphorus acid;
- Treat sulfur and phosphorus wastes with bleach before disposal;
- Treat organolithium waste with water or ethanol; and
- Consider including detoxification and/or waste neutralization steps in lab experiments.

HAZARDOUS WASTE MANAGEMENT PROGRAM CHECKLIST	
Action	**Notes**
Hazardous Waste Identification	
1. Verify waste has been properly characterized to determine that (1) it is hazardous waste and (2) proper EPA identification code numbers have been assigned.	
Generator Status	
2. Ensure the facility has a system to determine the generation rate and quantity of hazardous waste accumulated on-site and uses this data to ascertain generator status	
3. Determine, if required (e.g., SQG or LQG), that the facility has an EPA identification number.	
Satellite Accumulation	
4. Verify each satellite accumulation area (SAA) is at or near the point of waste generation for each waste and is under the control of the operator of the process that generated the waste.	
5. Verify waste containers are labeled “Hazardous Waste” and/or with words to indicate their contents.	
6. Verify waste containers are kept closed and are in good condition.	
7. Verify wastes are compatible with containers.	
8. Verify wastes in any given SAA do not exceed 55 gallons of hazardous waste or one quart of acutely hazardous waste.	
Central Accumulation Area	
9. Ensure every hazardous waste container is marked “Hazardous Waste” and with its accumulation start date.	
10. Verify waste is stored $\leq$90 days for LQGs and $\leq$180 days for SQGs, or 270 days if transported more than 200 miles.	
11. Ensure incompatible wastes and/or materials are separated or protected by physical means (e.g., wall, cabinet).	
12. Determine if internal communications equipment is available (e.g., two-way radio, telephone).	
13. Ensure floor drains are covered to prevent a spill from entering.	
14. Verify that fire extinguishers are in place and that a water supply is available.	

HAZARDOUS WASTE MANAGEMENT PROGRAM CHECKLIST	
Action	**Notes**
15. Determine if decontamination equipment is available (emergency shower, eyewash).	
16. Verify aisle spaces are unobstructed.	
17. Verify containers are inspected for leakage and/or corrosion at least weekly and inspections are recorded.	
18. Ensure the storage area provides secondary containment.	
19. Ensure personal safety equipment is available and usable.	
20. Determine if ignitable and reactive wastes are handled and stored in a manner to prevent fires and/or explosives.	
21. Verify containers are arranged on shelving so that the heavy containers are on the lower shelves and smaller containers on higher shelves.	
22. Ensure the shelving supporting hazardous wastes is in good condition and sturdy enough to support the load.	
Hazardous Waste Disposal	
23. Verify any hazardous waste treated or disposed on-site (e.g., neutralized and/or discharged down the drain) is done so in accordance with all applicable regulations.	
24. Ensure any hazardous waste leaving the site is sent to an appropriately permitted TSDF.	
25. Verify the hazardous waste transporter/broker is licensed, insured and reputable.	
26. Determine if employees responsible for shipping hazardous waste have been trained in accordance with DOT regulations.	
Recordkeeping and Reporting	
27. Verify the following records are retained on-site for at least three years: • Manifests; • Waste analyses results; • Inspection records; • Training records; and • Land disposal restrictions notifications.	

HAZARDOUS WASTE MANAGEMENT PROGRAM CHECKLIST	
Action	**Notes**
28. Determine if hazardous waste manifests signed by the transporter and designated TSDF have been received by the facility within the appropriate time period (e.g., 35 days for LQG and 60 days for SQG).	
Emergency Preparedness	
29. Ensure an emergency coordinator who is familiar with response procedures at the facility has been designated and is on site or on call at all times.	
30. Verify emergency phone numbers (Fire Department, Police Department and Local Hospital) have been posted.	
31. Ensure the Fire Department is aware of the types and quantities of hazardous materials stored in the facility.	
32. For LQGs, determine if a written contingency program has been developed and distributed.	
33. Verify that spill cleanup materials and equipment (e.g., absorbents, neutralizers, and personal protective equipment) are available.	
Management System	
34. Ensure copies of current Federal, state, tribal or local hazardous waste management regulations are available.	
35. Ensure an individual has been designated to manage hazardous waste at the facility (e.g., tracking, accumulation, disposal, minimization and recordkeeping).	
36. Ensure a formal training program (e.g., waste management, and emergency response) is in place.	
37. Determine if a system to track the quantities of chemicals and hazardous wastes on-site is in place.	
38. Determine if the lab has investigated and, where feasible, implemented P2 opportunities.	

3.4 Non-Hazardous Solid Waste

Small labs generate a variety of nonhazardous solid wastes. These wastes (commonly referred to as solid waste) include office trash, used packing materials, garbage from cafeterias and lab unique wastes such as broken glassware, used filter or weight papers and empty chemical containers, discarded tubing, discarded equipment and other materials.

Labs are subject to requirements related to the collection and storage of solid waste as well as ensuring that the waste is disposed of properly. Most labs arrange to have these wastes disposed of through municipal or private haulers at a permitted municipal waste landfill or incinerator. Onsite landfills and incinerators are uncommon for small labs due to stringent regulatory requirements.

Regulatory Considerations

RCRA Subtitle D encourages environmentally sound solid waste management practices that maximize reuse of recoverable materials and foster resource recovery. Although solid waste is predominately regulated by state, tribal or local governments, EPA has promulgated some regulations governing solid waste management. In particular, 40 CFR 243 establishes minimum levels of performance for solid waste collection operations including storage, safety, collection equipment, collection frequency and management. 40 CFR 246 establishes guidelines for source separation of high-grade office paper and corrugated paper. Many state, tribal or local regulations include additional requirements for segregating and recycling certain materials (i.e., glass, newspapers, and aluminum).

Management Issues

What Can Be Thrown in the Trash?

Certain materials are prohibited from disposal as solid waste in the regular trash.

- ***No Hazardous and Polychlorinated Biphenyl (PCB) Wastes.*** Landfills and municipal solid waste incinerators are prohibited from accepting hazardous and PCB wastes. (40 CFR 258.20).
- ***No Liquid Wastes.*** Bulk or non-containerized nonhazardous liquid wastes are prohibited from disposal at a landfill (40 CFR 258.28). Whenever possible, do not dispose of liquids in the trash. Make sure any liquid wastes are limited to small containers such as would be found in household trash (e.g., soda in a can or cups, hand-washing detergent container with some residue.
- ***Other Prohibited Wastes.*** The disposal facility may prohibit other wastes such as green waste (e.g., landscaping wastes) or bulky waste (e.g., appliances and equipment) from disposal in the regular trash based on state, tribal or local requirements.

Empty Containers

Make sure containers that contained hazardous materials such as chemical containers and cleaning supply containers are completely empty per the RCRA definition (see Hazardous Wastes, Section 3.3).

Waste chemicals do not go in the regular trash!

Storage and Collection

Waste containers for garbage or recycling must be of adequate size and number to handle the amount of waste being generated. The solid waste must be stored in a manner that does not constitute a fire, health, or safety hazard and must be contained or bundled so as not to result in a spill. In addition, containers storing food wastes must be covered, leak proof, and maintained to prevent a nuisance (odor, sight), and control vectors such as animals and insects.

Is the cover on your outside dumpster closed?

The solid waste must be collected with sufficient frequency to inhibit the propagation or attraction of vectors or the creation of a nuisance. Food waste must be collected at least weekly. Bulky wastes must be collected at least once every three months.

Waste Transport and Disposal

The lab is responsible for the proper disposal of its solid waste. If using a private hauler, lab staff should make sure the vehicles being used are enclosed or can otherwise prevent spills, and that they are adequately maintained. The lab staff should also make sure that the waste is being disposed at a permitted municipal waste landfill or incinerator.

Recycling

RCRA mandates source separation for high-grade paper and corrugated containers under certain circumstances. State, tribal or local governments may also have recycling requirements.

In office facilities employing more than 100 people, the facility is required to separate and sell high-grade office paper (40 CFR 246). The EPA encourages smaller facilities to implement this practice as well as the recycling of other materials such as mixed paper, newspaper, glass, aluminum and plastic if it is economically feasible, even if it is not required by state, tribal or local regulation. Lab facilities should establish central collection points for these materials in common areas such as a break room, hallway alcove or office area. Individual containers for office paper should also be provided for all employees. All central collection containers should be clearly labeled.

Pollution Prevention and Non-Hazardous Waste

P2 and waste minimization strategies for non-hazardous waste include reducing, reusing, and recycling. Recycling strategies are discussed in the previous section. Implement reduction strategies in the office as well as lab areas. Some suggestions include:

- Print and copy on both sides of the paper;
- Make all manuals, memos, and training aids available in electronic format only;
- Distribute presentation electronically on CD, diskette, or the Internet;
- Fax directly from your computer;
- E-mail documents as attachments and edit on screen;
- Share periodical subscriptions with colleagues;
- Purchase materials in bulk;

- Use resealable containers in transportation;
- Ensure there are no purchasing policies or procedures that discourage reduction strategies; and
- Talk to suppliers about minimizing packaging.

Suggestions for reusing non-hazardous waste include:

- Use corrugated boxes to move supplies or as temporary recycling bins;
- Use incoming packaging for outgoing packaging;
- Recycle office furniture; and
- Return containers to the manufacturer or distributor.

Remember that the key to a successful solid waste management program is employee awareness. Ensure staff is trained on what can and can not go in the regular trash, that staff are aware of and are encouraged to buy smart, reuse, recycle, and reduce. Training should include the identification of types of wastes, use of collection containers, proper labeling, and the importance of source separation, recycling, and reusing.

NON-HAZARDOUS WASTE PROGRAM CHECKLIST	
Action	**Notes**
1. Ascertain whether the solid waste collection facilities meet regulatory requirements including: an adequate number of containers; containers in good condition; and food waste containers that are liquid-tight and closed when not in use, collected at least weekly.	
2. Verify the establishment of a recycling program that meets Federal, state, tribal or local requirements.	
3. Confirm that the solid waste from the lab is going to a permitted landfill or incinerator.	
4. Determine if the lab has a waste minimization program in effect for solid waste collection and packaging.	

3.5 Biologically Active Substances and Wastes

Labs that work with microorganisms, recombinant DNA (rDNA) technologies, lab animals, human body fluids (blood, urine, feces, tissues, etc.) or bloodborne pathogens are special and often require unique work environments. These labs must be managed so as to reduce the potential for personnel exposure and environmental release. Wastes generated from these activities must also be uniquely managed.

Regulatory Considerations

The Federal EPA does not generally regulate biologically active substances or wastes. Exceptions include air regulations for medical waste incinerators and chemical treatment systems, biotechnology products such as bioremediation microorganisms regulated under the Toxic Substance Control Act (TSCA), and biopesticides regulated under the Federal Insecticide, Fungicide and Rodenticide Act (FIFRA). OSHA has established two standards that are applicable. In addition the Centers for Disease Control/National Institutes of Health (CDC/NIH) and National Research Council (NRC) have developed guidelines that labs should follow.

OSHA Standards

OSHA promulgated the Blood-borne Pathogen Standard (BBP) (29 CFR 1910.1030) to protect workers who may be exposed to blood and OPIM (e.g., human body fluids). In addition, OSHA has promulgated a standard on occupational exposure to TB (FR 62:54159 - 54309).

Guidelines

The CDC/NIH published guidelines that apply to labs involved in working with infectious microorganisms and rDNA. Biosafety in Microbiological and Biomedical Labs describes four biosafety levels and associated standard and special microbiological practices, safety equipment, and facility design criteria. The guidelines for research involving rDNA provide recommendations on equipment and procedures specific to rDNA. In addition, the NRC developed the Guide for the Care and Use of Laboratory Animals. Information on how to obtain these publications is provided in section 4.0 of this Guide.

Other Federal Agency Requirement

It is important to understand that other Federal agencies such as DOT, OSHA, and the Nuclear Regulatory Commission (NRC) have regulations that address various aspects of biological waste management. Information on how to contact these agencies for more information is also in Section 4.0 of this Guide.

State, Tribal or Local Requirements

In addition to the federal standards and guidelines, many local regulations exist to ensure proper management of biologically active substances such as rDNA. Although there are no Federal EPA requirements for the management and disposal of biological waste (including medical waste) most states do define and regulate this waste stream. Medical waste is generally defined as any solid waste generated in the diagnosis, treatment, immunization of human beings or animals, in related research, or in the production or testing of “biologicals” including cultures and

stocks, human blood and blood products, human pathological wastes, sharps, animal waste, and wastes from isolated patients.

It is important to consult with the state office of environmental management to obtain current requirements for the lab.

Management Issues

Small labs which handle biologically active substances should consult the standards and guidelines identified above in order to establish an effective biosafety program. This program should include the following:

- Assessment to identify employees with biohazard exposure potential as well as procedures that pose an environmental risk;
- Designation of a Biological Safety Officer;
- Development of a Biosafety Plan;
- Development of an Exposure Control Plan if subject to the BBP standard (this may be integrated into the Biosafety Plan);
- Training for each employee included under the plan;
- Application of appropriate controls, including engineering controls, protective equipment, work practice, and housekeeping techniques including universal precautions, biohazard container labeling and management;
- Development and implementation of decontamination procedures;
- Development and implementation of waste handling procedures;
- Lab inspections for work practices and engineering controls;
- Medical Surveillance Program;
- Recordkeeping program for exposure monitoring, incidents such as spills or releases, and waste disposal; and
- Development and implementation of programs to comply with OSHA Bloodborne Pathogen Standard (29 CFR 1910.1030) if applicable.

Several states require generators to complete manifests for biological active wastes.

Several key aspects of the biosafety program are outlined below.

Biohazard Communication

Biohazards should be communicated through labeling and biohazard signs. Where biologically active substances and wastes are used, handled or stored, labs should use the universal biohazard symbol. This symbol is required for bags, sharps containers, containers of contaminated laundry, refrigerators, and freezers used to store, transport or ship blood or OPIM.

In addition to labels, post a biohazard sign at the entrance to a lab. The sign should include the universal biohazard symbol, the agent in use, the criteria for entry (e.g., vaccinations, PPE) and the biosafety level. HBV/HIV research labs also require the name and telephone number of a contact person; this is a good idea for all areas.

Biohazard Training

All lab employees should be adequately trained prior to beginning work with biologically active substances. Training should occur at the time of initial assignment and whenever a change in work tasks or operations create new exposure situations. Training should be tailored to the specific job.

Biological Waste Management Program

Proper management ensures that biologically active waste is properly handled from cradle to grave. The following elements of a biological waste management program should be in place to reduce exposure to employees and the public:

- Segregate infectious waste from the general trash;
- Use the universal biological hazard symbol on infectious waste containers;
- Select the packaging material that is appropriate for the type of waste handled:
  - Plastic bags for solid or semisolid infectious waste,
  - Puncture resistant containers for sharps, and
  - Bottles, flasks, or tanks for liquids;
- Use packaging that maintains its integrity during storage and transportation;
- Do not compact infectious waste or packaged infectious waste before treatment;
- Minimize storage time;
- Select the most appropriate treatment option for your waste. Consider steam sterilization, incineration, thermal inactivation, and chemical disinfection. Note that in most cases, it is acceptable to discharge blood and blood products to the sanitary sewer, but check first with your local POTW; and
- Contact state, tribal or local authorities to identify approved treatment disposal options.

Use a licensed medical waste vendor for transportation.

Some states require transporters of infectious waste have additional permits.

Pollution Prevention and Biologically Active Substances

An effective biological waste program not only protects workers and the environment, it can also lead to cost savings from waste reduction or prevention. Lab staff and management should pursue opportunities to use materials with a lower biohazard level or alternative procedures to reduce the material handling and disposal requirements of the program.

Is It All Biological Waste?

Clinical labs in a hospital were using sharps containers for disposal of most of their biohazardous material. This was not required by the state. By changing to a corrugated disposable box with a bag liner, the labs reduced costs from $75,000 annually to $7,000.

The elimination of the unnecessary plastic sharp containers also helped reduce air pollution loading for the on-site incinerator.

BIOLOGICALLY ACTIVE SUBSTANCES AND WASTES PROGRAM CHECKLIST	
Action	**Notes**
1. Verify the lab has all applicable EPA, OSHA, CDC/NIH, DOT, and NRC regulations and guidelines available.	
2. Determine if the lab established an effective biosafety program that includes the following: • An assessment to identify employees with biohazard exposure potential; • Designation of a Biological Safety Officer; • Development of a biosafety plan (to include an Exposure Control Plan); • Employee training; • Application of appropriate controls; • Development of decontamination and waste handling procedures; • Inspections of work practices and engineering controls; • Medical surveillance program; • Recordkeeping program; and • Development of a bloodborne pathogen program.	
3. Verify that the universal biohazard symbol is placed prominently on all bags, sharps containers, containers of contaminated laundry, refrigerators, and freezers used to store, transport or ship blood or OPIM.	
4. Ensure biohazard signs are posted at the entrance to all labs using or storing biohazards. The signs should include: • The universal biohazard symbol; • The agent in use; • The criteria for entry; and • The biosafety level.	
5. Verify employee training occurred prior to working with biologically active substances and whenever there is a change in the work task or operations that create new exposure situations,	

BIOLOGICALLY ACTIVE SUBSTANCES AND WASTES PROGRAM CHECKLIST	
Action	**Notes**
6. Ensure the lab developed and implemented an infectious waste management program that includes the following elements: • Guidelines to separate infectious waste from general trash; • Labeling requirements (use of the universal biological hazard symbol on all containers); • Guidelines on selecting the appropriate type of packaging material to contain the infectious waste and to maintain its integrity during storage and transportation; • Requirements that do not allow for the compaction of infectious waste prior to treatment; • Procedures in place to minimize storage time; and • Guidelines for selection of the most appropriate treatment option for the waste.	
7. Determine if lab staff and management developed or studied opportunities for pollution prevention or waste management.	

3.6 Radioactive Materials

Small labs may be required to maintain a radiation safety program if their operations involve the use of radioactive materials. Such materials at small labs might be in one or more of the following applications:

- Radioisotopes, usually in liquid form, used as tags in biological experimentation. Commonly used isotopes are ^{3}Hydrogen (tritium), ^{14}Carbon, ^{32}Phosphorus and ^{33}Phosphorus, ^{35}Sulfur, and ^{125}Iodine.
- Sealed radioactive sources used in measuring devices. Examples are ^{63}Nickel used in gas chromatographs, and ^{210}Polonium used in static eliminators.
- Contrasting agents in powder form such as uranyl acetate, thorium nitrate and uranyl nitrate, contain uranium or thorium which are radioactive.

Radiation-producing devices such as X-ray equipment or electron microscopes might also require a radiation safety program.

In addition to the sources of ionizing radiation described above, some labs may manage non-ionizing radiation sources such as lasers and electromagnetic sources.

Regulatory Considerations

The EPA does not have a large role in regulation of radiation safety. However, there are a number of federal, state, tribal and local standards and regulations that pertain to radiation safety and the possession of sources of ionizing radiation.

Nuclear Regulatory Commission

The Nuclear Regulatory Commission (NRC) has regulations that govern the possession and use of radioactive material in three categories: Special nuclear material (SNM), source material, and byproduct material. Definitions of these are provided below.

"Special nuclear material" means (1) Plutonium, uranium-233, uranium enriched in the isotope 233 or in the isotope 235, and any other material which the NRC determines to be special nuclear material, but does not include source material; or (2) Any material artificially enriched by any of the foregoing but does not include source material.

"Source material" means (1) Uranium or thorium, or any combination of uranium and thorium in any physical or chemical form; or (2) Ores which contain, by weight, one-twentieth of one percent (0.05 percent), or more, of uranium, thorium, or any combination of uranium and thorium. Source material does not include special nuclear material. Source material, if placed in a breeder reactor, can be turned into special nuclear material. This is why source material is placed in a special class.

"Byproduct material" is defined in two separate ways: (1) Any radioactive material (except special nuclear material) yielded in, or made radioactive by, exposure to the radiation incident to the process of producing or utilizing special nuclear material. For all intents and purposes, any

material that becomes radioactive because it is used in a nuclear reactor is byproduct material. This includes fission products such as ^{90}Sr, ^{131}I, ^{137}Cs and numerous others. It also includes material made radioactive by its exposure to neutron radiation emitted during the fission process. Some examples are ^{60}Co, ^{54}Mn, ^{59}Fe, ^{65}Zn and many others; and (2) Byproduct material also includes the tailings or wastes produced by the extraction or concentration of uranium or thorium from ore processed primarily for its source material content, including discrete surface wastes resulting from uranium solution extraction processes. Underground ore bodies depleted by these solution extraction operations do not constitute "byproduct material" within this definition.

Certain small quantities or concentrations of byproduct material may be exempt from requirements for a NRC license. Certain devices (such as gas chromatographs) containing sealed sources might be able to be possessed under a so-called general license. These general licenses for byproduct material are issued under 10 CFR 31. Also, 10 CFR 40 allows for possession of relatively small quantities of source material. Other parts of 10 CFR contain various other exceptions and exemptions from licensing requirements.

Agreement States

Approximately two-thirds of the states have entered into an agreement with NRC to take over most of the responsibility of licensing and regulating the use of byproduct, source and special nuclear material within their borders. These are called "Agreement States." NRC, however, retains the authority to license federal facilities that are located in agreement states.

Authority of State Agencies

Several types of radioactive material and sources of ionizing radiation fall outside the definitions provided above and are therefore not regulated by NRC. Some examples of these are:

- Naturally occurring radioactive material (NORM);
- Accelerator-produced radioactive material; and
- Radiation-producing machines, such as diagnostic and therapeutic x-ray machines, accelerators, industrial x-ray machines, scanning electron microscopes, ion implanters, and the like.

Therefore, labs in possession of such materials and machines may need to be licensed or registered with the state in which they are located and to follow the state regulations that apply. Some states also have laser regulations.

Small labs should check with the NRC regional office in which they are located and with the appropriate state or tribal office to resolve any questions about licensing and/or registration of sources of radiation.

NRC Requirements

The NRC's rules for licensing, inspection, and radiation protection practices are contained in Title 10 of the Code of Federal Regulations. Requirements for byproduct material licenses, the type that applies to most small labs, are contained in 10 CFR 30. Requirements for posting notices, registration of employee complaints or concerns, providing reports and instructions to employees, and general radiation safety training requirements for employees are contained in 10 CFR 19. 10 CFR 20 contains the standards for protection against radiation, including radiation dose limits for workers and the general public and permissible levels of airborne contamination and radioactivity in effluents. It also specifies standards for establishing personal radiation dose monitoring procedures, posting radiation warning signs, picking up, receiving and opening packages containing radioactive materials, radioactive material transfer and disposal, recordkeeping, reporting and notifications.

OSHA Requirements

Subpart Z of 29 CFR 1910.1096, the OSHA standard on ionizing radiation, applies to labs that are not required to have a specific license from NRC. At licensed facilities, NRC rules supercede OSHA rules on radiation protection, in accordance with the OSH Act. In non-licensed labs, subpart Z specifies limits for exposure of staff in certain areas, precautionary measures and personnel monitoring, requirements for labeling and handling radioactive materials, reporting of exposures, and others. Subpart G of 29 CFR 1910.97 provides standards for non-ionizing radiation.

Information on how to contact these various agencies for more information is in Section 4.0 of this Guide.

Management Issues

Small labs that have radioactive material licenses have committed to developing and following specific procedures and practices as part of the licensing process. Compliance with the applicable Federal, state or tribal regulations, the terms of the specific license, and the requirements of related facility procedures is mandatory.

Small labs that possess radiation-producing machines should operate their safety program in accordance with the applicable state or tribal regulations.

Small labs that possess both radioactive materials and radiation-producing machines must run their radiation protection program in accordance with both sets of requirements. One does not supercede the other.

A radiation safety program should include the following:

- Development of a documented program in the form of procedures or a radiation safety manual;
- Designation of a Radiation Safety Officer (RSO) to administer the program;
- Personal radiation monitoring devices under certain circumstances;
- Internal dose monitoring (bioassay) under certain circumstances;

- Establishment of work practice controls including those for:
  - Ordering radioactive materials or radiation-producing machines,
  - Packaging and shipment of radioactive materials,
  - Receipt and storage of radioactive materials,
  - An area radiation and contamination survey program,
  - Sealed source leak tests (usually every six months),
  - A routine maintenance and calibration program for certain equipment,
  - Proper use of protective equipment and clothing,
  - Spill response, and
  - Radioactive waste disposal.
- Posting and access control for areas where there are radiation hazards;
- Development and conduct of radiation safety training appropriate for the job; and
- Recordkeeping, notification and reporting as required.

Several key aspects of the radiation safety program are outlined below.

Contamination Monitoring and Surveys

Labs and equipment can become contaminated when liquids and powders that are labeled with radioisotopes are used. In addition, although infrequent, leakage from a sealed radioactive source is possible.

Sealed-Source Leak Tests

Most sealed sources must be tested for leakage every six months. Obtain a leak-test kit from a licensed lab and follow the instructions.

Routine Day-to-Day Monitoring. Each individual is responsible for monitoring his or her person, clothing, and shoes with the appropriate hand-held survey instrument before leaving an area where there is the potential for contamination.

Contamination Surveys. Labs using unsealed radioactive material must be surveyed periodically by the RSO. Semiannual leak tests are also required for sealed beta and gamma sources containing 100 microcuries or greater, and for alpha sources that contain 10 microcuries or greater.

Radiation-Producing Machine Surveys. X-ray machines, electron microscopes and other radiation-producing machines should be surveyed at installation, after being moved, after attachments are added or the unit is modified, before resuming routine operations after maintenance, or any other time that the machine or procedures for its use are changed.

Radioactive Waste Management

Radioactive wastes from small labs may include solids, liquids, liquid scintillation cocktail and vials, animal carcasses and animal bedding. Management of this low-level radioactive waste (LLRW) may include decay-in-storage for short-lived isotopes, release to sanitary sewers under certain conditions, or interim storage on site pending transfer to a licensed waste broker for land burial or incineration.

Specific Wastes

Liquid scintillation medium or animal tissue containing less than 0.05 µCi of ^{3}H or ^{14}C per gram of material may be disposed of as if it were not radioactive.

Lab Collection. Radioactive waste must be collected into designated containers that are clearly labeled. Bins or step-cans for solid waste should be lined with a yellow plastic bag. Polyethylene bottles are recommended for liquid wastes because they provide less secondary radiation from high-energy beta-emitting isotopes than glass, are compatible with most chemicals and do not break as easily.

Container labels should show:
- The radionuclides present in the waste;
- The dates of accumulation; and
- The lab in which the waste was generated.

A log sheet should be provided for each container for scientific staff to record:
- The radionuclide present in the waste;
- Amount of activity;
- Users initials; and
- Disposal date.

Segregate the wastes by physical form and radionuclide. Move the waste to the radioactive waste handling room for processing or temporary storage when the container is full or when exposure at the outside of the waste container exceeds 0.25 mR/h. Use plastic containers rather than steel for high-energy beta emitting isotopes such as P-32.

Storage. Radioactive waste in storage must be housed in rooms exclusively dedicated for this purpose. The room should be in a low traffic area, be secured against unauthorized entry when not attended and monitored by a trained radiation worker.

Packaging, Transportation and Disposal. The lab must provide documentation on the identity and quantity of radioactivity and properly label and contain the radioactive waste to be shipped off-site. Radiation surveys of the container are required to determine external radiation levels and if there is any removable contamination. Check DOT requirements in 49 CFR 172.403 and 173 for specific requirements. A reputable radioactive waste broker can assist with these requirements.

Labels for Shipping

Some are required on opposite sides of the container

Sanitary Sewer Discharge. The NRC allows for the disposal of small amounts of liquid radioactive waste in specifically designated sinks that drain to sanitary sewers. The waste must be soluble or dispersible in water and be absent of chemically or biologically hazardous components. The average concentration disposed of in this

Sink Discharge Log

If discharges are made to sanitary sewers, maintain a log to record the nuclide, quantity disposed, date of disposal and person disposing the waste for each discharge.

manner must not exceed limits in 10 CFR 20, Appendix B. Table 3. There may be state, tribal or local sewer district limits, or specific license discharge limits. The NRC limits are the average monthly concentrations that may be disposed down the drain. The complete list of requirements is contained in 10 CFR 20.2003 (see Water Discharges, Section 3.2).

Equipment Disposal. When taking equipment out of service that contains a sealed radioactive source, it is important to follow the manufacturer's instructions regarding removal and proper disposal of the sealed source. Generally, manufacturers advise returning the equipment to them and they in turn will dispose of the radioactive source. The manufacturer should be your first contact to learn about handling, shipping and disposal options prior to shipment.

Pollution Prevention and Radioactive Materials

Opportunities for P2 and waste minimization can have significant economic impact due to the high disposal costs associated with radioactive waste. There are a limited number of disposal options currently available to licensees. Several opportunities include:

- Using non-radioactive substitutes;
- Substituting radioactive materials with shorter half-lives, and use the decay-in-storage option;
- Sharing and reusing radioisotope source vials that come in larger-than-required quantities or buy the correct quantity;
- Carefully segregating radioactive from non-radioactive materials (e.g., leftover reagents, boxes, packing material); and
- Using reusable spill trays and wearing reusable protective clothing that can be radiologically surveyed and laundered.

RADIOACTIVE MATERIALS MANAGEMENT CHECKLIST	
Action	**Notes**
1. Verify the lab identified all applicable Federal, tribal, state, and local regulations.	
2. Ensure the lab is operating under a NRC license or a state license if located in an agreement state. Labs operating in Indian Country should check with the tribal council to determine license requirements.	
3. Determine if the lab produces or uses a source of ionizing radiation that falls outside the scope of the NRC (e.g., NORM, lasers). Verify the lab is meeting all applicable state, tribal, and local regulations regarding NRC exempt materials.	
4. Verify the lab developed and implemented a documented radiation safety program (procedures or a manual) that includes the following elements: • Designation of a Radiation Safety Officer; • Use of personal radiation monitoring devices; • Procedures for the use of internal dose monitoring in certain circumstances; • Access control and signage; • Radiation safety training appropriate for a job; • Recordkeeping, notification, and reporting procedures; and • Establishment of work practice controls that cover: – Ordering radioactive materials or radiation-producing machines, – Packaging and shipment of radioactive materials, – Receipt and storage of radioactive materials, – Area radiation and contamination survey program, – Sealed source leak tests, – Routine maintenance and calibration program, – Proper use of PPE, – Spill response, and – Radioactive waste disposal.	
5. Determine if every individual monitors his or her person, clothing, and shoes before leaving an area where there is contamination potential.	
6. Verify the RSO surveys unsealed radioactive materials and performs semiannual leak tests on sealed sources.	

RADIOACTIVE MATERIALS MANAGEMENT CHECKLIST	
Action	**Notes**
7. Verify the RSO surveys radiation-producing machines at installation, after being moved, after attachments are added or the unit is modified, before resuming routine operations after maintenance, or any other time the machine or procedures are altered.	
8. Ensure containers used for collection in the lab are designated for radiation waste only and clearly labeled with: • The type of radionuclides present in the waste; • The dates of accumulation; and • The lab in which the waste was generated.	
9. Verify that a log sheet accompanies each collection container and that staff record the following information: • Radionuclide present in the waste; • Amount of activity; • Users initials; and • Disposal date.	
10. Verify the lab has a separate room for radioactive waste that is in a low traffic area, secured against unauthorized entry, and monitored by a trained radiation worker.	
11. Determine if the lab surveys transport containers for external radiation levels prior to shipping and documents the identity and quantity of radioactivity.	
12. Verify the lab regulates and monitors the disposal of small amounts of liquid radioactive wastes disposed of in specially designated sinks.	
13. Verify the lab staff looks for opportunities for waste minimization and P2.	

3.7 Special Wastes

Special consideration has been made for the recycling and disposal of several commonly generated wastes that can be found at small labs. These special wastes include used oil, spent batteries, thermostats and fluorescent lights. The regulatory requirements and management issues related to these "special wastes" are described in this Section.

Used Oil Management

Labs may generate used oil from building systems equipment (e.g., compressors and power generators), from oil containing lab equipment (e.g., hydraulic oil), or from vehicles and landscape maintenance equipment. In September 1992 the EPA developed regulations for managing used oil through recycling (40 CFR 279).

What is Used Oil. The EPA defines used oil as "any oil that has been refined from crude oil or any synthetic oil that has been used and as a result of such use is contaminated by physical or chemical impurities." The used oil program utilizes a three tiered approach to determine if a substance meets the definition of used oil and must be managed under the EPA used oil program. The three criteria are listed below:

> Some state and tribal regulations require used oil to be treated as a hazardous waste. Check with state and tribal regulators for specific requirements.

- Origin: used oil must have been refined from crude oil or made from synthetic materials. This origin determination excludes animal and plant based oils.
- Use: used oil must have been used as a lubricant, heat transfer fluid or hydraulic fluid to name a few. Unused oil does not meet the EPA definition, also excluded are oils used as solvents or cleaning agents as well as antifreeze and kerosene.
- Contaminants: used oil must have been contaminated during use. Contaminants may include metal shavings, dirt, solvents, or halogens.

Used Oil Exemptions. Used oil is exempt from the hazardous waste program if it is managed through a used oil recycler and is not mixed with hazardous waste. Several of the exemptions to this policy are listed below:

> Segregate used oil from hazardous waste to eliminate the possibility of cross contamination.

- If the used oil is found to contain greater than 1000 parts per million (ppm) of a halogen then it is presumed to have been mixed with a hazardous waste and must be managed as such. The generator through testing may rebut this presumption.
- If mixed with a waste that is ignitable then the mix can be disposed of as used oil provided the mixture is no longer ignitable (see The Mixture Rule, p.31 in Hazardous Wastes, Section 3.3).

- If mixed with a waste that is ignitable and contains another hazardous waste characteristic, the resultant mixture must not exhibit any hazardous waste characteristics to be managed as used oil.
- If mixed with a CESQG hazardous waste regulated under 40 CFR 261.5 the resultant mixture is regulated as used oil.

Used oil should be stored in tanks or other containers that are in good condition (i.e., no rust, dents, or leaks). The containers and fill pipes to storage tanks must be clearly labeled with the words "Used Oil." Used oil containers should be marked with "Flammable" and "No Smoking" signs. Container tops and fill pipes should be closed and secured when not in use and the containers should have secondary containment. The storage areas should be inspected on a regular basis to ensure all requirements and best management practices are complied with. Storing used oil tanks outside may require a SPCC Plan (see Water Discharges, Section 3.2).

Off-Site Recycling. Facilities can transport used oil on their own or use a regulated transporter (i.e., one that has an EPA ID number). Facilities may transport small quantities of used oil to approved collection centers without obtaining an EPA ID number provided the following conditions apply:

- Facilities use their own vehicles to transport the used oil;
- No more than 55 gallons is transported at any one time; and
- Used oil is transported to a licensed used oil collection center.

Used Oil Records. The facility should keep a logbook at each collection point requiring the following information: the amount of oil added, the name of the person adding the used oil, and the source of the oil. This logbook will allow the facility to track generation and ensure hazardous wastes are not being added to the used oil storage containers.

The facility should keep records of the off-site transportation including the transporter's EPA ID number, amount and date of shipments, and the name of the recycling facility receiving the used oil.

Universal Wastes Rule

On May 11, 1995, the EPA Promulgated regulations for streamlining the universal waste management requirements, making it easier to collect, manage, and recycle universal waste. Traditionally, labs that are regulated under RCRA treated universal waste as hazardous waste. The Universal Waste Rule eases the regulatory burden on small labs by simplifying requirements for labeling, marking, training, collecting, tracking, and transporting universal waste. Facilities are no longer required to ship universal waste with a manifest or with a hazardous waste transporter. In addition, facilities are allowed to accumulate universal waste on site for up to one year.

The Universal Waste Rule does not affect facilities that generate less than 100 kg of universal waste per month. Labs that generate less than 100 kg of universal waste per month are encouraged to set up central collection points and recycle the universal waste.

Lab Universal Wastes. Universal waste is widely generated and common to businesses of all sizes and households. The two most common types of universal waste found in labs are:

Universal Waste:
- Batteries
- Agricultural pesticides
- Thermostats
- Lamps

- Batteries (40 CFR 273.2): Includes nickel-cadmium (Ni-Cd) and the small sealed lead-acid (SSLA) batteries found in common item such as electronic equipment and cordless/mobile phones. Non-hazardous batteries (alkaline batteries manufactured after 1992) and spent lead acid batteries that are reclaimed are excluded from management under the universal waste rule. (See additional information in the battery management section.); and
- Lamps (40 CFR 273.5): Includes fluorescent, high intensity discharge, neon, mercury vapor, high-pressure sodium, and metal halide lamps. The included lamps usually contain mercury and sometimes lead.

Agricultural pesticides that were recalled, banned, damaged, or no longer needed and thermostats are considered two additional types of universal waste. Note: check with the state or tribal regulator to determine how the state/tribe implemented the universal waste rule and whether or not additional types of regulated hazardous waste are included in the rule.

Universal Waste Management. The Universal Waste Rule streamlines the regulatory process for small quantity and large quantity handlers of universal waste (SQHUW and LQHUW), but the following requirements must still be met:

SQHUW accumulates ≤5000 kg at any time.

LQHUW accumulates ≥5000 kg at any time.

- Prohibitions: Both SQHUW and LQHUW are prohibited from disposing of and diluting or treating universal waste;
- Notification:
  - SQHUW are not required to notify the EPA of their universal waste collection and transportation activities.
  - LQHUW are not required to notify the EPA if they already informed the EPA of all hazardous waste activities and received an EPA identification number;

A SQHUW becomes a LQHUW when it exceeds 5000 kg and remains a LQHUW until the end of the calendar year.

- Waste Management: All universal waste must be managed in a way that will prevent a release to the surrounding environment. Storage containers must be in good condition (structurally sound, closed) and compatible with the waste;

- Labeling/Marking: The collection/storage container or the individual item must be marked with the type of universal waste (batteries, lamps, etc.) and the words “Universal Waste”;
- Accumulation Time Limits: The SQHUW and LQHUW cannot store universal waste for more than one year (or more than one year if the activity is collecting enough universal waste to properly recover, treat or dispose). Both must be able to demonstrate the length of time the universal waste has been accumulating. The facility can accomplish this by marking the collection start date on the collection/storage container or individually marking each item with the date it became a waste;

  As a good management practice, universal waste should be stored for less than one year in a centralized location.

- Employee Training:
  - SQHUW must inform all employees who handle universal waste or have some responsibility for universal waste in proper handling and emergency procedures.
  - LQHUW must ensure all employees are familiar with proper handling and emergency procedures for universal waste;
- Transportation: Both are prohibited from transporting universal waste to any facility that is not a universal waste handler or a destination facility (a facility that treats, recycles, or disposes of a particular type of universal waste). Prior to sending a shipment of universal waste off-site, the handler must notify the receiving facility and secure an agreement of acceptance; and
- Recordkeeping Requirements:
  - SQHUW are not required to keep records of universal waste shipments.
  - LQHUW must keep a record (log, bill of lading, invoice, or any other standard business document) of every shipment of universal waste sent to another facility and show the name and address of the handler, destination facility, quantity of each type of universal waste sent, and the date the shipment left the facility. Records must be kept for three years.

More Batteries

Several other types of batteries may be managed at small labs. These are unsealed lead acid batteries used in vehicles, emergency generators and other equipment, and alkaline batteries used in small appliances such as clocks and radios.

Alkaline batteries manufactured after 1992 can be disposed of in the municipal trash in ones or twos. Alkaline batteries manufactured prior to 1992 contain mercury and other toxic materials requiring handling under either the universal waste rule or as a hazardous waste depending on state requirements.

Ni-Cd and SSLA rechargeable batteries are recycled under the Universal Waste Rule.

Unsealed lead acid batteries should be recycled and managed in accordance with 40 CFR 266.

EPA has promulgated special regulations for the management of lead acid batteries in 40 CFR 266. Under these regulations, spent lead acid batteries do not have to be bundled as hazardous waste provided that they are recycled. Small labs should ensure that spent lead acid batteries are disposed via an authorized recycler. Automotive store and other suppliers have buy-back programs to ensure that the batteries are recycled.

Pollution Prevention and Special Wastes

Implementing P2 and waste minimization strategies will reduce or eliminate hazardous wastes from entering any waste stream or being released to the environment. P2 opportunities are listed below. The list is not exhaustive but serves as a resource to encourage lab personnel to consider and implement P2 strategies.

- Perform a waste audit to identify all universal waste. Ensure universal waste is segregated from hazardous waste.
- Properly maintain and store batteries to provide the longest life.
- Follow all charging and discharging instructions for rechargeable batteries to maximize the useful life.
- Do not stockpile batteries or fluorescent tubes. Instead use a one-for-one swap program.
- Purchase and use solar powered equipment or rechargeable batteries whenever feasible.
- Turn off battery powered equipment and lights when not is use.
- Segregate used oil collection points from hazardous waste accumulation sites.
- Discourage lab personnel from adding anything to oil.

SPECIAL WASTE PROGRAM CHECKLIST	
Action	**Notes**
Universal Waste	
1. Verify that the lab properly identified all the universal waste streams.	
2. Confirm the lab does not generate and store more than 5000 kg of universal waste at any time.	
3. Check the storage containers to make sure they are in good condition and compatible with the waste.	
4. Confirm that the containers or individual items are labeled as “Universal Waste”.	
5. Verify universal waste is not stored for greater than one year and the lab maintains support documentation.	
6. Determine whether or not the employees received proper training on handling universal waste.	
7. Verify the lab transports all universal waste to a universal waste handling facility.	
Battery Management	
8. Verify alkaline batteries manufactured after 1992 are disposed of in quantities of one or two.	
9. Confirm the lab recycles unsealed spent lead acid batteries.	
10. Verify the lab manages Ni-Cd and SSLA as universal waste.	
Used Oil	
11. If lab operations result in the generation of used oil ensure there is a program in place to ensure the separation of used oil and hazardous waste.	

SPECIAL WASTE PROGRAM CHECKLIST	
Action	**Notes**
12. If used oil is mixed with hazardous waste, ensure the lab is managing the mixture as a hazardous waste.	
13. Verify that used oil storage areas are properly maintained and regularly inspected to ensure: • Containers or tanks are in good condition; • Containers & fill pipes are labeled “Used Oil”; • Flammable & No Smoking signs are posted; • Container lids and bungs are closed and secured when not in use; and • Containers or tanks have secondary containment.	
14. Confirm the used oil transporter has an EPA ID number, or if the lab transports the oil, confirm it is going to a licensed recycler and transported in less than 55 gallon quantities.	
15. Verify that records of off-site transfers are maintained: • Transporter's EPA ID number; • Quantity shipped; • Date shipped; and • Name of the receiving facility.	

3.8 Hazardous Substance Releases

In 1980, Congress passed the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) in response to the growing concern about releases of hazardous substances to the environment. CERCLA was intended to provide for response to, and cleanup of, environmental problems not adequately addressed by other environmental statutes. Under CERCLA, provisions were made to establish a trust fund to finance environmental cleanups – this resulted in CERCLA's nickname "Superfund."

CERCLA has been amended over ten times since its passage in 1980. Two important amendments are the Superfund Amendments and Reauthorization Act (SARA) of 1986 (see Emergency Planning and Community Right-To-Know, Section 3.9), and the P2 Act of 1990.

Past Disposal Areas

The primary purpose of CERCLA is to provide for liability, compensation, cleanup, and emergency response for hazardous substances released to the environment. If lab personnel discover or have knowledge of an area that may be contaminated with hazardous substances (e.g., an abandoned landfill), they should consult with environmental professionals prior to disturbing the area. Such areas may require historical investigation and environmental sampling and analyses.

Releases of Hazardous Substances

EPA has designated hazardous substances and established reportable quantities (RQs) for releases (40 CFR 302) of these substances. The regulation mandates notification to the National Response Center (NRC) for releases of hazardous substances in quantities exceeding the associated RQ. It is unlikely that RQs of hazardous substances will be present at most small labs. However, lab managers should be familiar with the substances and RQs listed in 40 CFR 302 to make their own determination. If hazardous substances are present on-site in quantities exceeding the RQs, then lab staff should be prepared to make the required notifications in the event of a regulated release.

Pollution Prevention and Hazardous Substance Releases

Hazardous substance releases are most effectively prevented by:

- Substituting non-hazardous products for hazardous products and improving operating practices to reduce the quantity of hazardous substances needed;
- Ensuring that employees are fully trained on how to handle the hazardous substances they manage. Handling practices include closing containers when not in use, using only the quantity of chemicals needed, storing chemicals in closed cabinets and on shelves with lips; and
- Proper waste disposal, which ensures that the lab is not contributing to an authorized release of a hazardous substance that could result in a costly cleanup action.

HAZARDOUS SUBSTANCE RELEASES CHECKLIST	
Action	**Notes**
1. Determine if the lab personnel surveyed the property to ensure there is no prior contamination.	
2. Verify lab personnel did not disturb previously contaminated areas without prior consultation with an environmental professional.	
3. Ensure lab personnel document all surveys and contaminated areas.	
4. Verify the lab is familiar with the RQs for releases and compared those to types and quantities of chemicals found in the lab.	
5. If chemicals are present on-site in quantities that exceed the RQ, verify lab personnel are prepared to make the required notifications (e.g., call the NRC).	

3.9 Emergency Planning and Community Right-To-Know

The Emergency Planning and Community Right-to-Know Act (EPCRA) of 1986 is actually Title III of the Superfund Amendments and Reauthorization Act (SARA). EPCRA was designed to inform emergency planners and the public of potential chemical hazards. These emergency planners include the Local Emergency Planning Committee (LEPC), the State Emergency Response Commission (SERC), and the local fire department.

Management Issues

Emergency Planning and Notification

In 40 CFR 355, EPA codified a list of extremely hazardous substances and associated threshold-planning quantities (TPQs). Labs storing extremely hazardous substances in amounts exceeding the TPQs must notify state, tribal or local emergency response authorities and participate in the community's emergency planning process. Lab management should review and compare inventories of chemicals on site with EPA's list of extremely hazardous substances to determine if these substances are present in amounts exceeding the TPQs.

Hazardous Chemicals Above Reporting Thresholds

Isopropyl Alcohol – 1,700 gal.
Chloroform – 879 gal.
Chlorine – 500 lbs.
Heating Oil – 1,600 gal.
Ammonia – 500 lbs.

Inventory and Material Safety Data Sheet (MSDS) Reporting

EPCRA established reporting requirements providing the public with important information on hazardous chemicals in their community (40 CFR 370). Labs storing chemicals may be required to submit material safety data sheets (MSDS) and inventories of the chemicals on site. Submissions are only required for OSHA hazardous substances present in amounts exceeding 10,000 lbs. and *extremely* hazardous substances present in amounts exceeding their TPQs or 500 lbs. (whichever is less). Labs can provide the chemical names and hazardous components by submitting either an MSDS or a list of the hazardous chemicals grouped by hazard category

Does your lab have...

- More than 500 lbs. or the TPQ of an extremely hazardous substance?
- More than 10,000 lbs. of an OSHA hazardous substance?

Remember to consider not only lab chemicals but also hazardous substances used in facility operations such as heating oil and refrigerants.

Other Regulatory Programs

OSHA's Hazard Communication Standard (29 CFR 1200) and Lab Standard (1900.1450) require that Labs maintain MSDSs for all OSHA hazardous substances.

Hazardous Chemical Inventory Form Reporting

If a lab meets EPCRA reporting thresholds, it is required to submit a Hazardous Chemical Inventory Form to the LEPC, SERC and the local fire department (40 CFR 370.20). A TIER I form requires a certification statement,

Reporting Dates to Remember

- MSDSs - Within 3 months of new chemical information.
- TIER I or II - March 1 each year.
- TRI - July 1 each year.

information on maximum amounts of chemicals in a lab, number of days materials are on site, and hazard type and storage locations for chemicals. TIER II forms contain more detailed hazard information. Labs may submit the simpler TIER I unless state agencies request the more complicated TIER II.

Toxic Release Inventory Reporting

The laboratory is subject to TRI reporting if it meets the following operational criteria established in 40 CFR 372.22 for the last calendar year:

- It has ten or more employees;
- It is in Standard Industrial Classification major group codes 10, 12, or 20 through 39; industry codes 4911, 4931, 4939, 4953, 5169, 5171, or 7389; and
- It manufactured, imported, processed, or otherwise used a toxic chemical in excess of TRI threshold quantities.

TRI Reporting Thresholds

- Manufactured Imported or Processed – 25,000 lbs.
- Otherwise Used – 10,000 lbs.

Labs, by themselves, do not usually meet the SIC code criterion or TRI reporting thresholds. However, if a lab is part of a larger covered facility subject to TRI reporting then it's releases must be included in the annual TRI report.

The toxic chemical usage in the lab portion of a covered facility does not need to be considered when determining whether the covered facility has exceeded the TRI reporting thresholds under an exemption contained in 40 CFR 372.38(d). However, this exemption does not apply for:

- Specialty chemical production;
- Manufacture, processing, or use of toxic chemicals in pilot plant scale operations; or
- Activities conducted outside the lab.

The lab exemption is important considering the reporting thresholds for chemicals that meet EPA's criteria for persistence and bioaccumulation (PBT chemicals) range from 0.1 grams to 100 pounds. Some labs could conceivably exceed the reporting threshold.

EPA Form R is used for TRI reporting. Reports require information on the amount of the regulated substance that is released or otherwise managed as waste. Executive Order 12856, Federal Compliance with Right-To-Know Laws and Pollution Prevention Requirements, stipulates that Federal lab facilities comply with all EPCRA regulations.

Pollution Prevention and EPCRA

Lab staff should review their operations and identify opportunities to reduce the amount of materials stored and used in processes and substitute with less hazardous substances (see Hazardous Wastes, Section 3.3). This may not only reduce the lab's reporting requirements under EPCRA but also reduce hazards in the lab and for the community.

EPCRA CHECKLIST	
Action	**Notes**
1. Verify an inventory of OSHA hazardous substances and extremely hazardous substances (including average as well as maximum amounts on-site) has been prepared and is updated annually or as new chemicals are introduced in the lab.	
2. Ensure the inventory of chemicals is compared against extremely hazardous substance TPQs and EPCRA reporting thresholds.	
3. Determine if the lab is coordinating with emergency planning agencies concerning those extremely hazardous substances on-site.	
4. Verify the lab has submitted MSDSs or a list of MSDSs to the emergency planning agencies for all hazardous chemicals above thresholds and is updating the list within 3 months of introducing a new chemical.	
5. Verify the lab has submitted a TIER I or II to the emergency planning agencies by March 1 for all hazardous chemicals above thresholds in the last year.	
6. Ensure the lab has determined whether TRI reporting is applicable for the facility.	
7. If TRI reporting is applicable, determine if the lab documents the amount of regulated toxic chemicals released and otherwise managed as waste. Documentation should be maintained for three years.	
8. If applicable, ensure TRI reports are submitted to the EPA by July 1 of each year.	

3.10 Toxic Substances

Labs may have equipment, which contains polychlorinated biphenyls (PCBs) or other toxic substances, may be required to manage buildings which have toxic substances requiring special handling such as asbestos or lead-based paint, or they may have the toxic substances in the lab for experimental reasons. Regardless of the situation, the EPA regulates toxic substances, including new and existing chemicals, PCBs and asbestos, from cradle-to-grave.

Regulatory Considerations

Toxic Substances Control Act

Under the Toxic Substances Control Act (TSCA) of 1976, EPA is given broad authority to ensure that "new" and "existing" chemical substances and mixtures do not present unreasonable risks to human health or the environment. The "cradle-to-grave" scope of TSCA covers manufacture (defined by the statute to include import), processing, distribution in commerce, use and disposal. Under TSCA, EPA can promulgate regulations designed to gather health, safety and exposure data on, require the testing of, and control human exposure and environmental release of chemical substances and mixtures. (Excluded from TSCA jurisdiction, are pesticides, tobacco, certain nuclear materials, firearms and ammunition, food, food additives, drugs, cosmetics and medical devices when such chemicals are used for these specific purposes.)

Implementing regulations concerning the management of new and existing chemicals that may be handled by small labs are promulgated by the EPA in 40 CFR 700 through 725. PCB regulations are contained in 40 CFR 761. Asbestos abatement requirements under TSCA are contained in 40 CFR 763, Subpart 6.

Management Issues

"New" Chemicals and "Significant New Uses"

In the late 1970s, EPA began compiling the TSCA Inventory of Chemical Substances. Any TSCA chemical substance not on the Inventory is considered a "new" chemical substance. No person may manufacture (or import) a new chemical for non-exempt commercial purposes without first giving EPA at least 90-days advance written notice in the form of a Pre-Manufacture Notice (PMN) (see 40 CFR 720, 723, and 725). A similar 90-day advance written notice is required before any "significant new use" (see 40 CFR 721).

In general, labs are not chemical manufacturers (or importers) or processors, and thus are not subject to the TSCA notification requirements. Additionally, research activities at labs that are part of a corporation that is a manufacturer (including importer) or processor may qualify for the Research and Development (R&D) exemptions from these TSCA notification requirements. The specific terms of those exemptions are found at 40 CFR 720.36 and 721.47, respectively.

However, labs must maintain records of employee allegations of adverse reactions to chemicals, must notify the EPA of any new substantial risks regarding chemicals or mixtures, and must submit certain data for some chemicals or mixes listed in Subpart B of TSCA.

Existing Chemicals

In general, small independent labs (unless they are themselves manufacturers (or importers), processors or distributors of TSCA-covered existing chemicals for commercial purposes) are typically exempt from the existing chemical reporting and recordkeeping requirements under Section 8 of TSCA.

However, labs who import TSCA-covered new and existing chemical substances must comply with the import certification requirements under Section 13 of TSCA and may be subject to “export notification requirements” if exporting TSCA chemicals.

PCB Storage and Handling

In labs, PCBs can often be found in samples, microscopy fluids, standards, electrical equipment (e.g., transformers, ballast), or hydraulic systems. Using its authority provided under TSCA, EPA implemented stringent requirements pertaining to polychlorinated biphenyls (PCBs). PCB-containing equipment and materials must be labeled, stored and disposed of in accordance with EPA's PCB management requirements in 40 CFR 761. “Facilities with more than 45 kg (99.4 lbs.) of PCBs, one or more PCB transformers or 50 or more PCB Large High or Low Voltage PCB capacitors on site, at any one time, must prepare annual records and an annual document log as described in 40 CFR 761.180.

Common PCB containing electrical equipment at labs are fluorescent light ballasts. Ballasts that were manufactured through 1979 are likely to contain PCBs. Ballasts manufactured after 1979 that do not contain PCBs are labeled “No PCBs.” If a ballast is not labeled “No PCBs,” lab personnel should assume it contains PCBs and handle it accordingly. Leaking ballasts containing PCB’s and any associated contaminated material must be handled as a “PCB waste” under 40 CFR 761.3. Non leaking ballasts containing PCBs in potting material (insulating material) are considered PCB bulk waste and must also be disposed in accordance with these regulations. Under federal regulations, intact ballasts containing PCBs only in the “small capacitor” of the ballast and not in the potting material can be disposed in a municipal landfill. However, state and tribal regulations vary; labs should check to determine what requirements apply.

PCB Waste

The EPA regulates wastes containing PCBs under 40 CFR Part 761. Many labs generate PCB wastes including liquid and solid excess samples, solvents containing PCBs (e.g., extracts) standards, disposable labware, and used personal protective equipment. Wastes containing 50 ppm of PCBs or greater are regulated under TSCA. The "anti-dilution provision" at 40 CFR 761.1(b)(5) generally prohibits the dilution of PCBs

to avoid disposal requirements. The anti-dilution provision, however, does not apply to lab generated wastes. Lab generated wastes may be disposed of at the PCB concentration found at the time of disposal, regardless of the original PCB concentration. The anti-dilution provision does, however, apply to such things as excess samples. These are not considered as lab generated waste and must be disposed of based on their original PCB concentration (40 CFR 761.64). It is important to segregate PCB waste from other lab wastes since management of PCB wastes is complex and disposal of PCB regulated waste is especially costly.

In some states, the management of PCB lab wastes is especially complex since they may be subject to both EPA's TSCA regulations and state hazardous waste regulations. PCB wastes are not regulated as a hazardous waste under the Federal RCRA regulations. PCB waste generators must be sure to comply with the following PCB management requirements:

- Generators of PCB waste who own or operate PCB storage units must submit a "Notification of PCB Activity," EPA Form 7710-53 (40 CFR 761.65(b) or (c)(7) and 761.205);
- PCB waste containers and entrances to PCB waste storage areas must be marked with a PCB warning label (40 CFR 761.40);
- PCB waste containers must be marked with the date it was determined to be waste and the decision was made to dispose of it (40 CFR 761.65(c)(8)). PCB waste containers in the lab must be marked with the date the first drop of waste enters the container. (Note: If the waste is also hazardous waste, this date will probably differ from the hazardous waste accumulation start date.);
- PCB waste containers must be inspected for leaks every 30 days (40 CFR 761.65(c)(5)); even if the containers are stored in the lab. The inspections should be documented in a logbook;
- PCB wastes must be placed in special containers as required by 40 CFR 761.65(c)(6); and
- PCB wastes must be stored in an area with a roof, walls and an impervious floor with six-inch curbing and a containment capacity equal to twice the volume of the largest PCB container or 25% of the total volume of all the PCB containers, whichever is greater (40 CFR 761.65(b)).

PCB waste must be disposed within one year from the date the waste was determined to be waste and the decision was made to dispose of it (40 CFR 761.65(a)). To be sure the disposal facility has adequate time to dispose of the wastes, all PCB wastes should be shipped off-site within nine months of generation. PCB waste shipments must be accompanied by a waste manifest.

Asbestos

Asbestos is regulated under TSCA, CAAA (40 CFR 61 Subpart M), and OSHA. TSCA regulates the abatement of asbestos from schools and other facilities. The CAAA details the reporting and recordkeeping requirements for disposal under NESHAP, and OSHA regulates protection against asbestos exposure (PPE, PEL, medical exams, etc). TSCA regulations detail requirements pertaining to the lab analysis of asbestos. TSCA requires the lab to have written quality control procedures and documents verifying this. In addition, qualified people must perform all testing and sampling and they must follow all EPA procedures. Labs that analyze bulk building material samples for OSHA regulated projects must participate in a nationally recognized proficiency testing program.

In addition to testing and managing asbestos, labs may have asbestos containing materials in pipe insulation, floor and ceiling tile, wall board and other building materials. Asbestos in poor condition can be a health hazard if it becomes airborne and is ingested. EPA has published management requirements for asbestos including procedures for demolition, renovation and disposal. Lab facility maintenance personnel should not engage in any asbestos abatement unless properly trained.

Good Laboratory Practice Standards (GLPS)

All labs must comply with TSCA Good Laboratory Practice Standards (GLPS) found in 40 CFR Part 792 when performing health effects, environmental effects, fate, analysis or monitoring studies of chemicals as required by EPA under a TSCA Section 4 Test Rule or Enforceable Consent Agreement/Order or an Order issued under TSCA Section 5. As a matter of policy, even when GLPS are not strictly required for certain TSCA Section testing, EPA prefers that any such testing complies with TSCA GLPS, and may reject non-compliant data as scientifically insufficient (40 CFR 792.1(c)).

In addition to the GLPS requirements that may apply when conducting experimentation involving new or TSCA listed chemicals research and development studies involving PCBs must be conducted in accordance with 40 CFR 761.

Pollution Prevention and TSCA

Labs should perform regular reviews of processes to determine if smaller quantities of a toxic chemical could be used or if toxic chemicals could be substituted with less toxic counterparts. In addition, when preparing a new testing protocol the labs should consider the kinds and amounts of waste generated and determine how they can be reduced or eliminated. Finally, labs must properly manage all toxic chemicals (including PCBs and asbestos) to minimize the possibility of contaminating the surroundings and other non-toxic material.

TOXIC SUBSTANCE CONTROL ACT CHECKLIST	
Action	**Notes**
1. Determine if the lab performs chemical testing required by EPA under TSCA Section 4 or 5 and if so, verify compliance with TSCA Good Laboratory Practice Standards.	
2. Determine if the lab is subject to specific chemical testing recordkeeping or reporting requirements under TSCA. Specifically, if the lab tests new chemicals verify that it maintains records of employee allegations of adverse reactions to chemicals, notifies the EPA of any new substantial risks regarding chemicals or mixtures, and submits certain data for some chemicals or mixes listed in Subpart B of TSCA.	
3. Verify that PCB containing equipment or containers are marked as required by TSCA.	
4. Determine if all PCB waste items are placed in approved containers and stored in appropriate areas.	
5. Verify that the date items were taken from service or designated as waste is placed on the article or container.	
6. Determine if all PCB containers are inspected at least every 30 days leaks and the results are annotated in a logbook.	
7. Verity that the storage area has adequate walls and roof to prevent water infiltration, the impervious floor has continuous curbing at least 6 inches high and a containment capacity equal to twice the volume of the largest PCB container or 25% of the total volume of all the PCB containers, whichever is greater	
8. Verify that the lab has an EPA ID number for handling waste.	
9. Determine if the lab notified the EPA of waste generation activities using EPA Form 7710-53	

TOXIC SUBSTANCE CONTROL ACT CHECKLIST	
Action	**Notes**
10. Verify that the lab has a manifest for each shipment of PCB waste sent off-site and the manifests were correctly and completely filled in.	
11. Determine if the lab shipped the PCB waste off-site within 9 months to an approved disposal facility.	
12. Determine if the facility uses or stores greater than 45 kg of PCBs at one time. If so, does the facility prepare an annual document IAW 40 CFR 761.180.	
13. Determine if the lab samples or tests for asbestos. Verify the lab is certified.	
14. Verify that the lab follows the testing and monitoring protocol required by TSCA.	

3.11 Pesticides

Pesticides include herbicides, insecticides, fungicides and rodenticides. Small labs may use these hazardous materials at their facilities to control pests. Small labs may also be involved in the testing of pesticide containing materials as part of its business.

Regulatory Considerations

The storage, use, and disposal of pesticides are regulated at the federal, state, tribal or local level. The primary federal legislation regarding the management of pesticides is the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA) as amended (especially by the 1972 Federal Environmental Pesticides Control Act). Under this law, the EPA is responsible for ensuring that persons who manufacture, market, formulate, distribute, use or dispose of pesticides and pesticide containers, do so in an environmentally sound manner. Implementing regulations related to pesticide management are found in 40 CFR 150-189. Waste pesticides may also be managed under the RCRA hazardous waste program (40 CFR 260-272) or the Standard for Universal Waste Management (40 CFR 273).

State, tribal or local regulations are typically more stringent than federal requirements. For example, state regulations may extend management requirements for federally designated restricted pesticides to all pesticides.

Management Issues

Management of pesticides in small labs must address proper storage, application, testing and disposal of these materials.

Pesticide Application

Certified Applicators. Off-the-shelf pesticides are not restricted. Labs may hire a contractor or have their own personnel spray the area for pests or weeds. Some pesticides have been determined to be restricted by the EPA. If the handler uses a restricted use pesticide that person must be a state-certified applicator. Check with the state, tribal or local pesticide program manager for complete details and a list of certified pesticide applicators.

OSHA Regulations

Ensure that hazard communication, respiratory protection and other personal protective equipment requirements are being met for pesticide management at your lab.

Most off-the-shelf pesticides (i.e., registered home and garden use) are not restricted. However, these products are still hazardous. Application should only be conducted in accordance with the instructions on the label.

Testing and Analysis of Pesticides

In support of pesticide registration requirements, manufacturers may require labs to conduct analysis on pesticides ranging from product chemistry and performance to environmental fate and transport. Labs testing pesticides are subject to FIFRA Good Laboratory Practice Standards (40 CFR 160) and should follow the pesticide assessment guidelines develop by the EPA to provide standards for conducting

acceptable tests, guidance on evaluation and reporting of data and examples of protocols.

Experimental Use Permits (EUPs) are required for the testing of any unregistered pesticide or a registered pesticide being tested for an unregistered use. EUPs are not required when the experimental use of a pesticide is limited to lab tests or other tests whose sole purpose is to assess the efficacy, toxicity, or other properties of a pesticide.

Pesticide Storage

Pesticides stored on-site must be managed in accordance with label directions (40 CFR 162). Specific storage requirements apply by regulation to pesticides classified as moderately or highly toxic and contain "DANGER, POISON, or WARNING" on the container.

Document pesticide storage area inspections.

- The pesticide storage areas should be in a dry, well ventilated, secured room or building, with spill containment and runoff retention systems (40 CFR 165);
- Identification and warning signs are required on the room or building, and on moveable equipment used to handle the pesticides (e.g., sprayers); and
- The pesticide containers must have visible labels, be segregated according to formulation, and be inspected regularly for corrosion and leaks.

It is a good practice to manage slightly toxic (labeled "CAUTION") and home and garden use pesticides in a similar manner even though not required by Federal law.

Pesticide Disposal

Pesticides and pesticide containers should be disposed of in accordance with 40 CFR 165 and, if appropriate, RCRA hazardous waste regulations (see Section 3.3) or the Universal Waste Rule (see Section 3.7).

Disposal requirements in 40 CFR 165 do not apply to pesticides registered as home and garden use or their containers. Home and garden registered pesticides and their containers should be wrapped individually in several layers of paper and disposed of in the trash according to label instructions.

Pollution Prevention and Pesticides

Labs should review their pesticide application operations to determine if a lower toxicity pesticide or non-pesticide option is available. All pesticides should be stored properly. Labs should purchase and use only what is needed to reduce the amount of waste generated. Empty containers for liquid pesticides should be rinsed prior to disposal and the rinse water should be added to the spray tank to be sprayed as part of the pesticide application. When pesticides are being generated as part of a lab procedure, if feasible, labs should incorporate chemical procedures into test protocols to deactivate or degrade pesticides to non-hazardous forms as the final step in the overall experiment.

PESTICIDE PROGRAM CHECKLIST	
Action	**Notes**
1. If restricted use pesticides are sprayed, verify the applicator is certified.	
2. Determine if pesticides are stored in accordance with 40 CFR 165.10: • Containers and equipment are properly labeled; • Containers are stored in a dry, well ventilated, marked, and secured room or building with spill containment and runoff retention; and • Containers are in good condition and inspected regularly.	
3. Ensure employees are trained regarding proper handling and emergency procedures (spill response) for pesticides and waste pesticides.	
4. Ensure waste pesticide containers are in good condition and free of leaks.	
5. Ensure waste pesticides, containers, and residue are managed IAW 40 CFR 165, RCRA hazardous waste regulations, or the universal waste rule.	

3.12 Drinking Water Management

Many small labs obtain their drinking water from a municipal water supply. In some cases, however, a small lab may obtain its drinking water from on-site wells. In addition, labs may adversely impact a potential drinking water supply if lab wastewater is discharged to a septic system or french drain.

Regulatory Considerations

The Safe Drinking Water Act (SWDA) establishes national drinking water standards applicable to public drinking water systems. The act specifies requirements for testing, monitoring, reporting/recordkeeping, and enforcement. In addition, the SWDA addresses ground water protection.

Public Drinking Water Systems At Labs

Generally the SDWA standards apply to municipalities operating a public drinking water system. However, a lab with an on-site drinking water system (e.g., on-site wells) may meet the EPA definition of a non-transient, non-community public drinking water system and be subject to the rigorous testing and monitoring standards required by the SDWA. In order for an on-site system to be classified as a public drinking water system, the following criteria must be met:

- The water is intended for human consumption;
- The water supply is a community supply:
  - Maintains at least 15 service connections, or
  - Regularly serves an average of 25 individuals on a daily basis for at least 60 days out of the year;
- The system has drinking water collection and treatment facilities (not entirely distribution and storage facilities); and
- The facility produces some or all of its own drinking water by modifying water procured or sells water from its system.

Underground Injection Control

The SWDA also establishes regulations governing the use and siting of underground injection wells to afford the maximum protection for aquifers that provide an underground source of drinking water (40 CFR 144-148). Underground Injection Control Programs have been delegated to authorized states.

Management Issues

Drinking Water Testing and Reporting

If the lab maintains a non-transient, non-community public drinking water system, it must sample and ensure the drinking water meets the primary drinking water standards (40 CFR 141) in accordance with EPA specified frequency. Test results must be reported to the state. The EPA developed primary standards (maximum contaminant levels (MCLs)) for inorganic compounds, organic compounds, turbidity, microbial contaminants, radium and gross alpha readings, and beta and photon readings for man-made radionuclides. In addition, the primary drinking

water standards set procedures for monitoring sodium, corrosivity, lead, and copper as well as prohibits the use of lead pipes, solder, and flux in the drinking water system.

A state certified lab is required to analyze drinking water samples. Certified labs are restricted to using certain EPA analytical methods for the different standards. A lab may request, from the state concurred to by the EPA, a waiver for an analytical method if the lab can show their test method is as precise and accurate as the standard method.

Discharges to Groundwater

Check to make sure you know how all your lab drains or other pipe discharges are routed. The underground injection of wastes except the use of septic systems for sanitary waste is generally prohibited. If allowed, the well is stringently regulated. The discharge must be permitted by the state, the lab must provide notification, receive an identification number, comply with the applicable recordkeeping and reporting requirements for manifested waste, provide discrepancy reports, keep an operating record, prepare annual reports for the state, train personnel, and when the well is abandoned the owner/operator must receive a certification of closure.

DRINKING WATER PROGRAM CHECKLIST	
Action	**Notes**
1. If the lab maintains a public drinking water system, verify that the lab tests the system for MCLs and SMCLs and reports the results to the state.	
2. Determine if the lab is certified by the state to perform drinking water sampling.	
3. Verify that the lab is using EPA approved analytical methods for testing. If not, verify that the lab has, in writing, permission from the state and EPA to use an alternate analytical method.	
4. If the lab maintains an underground injection well, ensure that the lab: • Determined the class; • Permitted the well; and • Has records of manifests, discrepancy reports, an operating record, annual reports, and personnel training.	
5. Verify that the lab has a certificate of closure for all abandoned underground injection wells it operated.	

3.13 Underground Storage Tanks

Labs may have underground storage tanks (USTs) for the storage of fuel oil or other types of petroleum products, chemicals, or hazardous waste. Leaking USTs may cause fires or explosions and they can contaminate groundwater. To mitigate these potential problems, the EPA has established stringent equipment, monitoring and recordkeeping and closure requirements for these tanks.

Regulatory Considerations

The 1984 amendments to RCRA included provisions to prevent leaks from USTs, mandating a comprehensive regulatory program for USTs that store petroleum, petroleum byproducts (i.e., gasoline or diesel fuel) or substances defined as hazardous under CERCLA Section 101. EPA regulations for USTs are contained in 40 CFR 280. These regulations contain requirements for tank design, construction and installation, general operation, release detection, release reporting and corrective action and closure.

Definition and Applicability

The EPA defines a UST as any tank, including the underground piping associated with the tank, that has at least 10 percent of its volume underground. The provisions in the UST regulations apply to tanks storing petroleum or certain hazardous chemicals. UST regulations do not apply to hazardous waste storage tanks, tanks storing heating oil used on the premises, septic tanks, tanks for collecting storm water and waste water, flow-through process tanks, tanks holding less than 110 gallons, and emergency spill and overfill tanks.

> Rule of Thumb
>
> If you cannot see the bottom of the tank it likely meets the definition of a UST.

State, Tribal and Local Regulations

The EPA has delegated the management of USTs to authorized state and tribal regulatory authorities. In addition, many local fire departments have promulgated ordinances covering USTs. Requirements small labs need to check with these agencies to determine specific requirements that apply.

Management Issues

USTs must meet the following installation and equipment requirements:

UST Installation

Proper Installation. Certify the tank and piping is installed according to manufacturers specifications (all USTs installed after December 1988).

Overfill/Spill Protection. Ensure overfill/spill protection by following proper filling procedures, monitoring transfer operations, and use catchment basins or automatic shut-off.

Corrosion Protection. Ensure the tank and piping is equipped with corrosions protection devises (cathodic protection, use fiberglass tanks & piping, etc.).

Leak Detection System. Provide a leak detection system that will detect a release from any part of the tank or associated piping, meets

performance standards, and is installed, calibrated and operated in accordance with manufacturers specifications. EPA approved methods of release detection for tanks are inventory control, manual tank gauging, tank tightness testing, automatic tank gauging, vapor monitoring, ground water monitoring, interstitial monitoring, and other approved methods.

USTs that store regulated chemicals must meet additional requirements. The tanks must have secondary containment (double walled tanks and pipes, vaults, or linings), and interstitial monitoring (monitoring system to detect leaks between the two walls).

Tank Monitoring

Both the tanks and piping systems must be monitored on a regular basis to ensure no product enters the environment and that systems are functioning properly (i.e., cathodic protection systems must be tested within 6 months of installation and at least every 3 years thereafter). In addition owners and operators of USTs must establish a method for release detection that can detect a release from any part of the tank or the associated piping. Tanks, as a rule, must be monitored at least every 30 days and associated piping must be equipped with an automatic line leak detector and must be monitored monthly or have annual line tightness tests.

Some methods must be used in conjunction with others see 40 CFR 280.43 for details.

Reporting and Recordkeeping

Reports must be sent to the regulatory agency when an UST is installed (notification form), when a release is suspected, confirmation of a release along with follow-up actions (corrective action plan), and a notification of change-in-service or a permanent closure. 40 CFR 280.34 also requires the following records be maintained: a corrosion experts analysis of corrosion potential if corrosion protection is not used, documentation of operation of corrosion protection equipment and of UST system repairs, compliance with release detection requirements and results of the site investigation conducted at permanent closure.

Recordkeeping time varies. Check with your state or tribal regulatory agency.

UST Closure

A UST can be temporarily closed, permanently closed or undergo a change-in-service (CIS). Operation and maintenance of corrosion protection and release detection must continue during temporary closure. In addition, if the UST is temporarily closed for three months or more the operator must also cap and secure all lines and pumps but leave the vent lines open. The operator must notify the regulatory authority 30 days prior to permanent closure of a UST or a CIS. The operator must test for releases and contamination around the tank before permanent closure or CIS and submit a corrective action plan. Finally, the operator must completely empty and clean the tank followed by removal or filling of the tank with an inert substance such as sand or pea gravel. The facility must maintain closure records for at least three years after permanent closure or CIS.

Keep all closure records on-site for 3 years or mail them to the regulating authority.

UNDERGROUND STORAGE TANK PROGRAM CHECKLIST	
Action	**Notes**
1. Confirm USTs are regulated by 40 CFR 280 and not exempt.	
2. Verify whether all regulated USTs and associated piping meet technical standards for overfill/spill protection, corrosion protection devices, and leak detection.	
3. Ensure hazardous chemical tanks are double walled with interstitial monitoring.	
4. Verify that a qualified professional conducts required monitoring on all regulated USTs in accordance with regulatory requirements.	
5. Confirm notification forms were filed for all USTs.	
6. Ensure all suspected and confirmed releases were reported to the state in the required time.	
7. Determine whether spill corrective action plans were sent to the regulatory authority for approval.	
8. Document that all required records are maintained to demonstrate compliance with UST regulations (i.e., leak detection, corrosion protection, etc.)	
9. Determine if there are permanently or temporarily closed USTs on site. If closed USTs are on site, verify that: • The state was notified at least 30 days in advance of the closure; • A site investigation was completed; • The UST was completely drained and cleaned; • The UST was removed or filled with an inert substance; and • Records are available for closures within the past three years. For temporary closure, ensure that all monitoring continues. If closed for over 3 months then all lines, except vents, are capped.	

3.14 Hazardous Materials Handling and Storage

Even chemicals that are generally considered to be benign have potential to be hazardous under specific circumstances. Lab staff should ensure that stock chemicals and other hazardous materials are stored properly in order to prevent spills, uncontrolled reactions and minimize worker exposures. Labs are particularly challenged because of the number and variety of chemicals that are handled.

Regulatory Considerations

EPA regulation of hazardous chemicals is limited. Most regulation of these materials is by OSHA. These regulations address:

- Storage and handling of flammable liquids (29 CFR 1910.106);
- Storage of compressed gases (29 CFR 1910). This standard incorporates by reference, Compressed Gas Association Pamphlets C-6 1968 and C-8 1962; and
- Communicating chemical hazards to employees under the Laboratory Standard (29 CFR 1910.1450) and the Hazard Communication Standard (29 CFR 1910.1200).

Most state, tribal or local jurisdictions address hazardous material storage through the use of building codes which can incorporate BOCA Codes (Building Officials and Code Administrator), NFPA Codes (e.g., NFPA 10, 30, 45 and 101), and UBC (Uniform Building Code).

In addition to OSHA and building code requirements, hazardous material requirements are also promulgated by the DOT (49 CFR 171-179 and 14 CFR 103).

Management Issues

In order to effectively manage chemicals, small labs should establish a program based on the following three principals:

- ***Minimize Exposures***. Take the necessary precautions when working with and storing chemicals. As a means of minimizing the potential for exposure, pursue opportunities for product substitution.
- ***Do Not Underestimate Risks***. Ensure that the risk associated with each chemical is assessed, understood and communicated. It is prudent to assume all chemicals are hazardous and handle them accordingly.
- ***Use Proper Control Measures***. Eliminate the hazard through engineering controls, personal protective equipment, and administrative procedures. Ensure that all staff are properly trained in accordance with regulatory requirements (e.g., Laboratory Standard) so that they can operate safety at their job.

The following are key management issues for the storage and handling of hazardous materials including hazardous chemicals, flammable liquids, and compressed gases. Regulations regarding the proper storage of hazardous materials are complex. The information provided below is not comprehensive. Small lab managers should review OSHA and other requirements and guidelines described above to ensure that all requirements are being meet and that hazardous materials are being managed in accordance with prudent practices.

The Chemical Hygiene and Hazard Communication Plan

29 CFR 1910.1450 and 1910.1200 establish requirements for the communication of chemical hazards to employees in the workplace. The programs include a number of common elements. These are:

- Establishment of *documented* programs. For labs subject to the Lab Standard, this is in the form of a Chemical Hygiene Plan (CHP);
- Preparation and periodic update of an inventory of all hazardous chemicals;
- Labeling of all containers of hazardous chemicals (including materials transferred from the manufacturer's container to end user container such as spray bottles);
- The availability of Material Safety Data Sheets (MSDS's) for workers on all shifts and in all locations;
- Employee chemical hazard training and documentation; and
- Processes to review and update the program on a periodic basis.

The Lab Standard also requires that a Chemical Hygiene Officer (CHO) be designated by the lab to implement and maintain the program.

The Chemical Inventory

A chemical inventory should be prepared and maintained. The inventory is important in complying with OSHA requirements such as the Lab Standard and EPA requirements such as those under EPCRA (see Emergency Planning and Community Right-To-Know, Section 3.9). The inventory can also be helpful in conserving space, saving economic resources, and promoting P2 (see Hazardous Wastes, Section 3.3). Inventories should include chemical names, storage locations, quantities, and hazard information. Individual inventories should be maintained in each lab and storage area with a roll-up inventory maintained by the CHO or other appropriate environmental staff.

Chemical Storage in the Lab

Centralized chemical storage is recommended. Chemical storage inside labs should be limited to those chemicals and quantities necessary to complete task requirements. Key consideration for lab storage and handling include:

- Chemicals should not be stored on floors or benches since they could be knocked over. Storage on open shelves should be avoided. When necessary, lips or restraining devices should be used. Do not store chemicals in the lab above eye level;
- Chemicals should be segregated according to chemical classes and compatibility first. Then they can be stored by a convenient finding method such as alphabetically. For example, acids should be kept separate from bases, oxidizers from organics, and cyanides from acids. Physical separation should be provided for reactive chemicals. Use secondary containers in storage areas if available space does not allow incompatible materials to be properly separated;

- Properly store flammable and combustible materials in accordance with NFPA 45 and NFPA 30 (see further descriptions below);

- When possible, segregate toxic chemicals from other chemicals and store in closed cabinets. Label the cabinets “TOXIC CHEMICALS" or with a similar warning;
- Maintain chemicals per manufacturer requirements;
- Ensure containers are labeled in accordance with the OSHA Laboratory Standard;
- Make sure containers are closed when not in use;
- Use secondary containment such as acid carriers when transporting liquid chemicals more than a very short distance; and
- Central chemical storage areas (e.g., rooms) require specific design and equipment such as construction materials, lighting, ventilation, fire extinguishers, and housekeeping procedures such as aisle space.

Flammable and Combustible Liquids

Additional requirements apply to those chemicals that are classified as flammable or combustible liquids. These materials must be stored in accordance with NFPA 45 in labs and NFPA 30 in other locations.

- Regardless of experimental or production requirements and even when NFPA allows higher quantities, prudent practice is that the quantity of these materials in a *lab room* not exceed a total of 60 gallons or one months supply (for all such chemicals combined);
- Flammable and combustible liquids should be stored in glass, metal or plastic containers that meet NFPA requirements. More than 10 gallons of flammable and combustible liquids should be stored in a flammables cabinet or specially designed room. Prudent practice is to store these materials in a flammables cabinet when ever possible;
- Storage in flammable cabinets must not exceed design quantities (e.g., 60 gallons). Cabinets should be properly vented if there is the potential for the buildup of hazardous vapors; and
- Refrigerators and freezers used to store flammable liquids should be explosion proof or “lab safe” in accordance with NFPA 45.

Highly Reactive Chemicals

Labs that use highly reactive chemicals should take measures to ensure that these substances are handled properly. Due to the volatile and explosive nature of this class of chemicals, it warrants special attention. The following guidelines should be followed when using and storing highly reactive substances:

- Consider the storage requirements of each highly reactive chemical prior to purchase and make sure that staff are trained to store it safely;
- Obtain and review the Material Safety Data Sheet or other chemical safety information to ensure that staff are aware of the hazards and storage requirements;
- Purchase small quantities of the chemical that staff will need for the short term. Try not to exceed a three-month supply;
- Label, date, and inventory all highly reactive materials as soon as they are received. If staff must transfer the chemical from its original container into another container, make sure it is labeled with the name of the chemical, and the words "DANGER! HIGHLY REACTIVE

MATERIAL." For water reactive chemicals include the warning "DO NOT USE WATER TO EXTINGUISH FIRE." Note: OSHA may require special labels disclosing all hazards on repackaged containers;

- Do not open a container of highly reactive material that is past its expiration date;
- Do not open a liquid organic peroxide or peroxide former (e.g., picric acid) if crystals or a precipitate are present;
- Segregate the following highly reactive materials:
  - Oxidizing agents from reducing agents and combustibles,
  - Powerful reducing agents from readily reducible substrates, and
  - Acids from reducing agents;
- Store highly reactive liquids in trays large enough to hold the contents of the bottles;
- Store peroxidizable materials away from heat and light;
- Do not use metal spatulas to handle peroxides because contamination by metals can lead to explosive decomposition. Use ceramic, Teflon, or wooden spatulas;
- Avoid friction, grinding, and all forms of impact near peroxides, especially solid peroxides and diazomethane solution (used in methylation of some pesticides). Glass containers that have screw-cap lids or glass stoppers should not be used. Instead, use polyethylene bottles with screw-cap lids;
- Store materials that react vigorously with water away from possible contact with water;
- Store thermally unstable materials in a refrigerator. Use a refrigerator with these safety features:
  - Alarm to warn when temperature is too high,
  - Spark-proof controls on the outside, and
  - Magnetic locked door;
- Store liquid organic peroxides at the lowest possible temperature consistent with the solubility or freezing point. Liquid peroxides are particularly sensitive during phase changes;
- Inspect and test peroxide-forming chemicals periodically; and
- Store containers in cabinets that are designed to hold that type of waste.

Compressed Gases

Compressed gas cylinder storage should meet the requirements in the Compressed Gas Association Pamphlets C-6 1968 and C-8 1962.

- Properly label the cylinders with their contents; store upright and away from heat sources;
- Cylinders should be chained to the wall or otherwise secured from falling;
- Do not store cylinders so as to block exits, obstruct aisles, or otherwise interfere with egress; and
- Cylinders should be separated based on their contents. Incompatible materials (e.g., oxygen and propane, chlorine and helium) should be segregated. In addition, full, partially full and empty cylinders should

be labeled as to their status and separated.

Pollution Prevention and Hazardous Materials Storage

P2 and waste minimization for hazardous chemicals starts with the substitution of less hazardous substances (see Hazardous Wastes, Section 3.3). Sometimes this is difficult in a lab environment where researchers may be unwilling to change because they are concerned about the performance of the substitute in their experimentation. This can often be overcome through a team effort involving the CHO, environmental staff, purchasing staff and the researcher. In this setting, limitations and concerns can be clearly articulated and more easily addressed. Other opportunities include:

- Maintaining an accurate inventory that can be shared throughout the facility. Using this inventory, chemicals can be shared and expiration dates can be tracked;
- Purchasing of only the smallest amounts needed. Often, the additional cost associated with the smaller or custom purchase is less than the cost of expired or unused chemical disposal;

Merrimack College in Massachusetts documented savings of $2,000 per 20-student section per year. The National Microscale Center at Merrimack provides training and other information on microscaling at http://www.silvertech.com/microscale/index.html.

- Establish a centralized purchasing program to ensure full utilization of chemical products;
- Order reagent chemicals only in amounts needed;
- Maintain a limited inventory of chemicals on hand so those chemicals do not expire or deteriorate and necessitate disposal;
- Scale down experiments or procedures. Over the last decade, microscale chemistry has come to be considered a proven technology. It can reduce the quantity of chemical reagents used by a factor of 100 to 1000. Lab safety can be improved due to the reduction in exposure to organic vapors, for example, and spill preparedness is easier. Less chemical storage space is needed and chemical inventory management requires less labor. Cost reductions also result even if per-unit reagent costs increase due to purchasing smaller containers, the annual dollar savings on total purchases usually offsets this. Reduce or eliminate the use of highly toxic chemicals in lab experiments;

Sometimes an alternative may at first appear too costly until potential cost savings are fully considered. Researchers at the National Oceanic and Atmospheric Administration's (NOAA) Alaska Fisheries Science Center identified an alternative method for evaluating oil contaminated sediment and marine life tissue samples which would greatly reduce solvent use, but initially was considered too costly to implement. Once the potential cost savings were estimated and a relatively short payback time was determined, approval was granted for purchasing the necessary equipment. The total savings is about $3,000 per 100 hydrocarbon samples resulting in annual savings of $6,000 - $12,000.

- Increase the use of instruments that require less reagent or smaller or fewer samples;
- Use less solvent to rinse equipment;
- Review the use of highly toxic, carcinogenic, reactive, or mutagenic materials to determine if safer alternatives are feasible; and
- If feasible, consider using computer simulation or modeling to replace wet chemistry.

HAZARDOUS MATERIALS HANDLING AND STORAGE	
Action	**Notes**
1. Verify that the lab established a documented program to communicate chemical hazards to employees (HAZCOM or CHP depending on type of lab).	
2. Ensure that the lab has a designated Chemical Hygiene Officer.	
3. Determine if the lab prepares and maintains an inventory of all hazardous chemicals used in the lab. Ensure the inventory includes: • Chemical name; • Storage location; • Quantity; and • Hazard information.	
4. Verify that all containers containing hazardous chemicals are properly labeled (including materials transferred from the manufacturer's container).	
5. Verify that MSDSs are readily available for all hazardous chemicals used and stored in the lab.	
6. Determine if all employees received chemical hazard training and that the training is documented. Training must occur when an employee is new or when the employee starts a new task they are not normally required to carry out.	
7. Ensure the lab has a review process in place to update the written hazard communication program (HAZCOM or CHP).	
8. Verify that the hazardous materials storage area(s) is managed in compliance with regulatory requirements: • Storage areas are appropriately designed and constructed; • Storage areas are clean and unobstructed; • Emergency response equipment is available, in good working condition, and regularly inspected (e.g., fire extinguishers and alarm systems); and • Materials are stored in a manner that will not promote releases to the environment or create a fire, safety, or health hazard.	

HAZARDOUS MATERIALS HANDLING AND STORAGE	
Action	**Notes**
9. Ensure flammable and combustible liquids are stored in accordance with NFPA regulations (e.g., in flame proof and explosion proof cabinets, no more than 60 gallons in one flammable cabinet).	
10. Verify lab personnel handle highly reactive chemicals in a safe manner according to lab procedures.	
11. For stored compressed gas cylinders, verify that the cylinders are: • Secured upright and protected against tipping and falling; • Protected against damage from surrounding equipment and materials; and • Separated based on content (e.g., oxygen and propane).	

3.15 SUSTAINABLE PRACTICES

Environmentally responsible management at labs should not end with programs to mange waste and ensure chemical, biological and radiation safety. Opportunities also exist in facility design and operation to conserve energy and water, and the affirmative purchase of other environmental preferable products. These programs can result in real cost savings in waste generation, energy consumption, and resource use. They can also improve the comfort and productivity of its employees and provide overall benefit to the environment.

Labs are high-energy users per square foot. This is expected due to the requirements for lighting, ventilation and equipment use. There are many opportunities to improve energy efficiency without compromising worker safety. Labs also have opportunities to reduce water consumption. These water conservation measures can translate to bottom line cost savings from water bills and/or reduced energy costs for pumping.

Labs are often also intensive users of chemicals, cleaning supplies, and disposables such as paper products. The purchase of environmentally preferable products may have safety and environmental benefits and can also save money in reduced waste disposal costs.

Management Issues

Implementing a Program. In order to conserve energy and water or implement a green purchasing program, labs should:

- Use a systems approach;
- Gain employee involvement;
- Use best available energy efficient, water conserving equipment and green products and operational practices; and
- Consider the *life cycle cost* of actions.

What Is a Green Product

Environmental preferability is a function of various factors. These include the following:

- Performance and durability;
- Toxicity and biodegradability;
- Packaging and transport cost;
- Recyclability and recycled content;
- Life cycle energy and natural resource use.

Systems Approach

Installing a new highly efficient but oversized air conditioning unit without having taken lower cost actions to reduce the heat load first or buying a lab glassware cleaner that is less polluting but requires double washing are examples of well intentioned energy efficiency and green procurement projects that may not pay off.

The key to good energy and water conservation or green purchasing program is a systems approach:

- ***Conduct a baseline assessment***. Conduct a baseline energy/water audit to identify current equipment, use and associated costs. There are tools available to help conduct a simple audit from the EPA Energy Star program and from DOE. A more complete audit may require a qualified professional. Similarly, assess current practices and product purchases to determine a green procurement baseline from which to develop program.

- ***Develop a Strategic Plan.*** Like with most environmental management programs, it helps to establish goals and objectives and a thoughtful strategy on how to accomplish these objectives. This strategy should cost effectively address: (1) what is to be done; (2) when it should be done; (3) who is responsible; and (4) how it will be financed.
- ***Identify Opportunities.*** Considerations must be taken when selecting energy/water efficient and green products to make sure they are the most environmentally preferred for labs. These considerations include:
  - Multiple Attributes: Make sure one environmental attribute is not offset by a more serious impact. Some projects can have secondary effects (e.g., an energy conservation project to switch to energy efficient lighting can reduce the heat load, requiring less air conditioning. A cleaning product that is more biodegradable may have a significant amount of product packaging that must be disposed).
  - Life Cycle Perspective: Use life cycle and other economic analyses to properly assess the total cost of proposed changes (equipment and operational). Make sure to look at environmental impacts over the entire life of the product (manufacturing, use, and disposal).
  - Magnitudes of Impact: When purchasing green products consider the scale and reversibility of the products environmental impact.
  - Local Conditions: Make sure the equipment or product will work based on your lab location and your intended use.
  - Equipment/Product Attribute Claims: Make sure the equipment/product claims are true. Obtain third party certifications and references.

Remember, energy efficiency measures and green procurement should not be taken if they result in poor performance or compromise the comfort of employees.

- ***Implement the Plan.*** Structure product specifications, requests for proposal, other purchasing tools and selection processes to give preference to green products and services. Be willing to use new companies, wait a little longer to get the product, and search a little more for the right vendor. Reviewing contractor proposals prevents product and service surprises.
- ***Monitor Performance.*** Regularly monitor the program to ensure the anticipated benefits are achieved; make adjustments if necessary.

Keep It Simple

To start, consider the no and low cost options first.

Employee Involvement

Labs should strive to involve employees in energy and water management and green procurement by forming energy/water management teams or a green procurement team to educate and motivate employees. Offer incentives for the best energy/water saving and green procurement ideas; report to employees how much energy/water/waste disposal costs were decreased through their efforts; and reward them based on the

reductions.

Opportunities

Opportunities to purchase green products exist in almost all products used in labs. Many of these opportunities have been described as P2 options in previous sections of this guide. Some opportunities are provided below. Opportunities for energy and water efficiency are highlighted in the tables following the Small Lab Sustainable Practices Checklist.

SMALL LAB SUSTAINABLE PRACTICES CHECKLIST	
Action	**Notes**
1. Verify that the lab established multi-discipline management teams to develop and implement strategies for these programs.	
2. Ensure that the lab has conducted baseline audits/assessment of current equipment and practices related to these activities.	
3. Determine if realistic goals and objectives have been established for each of these programs.	
4. Verify that opportunities for improvements in equipment and practices to meet the goals and objectives have been identified and consider multiple attribute characteristics, life cycle cost, local conditions and product performance claims have been in these analyzes.	
5. Determine if implementation plans have been developed and acted upon. These include procedural changes to ensure preferences are considered in the procurement process as well as programs for employee education and involvement.	
6. Verify that performance is monitored and adjustments are made based on this feedback.	

Opportunities for Green Purchasing at Small Laboratories
Paper Products: Printing and writing paper, paper towels, bench coat, and tissue paper with recycled content.
Lab Instruments and Supplies: Equipment (and procedures) which uses less sample, less and/or less hazardous reagents, chemicals which are less hazardous and/or can be treated using in-house processes to reduce or eliminate hazards and/or facilitate disposal (see Air Emissions, Section 3.1, and Little Known But Allowable Ways to Manage Hazardous Waste, Section 5.0 for more information)
Office Equipment: Properly sized and Energy Star equipment; two side copy machines; plain paper (recyclable) fax machines; remanufactured toner and ink cartridges, binders, and desk accessories with recycled content.
Maintenance Equipment and Supplies: CFC/HCFC free air conditioning and refrigeration equipment, rerefined oil, nontoxic antifreeze (non ethylene glycol) citrus or other less toxic cleaners and solvents; landscaping water hose and edging, trash containers, with recycled content, recycled content or biobased trash bags.
Building Supplies: Recovered building materials (lumber, brick, steel), floor tile, shower and restroom dividers, carpet, and fiberglass building insulation and other materials with recycled content.

Opportunities for Energy and Water Conservation at Small Laboratories

Lighting:

- Replace incandescent bulbs with high efficiency fluorescent units; remove unneeded lamps.
- Install occupancy sensors.
- Install more energy efficient ballasts when replacing failed units.
- Increase natural lighting by installing skylights and painting walls lighter colors and use fully modulated lighting that ramps up only as natural lighting decreases.
- Consider switching to high intensity discharge (HID) lights in outdoor locations.
- Encourage personnel to shut off lights.

Heating and Cooling Equipment:

- Ensure is properly sized and maintained regularly.
- Upgrade equipment using more energy and water efficient systems.
- Recover condensate water from chilled water coils and HVAC units And the recovery of heat back into HVAC systems. Consider air rather than evaporative water cooling towers for HVAC units.
- Use programmable/automatic thermostats to adjust temperatures during off-work hours.
- Use drapes, shades, and awnings to reduce heat loading through windows.
- Consider alternative energy sources such as photovoltaics. (NOTE: Also include that Variable-air-volume (VAV) fume hoods can reduce lab energy use by up to 50 percent; also that limited air flow containment devices can reduce ventilation requirements (e.g., local exhaust snorkels at lab benches).

Water Supply Systems:

- Ensure that equipment is properly sized and installed as close to the point of use as possible.
- Use programmable thermostats to control water temperature during off-work hours.
- Insulate hot and chilled water systems and pipes to maintain temperature.
- Immediately repair water system leaks.
- Ensure that glassware is washed only with a full load.
- Use low flow toilets.
- Install more efficient horizontal axis cloths washers for laundry facilities. NOTE: Lab water-cooling devices can also be upgraded to reduce water consumption.

Building Envelope and Siting:

- Use reflective colors for the exterior roof and walls.
- Provide wall shading through the use of overhangs and shades.
- Install energy efficient windows, doors and insulation and doors to reduce heat loss and loads.
- Verify that doors and windows are closed when AC and heating equipment is operating.
- When designing or choosing new facilities, consider building orientation and its impact on energy consumption.
- Use landscaping to shade and as a windbreak. Use zeriscape landscaping.
- Irrigate landscape after dark; use drip irrigation to reduce evaporative loss. NOTE: Sustainable building materials for remodeling and new construction can also be used (e.g., recycled steel, recycled gypsum, “certified wood” from renewable forests, “green leasing” carpeting vs. purchasing new, etc.)

4.0 RELIABLE RESOURCES

Of the numerous sources of information on environmental management, the following list provides information most relevant to small lab environmental programs. Included are reference materials, organizations, World Wide Web (www) site addresses, toll-free hotlines, governmental resource centers, EPA Regional Offices, and state Small Business Assistance Programs. In addition, lab staff should consult with the relevant state, tribal or local agencies for specific questions regarding air emissions and hazardous waste management, and contact the local POTW for information regarding wastewater discharge issues.

Publications

Topic	**Source**
Comprehensive Lab EHS Coverage	**Laboratory Safety & Environmental Management (LS&EM).** A newsletter published by PRIZIM Inc. covering the full spectrum of lab environmental, health, and safety issues. 316 E. Diamond Avenue, Suite 201, Gaithersburg, MD 20877, (301) 840-9316, www.PRIZIM-Inc.com.
Environmental Management Systems	**Environmental Management Systems: An Implementation Guide for Small and Medium- Sized Organizations**. EPA 832-B-96-007, November 1996.
	Practical Guide to Environmental Management at Small Businesses. EPA Small Business Division (in progress).
Chemical Safety	**Prudent Practices in the Lab: Handling and Disposal of Chemicals**. National Research Council, National Academy Press, Washington, DC. 1995.
	Chemical Safety in the Laboratory. Stephen K. Hall, CRC Press-Lewis Publishers, Inc. 1994.
Pollution Prevention	**P2 and Waste Minimization in Laboratories**. P. A. Reinhardt, K. Leigh Leonard, and P. C. Ashbrook, CRC Press, Inc. 1996.
General Safety	**CRC Handbook of Laboratory Safety**. A. Keith Furr, Ph.D. (Ed.). CRC Press. Fifth edition published 2000.
Waste Management	**Hazardous Laboratory Chemicals Disposal Guide**. M. Armour, 2nd Edition, CRC Press, Inc. 1996.

Waste Management (contd.)

Step-by-Step Guide to Better Laboratory Management Practices. Publication No. 97-431, Washington State Department of Ecology, Hazardous Waste and Toxics Reduction Program. July 1997. Department of Ecology, Publications Distribution Center, P.O. Box 47600, Olympia, WA 98504-7600.

Laboratory Waste Management - A Guidebook. American Chemical Society, Washington, DC. 1994.

Understanding the Small Quantity Generator Hazardous Waste Rules – A Handbook for Small Business. EPA/530-K-95-001.

Private Organizations

American Chemical Society, 1155 16th Street, NW, Washington, DC 20036, (202) 872-4600, www.ACS.org.
Offers journals, training, and information on lab waste.

National Fire Protection Association, 1 Batterymarch Park, P.O. Box 9101, Quincy, MA 02269-9101, (617) 770-3000, www.NFPA.org.
Develops and offers standards on flammable chemical storage in labs.

National Pollution Prevention Roundtable, 2000 P Street, NW, Suite 708, Washington, DC 20036, (202) 466-7272, www.p2.org.
Offers participation in a small business roundtable to provide information concerning innovative ways to improve compliance and efficiency through pollution prevention. This organization also hosts four listserves that can be accessed through the web site.

PRIZIM Inc., 316 E. Diamond Avenue, Suite 201, Gaithersburg, MD 20877, (301) 840-9316, www.PRIZIM-Inc.com. *Sponsors national and regional meetings and training titled, "Laboratory Safety & Environmental Management (LS&EM)," publishes the LS&EM newsletter, and offers environmental, health, and safety management consulting services for all organizations with labs.*

American Biological Safety Association, 1202 Allanson Rd., Mundelein, IL 60060, (847) 949-1517, www.absa.org.
A professional association of biosafety experts and interested parties.

ASTM, 100 Barr Harbor Drive, West Conshohocken, PA 19428-2959, (610) 832-9740, www.astm.org.
Offers standards on lab practices and environmental management.

Government Resource Centers

U.S. EPA Small Business Ombudsman Clearinghouse/Hotline, 401 M Street, SW, Washington, DC 20460, 1-800-368-5888.
Helps private citizens and small businesses with questions on all program aspects within EPA.

EPA National Center for Environmental Publications and Information,

1-800-490-9198.
Provides access and information about EPA publications.

U.S. Department of Health and Human Services, Public Health Service, Centers for Disease Control and Prevention, National Institute for Occupational Health and Safety (NIOSH), 1-800-356-4674, www.cdc.gov/niosh/homepage.html.
Provides information about occupational safety and health issues.

American Indian Environmental Office, www.epa.gov/indian.
Provides information on programs, laws, regulations, grants and tribal contacts.

U.S. Environmental Protection Agency (U.S. EPA) Clean Air Technology Center (CATC), U.S. EPA, Research Triangle Park, NC 27711, (919) 541-0800, www.epa.gov/ttn/catc.
Serves as a resource on all areas of emerging and existing air pollution prevention and control technologies.

U.S. EPA Pollution Prevention Information Clearinghouse, 401 M Street, SW, Washington, DC 20460, (202) 260-1023, E-mail: PPIC@epamail.epa.gov.
Provides a library and electronic bulletin board dedicated to information on pollution prevention.

U.S. Nuclear Regulatory Commission, One White Flint North, 11555 Rockville Pike, Rockville, MD 20852-2738, (301) 415-7000, www.nrc.gov/.
Provides information on regulations addressing radioactive materials.

Internet Sites

U.S. Environmental Protection Agency: www.epa.gov.

U.S. Environmental Protection Agency Small Business Ombudsman: www.epa.gov/sbo/. Also see the Small Business Environmental Home Page: www.smallbiz-enviroweb.org/. In addition, see the U.S. EPA Small Business Gateway: www.epa.gov/smallbusiness/.

U.S. Environmental Protection Agency Green Chemistry Program; www.epa.gov/greenchemistry.
Provides information on green chemistry conferences and other sources.

U. S. Department of Labor, Occupational Safety and Health Administration (OSHA): www.osha-slc.gov.
Provides information on occupational safety and health issues.

U. S. Department of Health and Human Services, Public Health Service, Centers for Disease Control and Prevention (CDC), National Institute for

Occupational Safety and Health (NIOSH):
www.cdc.gov/niosh/homepage.html.

Listserves

These listserves can be helpful for solving unique problems. All have lab-oriented participants.

SAFETY list. A general discussion of environmental, health, and safety. Contact Ralph Stuart at the University of Vermont (email: rstuart@esf.uvm.edu) for information on how to subscribe.

LAB-XL. A discussion of performance oriented environmental regulation of labs. Contact Ralph Stuart at the University of Vermont (email: rstuart@esf.uvm.edu) for information on how to subscribe.

Hotlines

EPA Small Business Ombudsman Hotline: 1-800-368-5888
Provides environmental management assistance information to small businesses, including labs.

EPA RCRA Hotline: 1-800-424-9346; (703) 412-9810
Provides information related to hazardous waste regulations and Resource Conservation and Recovery Act (RCRA), Superfund-related matters.

TSCA Hotline: (202) 554-1404
Provides information concerning the Toxic Substances Control Act (TSCA)-related regulations and policies.

CHEMTREC: 1-800-262-8200
The Chemical Transportation Emergency Center provides technical information related to chemical exposure, spills, leaks, and fires, including Material Safety Data Sheets (MSDS).

Department of Transportation: 1-800-467-4922
Provides information on matters related to the U.S. Department of Transportation (DOT) hazardous materials transportation regulations.

National Response Center: 1-800-424-8802
For reporting spills of hazardous substances.

OSHA: 1-800-321-6742
Provides information regarding matters related to the Occupational Health and Safety Administration (OSHA) programs and standards.

EPA Hotline List: www.epa.gov/epahome/hotline.htm.
Provides a comprehensive list of all EPA sponsored hotlines.

U.S. EPA Regional Offices

Addresses, phone numbers, and web sites for all EPA regional offices are located on the EPA homepage at www.epa.gov/epahome/locate2.htm. The web site offers a map of the United States by region to assist in the regional office location.

State Small Business Assistance Programs

Small Business Ombudsman (SBO) and Small Business Assistance Program (SBAP) offices are located in each state. These are an excellent and free source of environmental management assistance. These sources are also familiar with local environmental requirements. A current listing of all SBO and SBAP contacts by state is located at www.epa.gov/tnn/sbap/offices.html.

5.0 LITTLE KNOWN BUT ALLOWABLE WAYS TO MANAGE HAZARDOUS WASTE

Hazardous waste management and off-site disposal can be challenging and expensive for small labs. However, not all hazardous waste must be shipped off site for treatment or disposal. The EPA has identified a number of allowable ways that small labs can minimize their hazardous waste on site. This section provides specific information on five of these methods. Of these five, one is on-site disposal through the domestic sewage exclusion and the remaining four are on-site treatment methods.

EPA has delegated authority to each state to implement and enforce major portions of the hazardous waste management program. Some state requirements relative to these hazardous waste minimization methods may be more stringent than the Federal requirement. Not all the EPA allowed method of hazardous waste minimization may be allowed at your lab. This section is a state-by-state review of the allowable ways to minimize hazardous waste. It provides summary information for each state including their definition of hazardous waste, allowances for each of the EPA waste minimization methods, and information on special state hazardous waste management program considerations.

It should be noted, state requirements do not apply to small labs located in Indian Country because states do not have jurisdiction in these areas. In these situations, the appropriate Tribal government, rather than the state, should be contacted to ensure that their regulations are not more stringent than those of the EPA.

If after reviewing the information contained in this section, it looks like any of the five waste minimization methods could be effective at your lab, you should conduct further research at both the Federal and state level to confirm their allowance and understand the specific operational requirements. Information on whom to call and where to get further information at each state is provided in the State-by-State subsection. Small labs should remember that the waste minimization methods described in this Guide should only be conducted as part of a comprehensive hazardous waste management program that addresses all regulatory requirements.

EPA mandates that generators attempt to minimize the volume and toxicity of their waste. EPA prefers that generators eliminate waste generation through source reduction – source reduction is synonymous with pollution prevention (P2) and includes any activity that reduces or eliminates the generation of hazardous waste at the source. EPA specifies that when source reduction is not feasible, when possible, waste should be recycled or treated to reduce the volume and toxicity of the waste. From a practical perspective, there are substantial incentives for source reduction and waste minimization; for example, avoiding the high costs of disposing of hazardous waste and limiting liability concerns.

Small labs should look for source reduction opportunities (e.g., through careful chemical purchasing and inventory control, substitution of hazardous chemicals with less hazardous replacements). Many such opportunities are presented in Sections 2 and 3 of this Guide. In addition, generators can sometimes treat their hazardous waste to reduce the volume or

toxicity of the waste without the burdensome process of becoming a RCRA Treatment Storage or Disposal Facility (TSDF).

On-Site Disposal

There is an allowance that provides for certain wastes to be disposed of down the drain, even if they may be hazardous. In writing its RCRA regulations, EPA wanted to avoid double regulation of wastewaters that are subject to the Clean Water Act. Specifically, wastes that are mixed with domestic sewage and discharged to a publicly-owned treatment works (POTW) are not regulated under RCRA (see 40 CFR 261.4(a)(1)). This exclusion is commonly called the "domestic sewage exclusion" (DSE). Essentially, a small lab tied to a POTW may discharge waste down the drain as long as it is in compliance with all applicable wastewater standards. Applicable wastewater standards typically include national pretreatment standards (40 CFR 403.5), state limits and discharge limits imposed by the POTW. In some cases, wastes that meet the RCRA definition of hazardous may be acceptable for sewer disposal. Be aware that hazardous waste stored prior to discharge is regulated and dilution of waste in order to meet discharge limits is usually not allowable.

On-Site Treatment

EPA and many states provide several regulatory exclusions that allow generators to treat of hazardous waste without a permit. Some of these treatment exclusions may be useful in furthering waste reduction efforts. Treating hazardous waste on-site in ways other than provided for in the regulatory exclusions subjects generators to extremely high fines (e.g., up to $50,000 per day) and possible criminal penalties (i.e., jail time). Before treating hazardous waste on site, generators must be absolutely sure that the treatment they are considering is allowed without a RCRA permit. In addition, generators must ensure that they have proper procedures, equipment and skilled employees to conduct treatment safely and effectively on-site.

EPA's exclusions that allow generators to treat hazardous waste on-site without a permit are described below.

☑ Elementary Neutralization

EPA and most state authorities clearly allow elementary neutralization (i.e., pH adjustment) of hazardous wastes. Elementary neutralization units (as defined in 40 CFR 260.10) may be used to neutralize D002 (corrosive) wastes without any worry of RCRA permitting requirements. Two important points to remember are (1) elementary neutralization only refers to pH adjustment, and (2) neutralized waste should only be discharged down the drain if it meets all applicable discharge standards (i.e., Local, state and EPA limits).

☑ Recycling	EPA allows generators to recycle hazardous wastes without a TSDF permit. In its regulations, EPA states that a material is "recycled" if it is used, reused or reclaimed (40 CFR 261.1). A material is "used or reused" if it is either (1) employed as an ingredient to make a product, or (2) employed in a particular function as an effective substitute for a commercial product. A material is "reclaimed" if it is processed to recover a useful product or if it is regenerated. Although EPA considers recycling a form of treatment, it does not require recyclers to obtain a treatment permit. In 40 CFR 261.6(c)(1), EPA states that "the recycling process is exempt from regulation." Generators may be able to take advantage of this exemption by distilling solvents, reclaiming precious metals (e.g., Silver) from solutions, or precipitating metal salts.
☑ Treatment in Accumulation Containers	Generators may treat hazardous wastes in accumulation containers without obtaining a RCRA treatment permit provided the containers are managed in compliance with EPAs container management standards in 40 CFR part 265, subpart I. EPA clearly states this exemption in its federal register notice issued march 24, 1986 (51 FR 10168) as well as in subsequent FR notices and interpretive memos. Examples of treatment in accumulation containers include precipitating heavy metals from solutions, and oxidation/reduction reactions. Remember, treatment residues may still require management as a hazardous waste and, residues destined for land disposal are subject to land disposal restriction (LDR) treatment standards (40 CFR 268).
☑ Small Boilers and Industrial Furnaces	The “small-quantity on-site burner exemption" (40 CFR 266.108), which is part of the Boiler and Industrial Furnace (BIF) regulations, allows hazardous waste generators (small or large quantity) to burn small quantities of hazardous waste in an on-site boiler without a permit. The quantity of waste that can be burned on-site is determined by the "terrain-adjusted stack height" as described in the regulation and the

boiler's total fuel requirement. Some additional restrictions apply to the properties of waste that can be burned (i.e., Btu value) and small labs taking advantage of this allowance are subject to simple notification and recordkeeping requirements. Before burning hazardous waste on site, consult not only with the state regulators: both the hazardous waste agency and the air pollution control agency.

A ☒ symbol adjacent to specific regulatory allowances in the state tables means that the allowance is not available, or available only with special conditions.

Contacting Your State

Contact with state regulators is essential since, in every state except Alaska, Iowa, and Hawaii (as of this writing), EPA has delegated authority to each state to implement and enforce major portions of the hazardous waste management programs. In order to receive authorization from EPA, a state's hazardous waste management regulations must be at least as stringent as EPAs hazardous waste regulations. Still, one must keep up with the EPA regulations since EPA regularly publishes new hazardous waste management regulations that are enforceable by EPA until they are included in a given state's hazardous waste regulations. The state authorization process is ongoing and can be difficult to track. Generators need to check with their states to understand what portions of the hazardous waste programs are operated and enforced by state authorities and what portions EPA enforces. In most cases, state hazardous waste regulations are available in the Internet. In some cases, however, the state must be contracted directly to obtain the regulations.

State Information

Information on individual state hazardous waste programs is provided on the following pages.

Alabama

Hazardous Waste Program Description

Definition of "Hazardous Waste": Same as federal (see 335-14-2).

Hazardous Waste Generator Status: Same as federal (see 335-14-2 and 335-14-3).

Regulatory Allowances for On-Site Waste Minimization

☑ Domestic Sewage Exclusion	See 335-14-2-.01(4)(a)(1).
☑ Elementary Neutralization	See 335-14-8-.01(1)(c)(2)(v).
☑ Recycling	See 335-14-2-.01(6)(a).
☒ Treatment in Accumulation Containers	Not allowed except limited allowances for evaporation (per verbal interpretation and 335-14-8-.01(c)(2)(viii), respectively).
☑ Small Boilers and Industrial Furnaces	See 335-14-7-.08, similar to 40 CFR 266, Subpart H).

Special Considerations

- ADEM requires that generators follow a "pre-approval process" before sending hazardous waste off-site (see 14-3-.08).

AL Department of Environmental Management
Hazardous Waste Branch
1400 Coliseum Blvd.
P.O. Box 301463
Montgomery, AL 36110
Phone: 334/271-7735
http://www.adem.state.al.us.

AL's hazardous waste regulations, Division 14, Alabama Administrative Code, are available for a fee from ADEM's Legal Department (334/270-5606) or, can be accessed for free on the Internet, check out http://www.adem.state.al.us/rdiv14.html.

Alaska

Alaska has not received authorization from US EPA to operate its hazardous waste program in lieu of the federal program. EPA's hazardous waste program is enforced by EPA's Region X office which is located in Seattle, WA. To contact EPA's Region X office, call 800/424-4372 from within Alaska only, or 206/553-1200.

Hazardous Waste Program Description

Definition of "Hazardous Waste": Alaska adds to the federal RCRA hazardous waste definition wastes with acute aquatic toxicity (96-hour LC50) of less than 500 mg/l (18 AAC 62.020).

Hazardous Waste Generator Status: Same as federal.

Regulatory Allowances for On-Site Waste Minimization

☑ Domestic Sewage Exclusion	Incorporates 40 CFR 261 by reference (see 18 AAC 62.020).
☑ Elementary Neutralization	Incorporates 40 CFR 270 by reference (see 18 AAC 62.710).
☑ Recycling	Incorporates 40 CFR 261 by reference (see 18 AAC 62.020).
☑ Treatment in Accumulation Containers	Follows EPA interpretation.
☑ Small Boilers and Industrial Furnaces	Incorporates 40 CFR 266 by reference (see 18 AAC 62.511).

Special Considerations

- Generators must send a copy of each hazardous waste manifest to ADEC, which is postmarked before the waste is sent off site (18 AAC 62.230).

AK Department of Environmental Conservation
Compliance Assistance Office
Hazardous Waste Section
555 Cordova Street
Anchorage, AK 99501
Phone: 907/269-7591 or 800/510-2332 (AK only)
http://www.state.ak.us/local/akpages/ENV.CONSERV/home.htm

AK's hazardous waste regulations, Chapter 62 of the Alaska Administrative Code, Title 18, are available for free by calling ADEC or can be accessed for free on the Internet at www.state.ak.us/local/akpages/ENV.CONSERV/title18/title18.htm

Arizona

Hazardous Waste Program Description

Definition of "Hazardous Waste": Same as federal. ADEQ incorporates 40 CFR 261 by reference (R18-8-261).

Hazardous Waste Generator Status: Same as federal. ADEQ has placed additional requirements upon CESQGs (R18-8-261.H.)

Regulatory Allowances for On-Site Waste Minimization

☑ Domestic Sewage Exclusion	Incorporates 40 CFR 261 by reference (R18-8-261).
☑ Elementary Neutralization	Incorporates 40 CFR 270 by reference (R18-8-270).
☑ Recycling	Incorporates 40 CFR 261 by reference (R18-8-261).
☑ Treatment in Accumulation Containers	Follows EPA interpretation.
☑ Small Boilers and Industrial Furnaces	Incorporates 40 CFR 266 by reference (see R18-8-266).

Special Considerations

- Hazardous waste must register annually with ADEQ and submit a registration fee (R18-8-260M.). Upon request of ADEQ, CESQGs may be required to submit reports.

AZ Department of Environmental Quality
Hazardous Waste Inspections and Compliance Unit
3033 N. Central Ave.
Pheonix, AZ 85012
Phone: 602/207-4108
http://www.adeq.state.az.us/waste/hazwaste/index.htm

AZ's hazardous waste regulations, Chapter 8 of Title 18 of the Arizona Administrative Code, are available for a fee from AZ Secretary of the State, 602/542-4086, or an "unofficial" copy can be accessed for free on the Internet from http://www.sosaz.com/public_services/Title_18/18-08.pdf.

Arkansas

Hazardous Waste Program Description

Definition of "Hazardous Waste": Same as federal, except Arkansas regulates PCBs as hazardous wastes.

Hazardous Waste Generator Status: Same as federal.

Regulatory Allowances for On-Site Waste Minimization

☑ Domestic Sewage Exclusion	Incorporates 40 CFR 261 (see Reg. 23 § 261).
☑ Elementary Neutralization	Incorporates 40 CFR 270 (see Reg. 23 § 270) .
☑ Recycling	Incorporates 40 CFR 261(see Reg. 23 § 261).
☒ Treatment in Accumulation Containers	Follows EPA interpretation.
☑ Small Boilers and Industrial Furnaces	Incorporates 40 CFR 266 (see Reg. 23 § 266).

Special Considerations

- Generators must submit annual rather than biennial reports (Reg. 23 § 262.41) and Arkansas subjects SQGs (100 and 1000 kg per month) to annual reporting requirements. Arkansas does exempt generators from manifesting requirements when tolling arrangements have been made (Reg. 23 § 262.13(g)). Reg. 23 § 262.24 contains additional requirements for generators regarding sending a return copy of each manifest to ADEQ and submitting manifest weight discrepancies.

AR Department of Environmental Quality
Hazardous Waste Division
8001 National Drive
Little Rock, AR 72219-8913
Phone: (501) 682-0833
http://www.adeq.state.ar.us/hazwaste/main.htm

AR's hazardous waste regulations are in ADEQ's Regulation No. 23. The regulations are largely a reprint of 40 CFR; language added by ADEQ is in italics. Regulation No. 23 is available for $15 from ADEQ's Public Affairs Office, 501/682-0916, or can be accessed for free on the Internet at http://www.adeq.state.ar.us/regs/reg23.htm.

California

Hazardous Waste Program Description

Definition of "Hazardous Waste": Similar to federal but adds extremely hazardous waste, special waste and non-RCRA hazardous waste (66261.110, 66260.120, and 662661.101, respectively).

Hazardous Waste Generator Status: CA recognizes LQGs, SQGs and CESQGs. SQG requirements pertain to generators of less than 1,000 kg/month of hazardous waste (22 CCR 66262). Provisions for CESQGs are specified in the HSC (Section 25218).

Regulatory Allowances for On-Site Waste Minimization

☑ Domestic Sewage Exclusion	Recognizes 261.4 *only* for wastes that do not exhibit a characteristic (66261.4(b)(2)).
☑ Elementary Neutralization	See HSC 25200.3 and permit-by-rule requirements (67450.11).
☑ Recycling	See 66261.6 and HSC 25143.2(c).
☑ Treatment in Accumulation Containers	See 22 CCR 66450.11 and HSC 25123.5, 25200.3 and 25201.5. Subject to limitations.
☑ Small Boilers and Industrial Furnaces	See 66266.108. Local air pollution control district regulations may apply.

Special Considerations

- Hazardous waste in satellite accumulation is subject to a one-year accumulation time limit (66262.43(e)(1)).
- Authorized household hazardous waste collection facilities may accept CESQG waste (HSC 25218.3).
- Special provisions for biotech firms, including an allowance for on-site treatment, are included in the Medical Waste Management Act.

CA Department of Toxic Substance Control (DTSC)
Hazardous Waste Management Program
P.O. Box 806
Sacramento, CA 95812-0806
Phone: 916/324-1781 or 800/61-TOXIC (CA only)
http://www.dtsc.ca.gov/

CA hazardous waste regulations are in Title 22 of the California Code of Regulations (22 CCR). Certain hazardous waste requirements are only cited in the Health and Safety Code (HSC). 22 CCR and HSC are available from the DTSC website. Hardcopies of the CCR and HSC are available for a fee from Barclays Law Publishers; 800-888-3600.

Colorado

Hazardous Waste Program Description

Definition of "Hazardous Waste": Same as federal with addition of certain chemical weapons agents to the P-list (see 1007-3 Part 261).

Hazardous Waste Generator Status: Same as federal (see 1007-3 Part 262).

Regulatory Allowances for On-Site Waste Minimization

☑ Domestic Sewage Exclusion	See 1007-3, Part 261.4(a)(1).
☑ Elementary Neutralization	See 1007-3, Part 100.10(a)(6).
☑ Recycling	See 1007-3, Part 261.6(c)(1).
☑ Treatment in Accumulation Containers	Allowed with conditions, see 1007-3, Part 100.10(a)(1), also CDPHE's "Treatment of Hazardous Waste by Generators Guidance Document."
☒ Small Boilers and Industrial Furnaces	CO has not yet adopted 40 CFR 266, Subpart H so EPA's BIF rule is in effect. CO has special requirements for "Solid Waste-to-Energy Incineration Facilities," which may apply.

Special Considerations

Satellite accumulation provisions are more stringent for LQGs; see 1007-3 Part 262.34(c). Satellite accumulation provisions for SQGs are spelled out in 1007-3 Part 262.34(g).

CO Department of Public Health and the Environment
Hazardous Materials and Waste Management Division
4300 Cherry Creek Drive South
Denver, CO 80246
Phone: 303/692-3322 or 888/569-1831 (CO only)
http://www.cdphe.state.co.us/environ.asp

CO's Hazardous Materials & Waste Management Division (HMWMD) regulations are in Title 6 of the CO Code of Regulations (CCR) Section 1007-3, Parts 100 and 260 to 270. The regulations are available from the Hazardous Waste Commission, 303/692-3467, for $40, or, an unofficial copy can be accessed for free on the Internet, check out http://www.cdphe.state.co.us/regulate.asp.

Connecticut

Hazardous Waste Program Description

Definition of "Hazardous Waste": Incorporates 40 CFR 261 by reference with a few changes (see 22a-449(c)-101). Under a separate program, CT regulates certain non-RCRA wastes or "CT-regulated" wastes such as oil, antifreeze, PCBs (>50 ppm), and asbestos.

Hazardous Waste Generator Status: CT largely incorporates EPA's generator requirements by reference; however, CT imposes more restrictive requirements upon SQGs and CESQGs (see 22a-449(c)-102 and 101(b)). For example, SQGs can accumulate only 1000 kg of hazardous waste on site at any time.

Regulatory Allowances for On-Site Waste Minimization

☑ Domestic Sewage Exclusion	Incorporates 40 CFR 261 by reference (see 22a-449(c)-101(a)).
☑ Elementary Neutralization	Incorporates 40 CFR 270 by reference (see 22a-449(c)-110).
☒ Recycling	Subject to registration and reporting requirements and other requirements imposed on a case-by case basis (see 22a-449(c)-101(c)).
☑ Treatment in Accumulation Containers	Allowed (see CT DEP memo dated 10/3/91).
☑ Small Boilers and Industrial Furnaces	Incorporates 40 CFR 266.108 by reference (see 22a-449(c)-106(a)).

Special Considerations

- Hazardous waste containers at satellite accumulation areas must be marked with the words "Hazardous Waste" (see 22a-449(c)-102(a)(2)(E)).

CT Department of Environmental Protection
Bureau of Waste Management
79 Elm St.
Hartford, CT
Phone: 888/424-4193
http://dep.state.ct.us/

For a free copy of the CT Hazardous Waste Management Regulations (22a-449(c)-100 through 110 and 22a-449(c)-11) call the Compliance Assistance Program at 888/424-4193. Relevant sections of the CT General Statutes can be accessed for free on the Internet at http://www.cslib.org/statutes/title22a/t22a-p9.htm#I1.

Delaware

Hazardous Waste Program Description

Definition of "Hazardous Waste": Same as federal.

Hazardous Waste Generator Status: Same as federal.

Regulatory Allowances for On-Site Waste Minimization

☑ Domestic Sewage Exclusion	DE regulations mirror 40 CFR 261.4(a)(1).
☑ Elementary Neutralization	Allowed under DE regulations (264.1 (g) and 265.1(c)).
☒ Recycling	Not allowed (261.6(c)(1) is different in DE regulations).
☑ Treatment in Accumulation Containers	Follows EPA interpretation.
☑ Small Boilers and Industrial Furnaces	DE regulations mirror 266.108.

Special Considerations

- For CESQGs, hazardous waste disposal regulations are more stringent then federal regulations.

DE Department of Natural Resources and Environmental Control
Air and Waste Management Division
Solid and Hazardous Waste Branch
89 Kings Hwy.
Dover, DE 19901
302/739-3689
http://www.dnrec.state.de.us/

The "DE Regulations Governing Hazardous Waste" closely resemble EPA's RCRA regulations and are available from the Hazardous Waste Branch for $45. The regulations are not presently available through the Internet.

District of Columbia

Hazardous Waste Program Description

Definition of "Hazardous Waste": Similar to federal (20 DCMR 41).

Hazardous Waste Generator Status: DC refers to generators of <100 kg/month as SQGs. DC SQGs are subject to requirements more stringent than federal CESQG requirements. All other DC generators are considered LQGs.

Regulatory Allowances for On-Site Waste Minimization

☑ Domestic Sewage Exclusion	See DCMR 4100.15.
☑ Elementary Neutralization	See DCMR 4600.8(d).
☑ Recycling	See DCMR 4100.33.
☑ Treatment in Accumulation Containers	See DCMR 4600.8(a).
☒ Small Boilers and Industrial Furnaces	DC has not yet adopted 40 CFR 266, Subpart H, so EPA's BIF rule is in effect. However, DC air regulations mandate permitting for hazardous waste combustion.

Special Considerations

- DC has no provisions for satellite accumulation areas.
- DC SQGs are subject to an accumulation quantity limit of 600 kg of hazardous waste and an accumulation time limit of 180 days (DCMR 4100.24).

DC Department of Health
Environmental Health Administration
Hazardous Waste Division
51 N St., NE
Washington, DC 20002
Phone: 202/535-2288
http://www.ci.washington.dc.us/index.html

DC hazardous waste management regulations are in Title 20 of the District of Columbia Municipal Regulations (20 DCMR), Chapters 40 through 54. Regulations can be purchased from the DC Office of Documents: 20 DCMR Chapters 40 to 70 is a single volume and sells for $20. Orders must be prepaid. The regulations are not presently available through the Internet.

Florida

Hazardous Waste Program Description

Definition of "Hazardous Waste": Same as federal. Incorporates 40 CFR 261 by reference (see FAC 62-730.030).

Hazardous Waste Generator Status: Same as federal. Incorporates 40 CFR 262 by reference (see FAC 62-730-160).

Regulatory Allowances for On-Site Waste Minimization

☑ Domestic Sewage Exclusion	Adopts 40 CFR 261 by reference (see FAC 62-730.030).
☑ Elementary Neutralization	Adopts 40 CFR 270.1(c) by reference (see FAC 62-730.220).
☑ Recycling	Adopts 40 CFR 261 by reference (see FAC 62-730.030).
☑ Treatment in Accumulation Containers	Follows EPA interpretation.
☑ Small Boilers and Industrial Furnaces	Adopts 40 CFR 266 by reference (see FAC 62-730.181).

Special Considerations

- Florida does not adopt 40 CFR 262.34(e), which allows generators to accumulate hazardous waste on-site for up to 270 days if they must transport their waste more than 200 miles to an off-site TSDF. Therefore, SQGs must not accumulate hazardous waste on site for more than 180 days.

FL Department of Environmental Protection (DEP)
Division of Waste Management
2600 Blair Stone Rd.
Twin Towers, MS-4555
Tallahassee, FL 32399-2400
Phone: 850/488-0300
http://www.dep.state.fl.us/dwm/bureaus/bshw.htm

FL's Hazardous Waste Management Regulations are in the Florida Administrative Code (FAC), Rule 62-730, and are available for free from the Hazardous Waste Regulation Section, 850/921-9258. The regulations can be accessed for free on the Internet at http://www.dep.state.fl.us/dwm/rules/numeric.htm.

Georgia

Hazardous Waste Program Description

Definition of "Hazardous Waste": Same as federal. Incorporates 40 CFR 261 by reference (see 391-3-11-.07).

Hazardous Waste Generator Status: Same as federal. Incorporates 40 CFR 262 by reference (see 391-3-11-.08).

Regulatory Allowances for On-Site Waste Minimization

☑ Domestic Sewage Exclusion	Incorporates 40 CFR 261 by reference (see 391-3-11-.07)
☑ Elementary Neutralization	Incorporates 40 CFR 270.1(c) by reference (see 391-3-11-.11(1)(a))
☑ Recycling	Incorporates 40 CFR 261 by reference (see 391-3-11-.07)
☑ Treatment in Accumulation Containers	Follows EPA interpretation.
☑ Small Boilers and Industrial Furnaces	Incorporates 40 CFR 266 by reference (see 391-3-11-.10(3)).

Special Considerations

None.

GA Department of Natural Resources
Environmental Protection Division (EPD)
Hazardous Waste Management Branch
205 Butler St., SE
Suite 1154, East Tower
Atlanta, GA 30334
Phone: 404/656-7802
http://www.ganet.org/dnr/environ/

For a free copy of GA's Hazardous Waste Management Regulations (Chapter 391-3-11), call the Hazardous Waste Management Branch. For an unofficial copy, go to EPD's website and click on "EPD Rules."

Hawaii

Although Hawaii has not received authorization from US EPA to operate its hazardous waste program in lieu of the federal program, it is expected to receive authorization in early 2000. Until then, EPA's hazardous waste program is enforced by EPA's Region IX office in San Francisco, CA (415/744-2074). The information below is based on Hawaii's regulations and interpretations.

Hazardous Waste Program Description

Definition of "Hazardous Waste": Same as federal with additional provisions with respect to geothermal wastes (see HAR 11-261).

Hazardous Waste Generator Status: Same as federal (see HAR 11-261.5 and 11-262.34).

Regulatory Allowances for On-Site Waste Minimization

☑ Domestic Sewage Exclusion	See HAR 11-261.4.
☑ Elementary Neutralization	See HAR 11-270.1(c)(2)(v)
☑ Recycling	See HAR 11-261.6(c)(1)
☑ Treatment in Accumulation Containers	Follows EPA interpretation.
☑ Small Boilers and Industrial Furnaces	See HAR 11-266.180

Special Considerations

None.

HI Department of Health (DEH)
Environmental Management Division
Solid and Hazardous Waste Branch
Hazardous Waste Section
919 Ala Moana Blvd., Room 212
Honolulu, HI 96814
Phone: 808/586-4226
http://www.hawaii.gov/health/eh/index.html

If you prepay postage, the Hazardous Waste Section will send you a copy of the "Hawaii Hazardous Waste Rules and Regulations," Chapter 11, Hawaii Administrative Code (HAR). Only the 1999 amendments to the hazardous waste regulations can be accessed for free on the Internet at http://www.hawaii.gov/health/eh/shwb/hw/index.html. A full version of the regulations is not available on the Internet.

Idaho

Hazardous Waste Program Description

Definition of "Hazardous Waste": Same as federal.

Hazardous Waste Generator Status: Same as federal.

Regulatory Allowances for On-Site Waste Minimization

☑ Domestic Sewage Exclusion	IDAPA 16.01.05.005 adopts 40 CFR 261 by reference.
☑ Elementary Neutralization	IDAPA 16.01.05.012 adopts 40 CFR 270 by reference.
☑ Recycling	IDAPA 16.01.05.005 adopts 40 CFR 261 by reference.
☑ Treatment in Accumulation Containers	Follows EPA interpretation.
☑ Small Boilers and Industrial Furnaces	IDAPA 16.01.05.010 adopts 40 CFR 266 by reference.

Special Considerations

- In the event of a fire, explosion or other release that may threaten human health or outside the facility or may reach surface water, generators must not only notify the National Response Center (NRC; per 262.34(d)(5)(iv)(C)), but also the Idaho Communications Center (see 16.01.05.006).

ID Division of Environmental Quality
Hazardous Waste Branch
1410 N. Hilton St.
Boise, ID 83706
Phone: 208/373-0502
http://www.state.id.us/deq/haz/waste1.htm

The "Rules and Standards for Hazardous Waste" can be obtained from the Hazardous Waste Branch for $5 or the rules can be accessed for free on the Internet at http://www.state.id.us/adm/adminrules/rules/idapa16/16index.htm.

Illinois

Hazardous Waste Program Description

Definition of "Hazardous Waste": Same as federal (35 Ill. Adm. Code 721).

Hazardous Waste Generator Status: Same as federal (35 Ill. Adm. Code 721 and 722).

Regulatory Allowances for On-Site Waste Minimization

☑ Domestic Sewage Exclusion	See 35 Ill. Adm. Code 721.104.
☑ Elementary Neutralization	See 35 Ill. Adm. Code 703.123.
☑ Recycling	See 35 Ill. Adm. Code 721.106.
☑ Treatment in Accumulation Containers	Follows EPA interpretation.
☑ Small Boilers and Industrial Furnaces	See 35 Ill. Adm. Code 726.208.

Special Considerations

None.

IL Environmental Protection Agency (IL EPA)
Bureau of Land
1021 North Grand Ave. East
P.O. 19276
Springfield, IL 62794-9276
Phone: 217/524-5024
http://www.epa.state.il.us/

IL's hazardous waste regulations are in Title 35 of the Illinois Administrative Code. For a free copy, call IL EPA Bureau of Land (217/524-3300) or check out their website at http://www.ipcb.state.il.us/title35/35conten.htm#g.

Indiana

Hazardous Waste Program Description

Definition of "Hazardous Waste": Same as federal with the addition of certain chemical munitions wastes (329 IAC 3.1-6-1 through 3).

Hazardous Waste Generator Status: Same as federal (329 IAC 3.1–7-1 incorporates 40 CFR 262 by reference).

Regulatory Allowances for On-Site Waste Minimization

☑ Domestic Sewage Exclusion	Incorporates 40 CFR 261 by reference (329 IAC 3.1-6-1).
☑ Elementary Neutralization	Incorporates 40 CFR 270 by reference (329 IAC 3.1-13-1).
☑ Recycling	Incorporates 40 CFR 261 by reference (329 IAC 3.1-6-1).
☑ Treatment in Accumulation Containers	Follows EPA interpretation.
☑ Small Boilers and Industrial Furnaces	Incorporates 40 CFR 266 by reference (329 IAC 3.1-11-1).

Special Considerations

- LQGs must pay an annual $100 fee to IDEM (329 IAC 3.1-1-14).
- Generators that ship hazardous waste off-site to a TSDF are subject to biennial reporting requirements (329 IAC 3.1-7-14).
- All spills or releases of hazardous waste must be reported immediately to IDEM's Office of Environmental Response (329 IAC 3.1-8-3).
- IDEM regulates PCB wastes under separate regulatory program (PCB Management; 329 IAC 4).

IN Department of Environmental Management (IDEM)
Office of Land Quality
100 N. Senate Ave.
P.O. Box 6015
Indianapolis, IN 46206-6015
Phone: 317/308-3103
http://www.state.in.us/idem/index.html
IN's hazardous waste regulations are in Article 3.1 within Title 329 of the Indiana Administrative Code (329 IAC 3.1). The regulations can be purchased from the IN Legislative Services Agency (317/232-9557) or accessed for free on the Internet at http://www.state.in.us/idem/olq/regulations_and_laws/swrules.html.

Iowa

Iowa has not received authorization from US EPA to operate its hazardous waste program in lieu of the federal program. EPA's hazardous waste program is enforced by EPA's Region VII office which is located in Kansas City, KS. To contact EPA's Region VII office regarding Iowa hazardous waste issues, call 913/551-7633.

Hazardous Waste Program Description

Definition of "Hazardous Waste": Follows federal program (see 40 CFR 261).

Hazardous Waste Generator Status: Follows federal program (see 40 CFR 261.5 and 262).

Regulatory Allowances for On-Site Waste Minimization

☑ Domestic Sewage Exclusion	See 40 CFR 261.4.
☑ Elementary Neutralization	See 40 CFR 270.1.
☑ Recycling	See 40 CFR 261.6.
☑ Treatment in Accumulation Containers	Follows EPA interpretation.
☑ Small Boilers and Industrial Furnaces	See 40 CFR 266.180.

Special Considerations

None.

IA Department of Natural Resources
Solid Waste Section
Henry Wallace State Office Building
502 E. 9th St.
Des Moines, IA 50319-0034
Phone: 515/281-4968
http://www.state.ia.us/government/dnr/organiza/epd/index.htm
Iowa has not promulgated hazardous waste regulations.

Kansas

Hazardous Waste Program Description

Definition of "Hazardous Waste": Same as federal (incorporates 40 CFR 261 by reference in 28-31-3).

Hazardous Waste Generator Status: Kansas defines three types of generators: EPA Generators (generate ≥ 1000 kg/month), Kansas Generators (≥ 25 kg/month and < 1000 kg/month) and SQGs (< 25 kg/month). See note below; but, for exact definitions, see 28-31-2(c-e).

Regulatory Allowances for On-Site Waste Minimization

☑ Domestic Sewage Exclusion	Incorporates 40 CFR 261 by reference (28-31-3).
☑ Elementary Neutralization	Incorporates 40 CFR 270 by reference (28-31-1).
☑ Recycling	Incorporates 40 CFR 261 by reference (28-31-3).
☑ Treatment in Accumulation Containers	Follows EPA interpretation.
☑ Small Boilers and Industrial Furnaces	Incorporates 40 CFR 266, Subpart H, by reference (28-31-8b).

Special Considerations

- In Kansas, generators of 25 kg to <1000 kg of hazardous waste per month are subject to regulations that are very similar to EPA's SQG regulations. Generators of < 25 kg of hazardous waste per month are subject to regulations like the EPA's CESQG regulations.
- Kansas's satellite accumulation area requirements mandate that waste be marked "Hazardous Waste."

KS Department of Health and Environment
Bureau of Waste Management
Forbes Field, Building 740
Topeka, Kansas 66620-0001
(785) 296-1600, FAX (785) 296-1592
http://www.kdhe.state.ks.us/waste/

KS's Hazardous Waste Management Standards and Regulations are in Title 28 of the KS Administrative Regulations (KAR), Article 31 (cited as 28-13). For a free copy, call KDHE or, an unofficial copy can be accessed for free on the Internet, check out http://www.kdhe.state.ks.us/pdf/regs/28-31.pdf.

Kentucky

Hazardous Waste Program Description

Definition of "Hazardous Waste": Same as federal with the addition of certain chemical nerve and blister agents (401 KAR 31).

Hazardous Waste Generator Status: Same as federal (401 KAR 31 and 32).

Regulatory Allowances for On-Site Waste Minimization

☑ Domestic Sewage Exclusion	See 401 KAR 31:010, Section 4(1)(a).
☑ Elementary Neutralization	See 401 KAR 38:010, Section 1(2)(b)(5): provides for permit by rule if pretreatment standards are met.
☑ Recycling	See 401 KAR 31:010, Section 6(3)(a).
☑ Treatment in Accumulation Containers	See 401 KAR 32:030, Section 6: allows on-site treatment by generators if certain conditions (e.g., notification to the Department) are met.
☑ Small Boilers and Industrial Furnaces	See 401 KAR 36:020, Section 6.

Special Considerations

- LQGs and SQGs who treat hazardous waste on site, must pay a $300 annual fee to the Department (401 KAR 39:110).

KY Department for Environmental Protection (KY DEP)
Division of Waste Management
14 Reilly Road
Frankfort, KY 40601
Phone: 502/564-6716
http://www.nr.state.ky.us/nrepc/dep/waste/dwmhome.htm

KY's hazardous waste regulations are in Chapters 31 to 39 within Title 401 of the Kentucky Administrative Regulations (401 KAR 31-39). The regulations can be purchased from KY DEP or the KY Legislative Research Commission (502/564-8100, x312) or can be accessed for free on the Internet at http://www.nr.state.ky.us/nrepc/dep/waste/regs/regeffect.htm#HW.

Louisiana

Hazardous Waste Program Description

Definition of "Hazardous Waste": Similar to federal (see LAC 33:V. Chapter 49).

Hazardous Waste Generator Status: LA's SQG generates less than an average of 100 kg hazardous waste per month and accumulates no more than 1000 kg on site (see LAC 33:V. Chapter 39). All other generators are subject to LQG requirements (see LAC 33:V. Chapter 11).

Regulatory Allowances for On-Site Waste Minimization

☑ Domestic Sewage Exclusion	See LAC 33:V.105D.1(a).
☑ Elementary Neutralization	See LAC 33:V.305C.6.
☒ Recycling	DEQ performs case-by-case review to determine if LAC 33:V. Chapter 41 applies (see LAC 33:V.105L).
☑ Treatment in Accumulation Containers	Follows EPA interpretation and LAC 33:V. 2245E.
☑ Small Boilers and Industrial Furnaces	See LAC 33:V.3017.

Special Considerations

- LA has no provisions for CESQGs.
- SQG regulations have no provisions for satellite accumulation; however, accumulation requirements are minimal (see LAC 33:V. Chapter 39).
- Generators are subject to initial registration and annual fees (see LAC 33:V. Chapter 51).

LA Department of Environmental Quality (DEQ)
Office of Environmental Services
7290 Bluebonnet Dr.
Baton Rouge, LA 70810
Phone: 225/765-0219
http://www.deq.state.la.us/

LA's hazardous waste regulations are in Part V of Title 33 of the Louisiana Administrative Code (LAC 33:V). The regulations can be purchased from DEQ's Legal Division, 225/765-0236, or can be accessed for free on the Internet at http://www.deq.state.la.us/planning/regs/title33/index.htm.

Maine

Hazardous Waste Program Description

Definition of "Hazardous Waste": Similar to federal but adds PCB wastes (see Chapter 850).

Hazardous Waste Generator Status: ME has provisions for SQGs (generate < 100 kg/month and accumulate no more than 600 kg hazardous waste and 1 kg acutely hazardous waste) in Ch. 850 Section 3A(5). Generator requirements are more stringent than federal; see Chapters 850 and 851.

Regulatory Allowances for On-Site Waste Minimization

☒ Domestic Sewage Exclusion	Applies only to "non-segregable wastes" (Ch. 850, Sect. 3A4).
☑ Elementary Neutralization	Subject to conditions (Ch. 856, Sect. 6I and 11A). Sect. 6G allows laboratories to neutralize corrosive wastes (only D002) in quantities less than 0.5 liter in the laboratory without a permit.
☒ Recycling	See Ch 850, Section 3A(6). Abbreviated permit requirements apply (Ch 856, Sect. 11A4).
☒ Treatment in Accumulation Containers	Abbreviated permit requirements apply to treatment in accumulation tanks (Ch 856, Sect. 11A11).
☒ Small Boilers and Industrial Furnaces	Abbreviated permit requirements apply to some thermal treatment (Ch 856, Sect. 11A6).

Special Considerations

- Satellite accumulation provisions are more stringent than federal and include a requirement for daily inspection (Ch. 851, Sect. 8C).

ME Department of Environmental Protection (DEP)
Bureau of Remediation and Waste Management
State House, Station #17
Augusta, ME 04333-0017
Phone: 207/287-2651
http://janus.state.me.us/dep/home.htm

ME's "Hazardous Waste Management Rules" (Chapters 850 to 857) are available for free from ME DEP or an unofficial copy can be accessed for free on the Internet at http://janus.state.me.us/dep/rules.htm.

Maryland

Hazardous Waste Program Description

Definition of "Hazardous Waste": Similar to federal but MDE adds PCB wastes and certain chemical warfare agents (see 26.13.02).

Hazardous Waste Generator Status: MDE regulates "SQGs" (requirements are similar to federal requirements for CESQGs; 26.13.02.05). All other generators are subject to full regulation except that if < 500 kg of hazardous waste and < 1 kg acute hazardous waste is accumulated on site, then the waste may be accumulated for up to 180 days (see 26.13.03.05E).

Regulatory Allowances for On-Site Waste Minimization

☒ Domestic Sewage Exclusion	Domestic sewage mixed with other waste that passes through a sewer system to a POTW is not exempt from regulation as solid waste (26.13.02.04A(1)).
☑ Elementary Neutralization	See 26.13.07.01A and 26.13.05.01A(3)(g).
☑ Recycling	See 26.13.02.06.
☒ Treatment in Accumulation Containers	MD statute prohibits treatment without a permit (Environment Article, Annotated Code of MD, Section 7-232, "Permit Required").
☑ Small Boilers and Industrial Furnaces	MD has not yet adopted 40 CFR 266, Subpart H, so EPA's BIF rule is in effect. However, MD generators burning hazardous waste are subject to 26.13.10.02.

Special Considerations

- Generators must maintain inspection logs (26.13.03.05E91(k)).

MD Department of the Environmental (MDE)
Waste Management Administration, Hazardous Waste Program
2500 Broening Highway
Baltimore, MD 21224
Phone: 410/631-3345
http://www.mde.state.md.us/

MD's hazardous waste regulations are in Title 26 of the Code of Maryland Regulations (COMAR), Subtitle 13. The regulations can be purchased from MDE for $20, prepaid. The regulations are not presently available through the Internet.

Massachusetts

Hazardous Waste Program Description

Definition of "Hazardous Waste": Waste determination varies from federal but hazardous waste lists and characteristics are similar to federal (see 310 CMR 30.120 and 30.131-136).

Hazardous Waste Generator Status: MA recognizes LQGs (≥ 1,000 kg hazardous waste per month or more than 1 kg acutely hazardous waste), SQGs (100 to 1000 kg hazardous waste per month and ≤ 1 kg acutely hazardous waste) and very small quantity generators (VSQGs: < 100 kg hazardous waste per month and no acutely hazardous waste).

Regulatory Allowances for On-Site Waste Minimization

☒ Domestic Sewage Exclusion	More restrictive than federal exclusion (310 CMR 30.104).
☒ Elementary Neutralization	Subject to licensing requirements (310 CMR 30.800).
☒ Recycling	Subject to permitting requirements (310 CMR 30.200).
☒ Treatment in Accumulation Containers	Prohibited by state statute.
☒ Small Boilers and Industrial Furnaces	Has not adopted 40 CFR 266 or similar regulations.

Special Considerations

- Satellite accumulation provisions are more stringent than federal (310 CMR 30.354).
- SQGs are limited to accumulating ≤ 2000-kg hazardous waste on-site in containers.
- MA does not allow SQGs to accumulate waste on-site for 270 days.
- Generators are subject to annual fees (310 CMR 4.03).

MA Department of Environmental Protection (DEP)
Bureau of Waste Prevention
Business Compliance Unit
Hazardous Waste Program
1 Winter St., 8th Floor
Boston, MA 02108
Phone: 617/292-5898
http://www.state.ma.us/dep/

MA's hazardous waste regulations are in Title 310 of the Code of Massachusetts Regulations (CMR). The regulations can be purchased from the State Bookstore 617/727-2834. The regulations are expected to be available on the Internet in early 2000.

Michigan

Hazardous Waste Program Description

Definition of "Hazardous Waste": Similar to federal but adds Michigan-specific wastes -- primarily dioxins (see 299.9219).

Hazardous Waste Generator Status: Similar to federal requirements (see 299.9301 for SQGs and LQGs and 299.9205 for CESQGs).

Regulatory Allowances for On-Site Waste Minimization

☑ Domestic Sewage Exclusion	See 299.9204(1)(a).
☑ Elementary Neutralization	See 299.9503(1)(e).
☑ Recycling	See 299.9206(1)(b).
☑ Treatment in Accumulation Containers	Subject to certain conditions; see 299.9503(1)(i).
☑ Small Boilers and Industrial Furnaces	Adopts 40 CFR 266, Subpart H by reference (see 299.11003(1)(q)).

Special Considerations

None.

MI Department of Environmental Quality (DEQ)
Waste Management Division
608 W. Allegan, 1st Floor
P. O. Box 30241
Lansing, MI 48909
Phone: 800/662-9278
http://www.deq.state.mi.us

MI's hazardous waste regulations are in the Michigan Administrative Code, Rule 299.9101 through 299.11107. A single free copy of the regulations can be obtained from the Waste Management Division. An unofficial copy of the regulations can be accessed for free on the Internet at http://www.state.mi.us/execoff/admincode/depart/deq.htm.

Minnesota

Hazardous Waste Program Description

Definition of "Hazardous Waste": Similar to federal but adds two characteristics: oxidizers and lethality (7045.0131); and certain listed wastes (e.g., PCBs; 7045.0135).

Hazardous Waste Generator Status: MN recognizes LQGs (≥ 1,000 kg hazardous waste per month or > 1 kg acutely hazardous waste), SQGs (100 to 1000 kg hazardous waste per month and ≤ 1 kg acutely hazardous waste) and very small quantity generators (VSQGs).

Regulatory Allowances for On-Site Waste Minimization

☑ Domestic Sewage Exclusion	See 7045.0120, Subp. 1.B. and 7045.0208 Subp. 1.E.
☑ Elementary Neutralization	Permit-by-rule; see 7001.0520 Subp 3.C.
☑ Recycling	Exemption applies to hazardous waste used as "feedstock;" see 7045.0125, Subp. 5.A.
☑ Treatment in Accumulation Containers	See 7045.0208 Subp. 1.A. and 7045.0211.
☑ Small Boilers and Industrial Furnaces	See 7045.0692 (not similar to 40 CFR 266).

Special Considerations

- Satellite accumulation areas are subject to more stringent requirements including inspections (7045.0292 Subp. 8).
- VSQGs are subject to substantial requirements (e.g., 7045.0292 Subp. 6). Those who collect, transport, treat, or store VSQG waste must obtain a license from PCA (7045.036).
- SQGs are limited to accumulation of 3000-kg hazardous waste on site (7045.0.0292).
- Generators are subject to annual fees (7046).

MN Pollution Control Agency (PCA)
Division of Solid and Hazardous Waste
520 N. Lafayette Rd.
St. Paul, MN 55155-4194
Phone: 651/297-8332
http://www.pca.state.mn.us/waste/index.html

MN's hazardous waste regulations are in Chapter 7045 of the MN State Rules. To order a paper copy of MN's Hazardous Waste Rules, contact Minnesota's Bookstore at (612) 297-3000 or (800) 657-3757. An unofficial copy of the regulations can be accessed for free on the Internet at http://www.pca.state.mn.us/waste/hw_mnrules.html#7045.

Mississippi

Hazardous Waste Program Description

Definition of "Hazardous Waste": Same as federal. Incorporates 40 CFR 261 by reference (Part 261).

Hazardous Waste Generator Status: Same as federal. Incorporates 40 CFR 262 by reference (Part 262).

Regulatory Allowances for On-Site Waste Minimization

☑ Domestic Sewage Exclusion	Incorporates 40 CFR 261 by reference (Part 261).
☑ Elementary Neutralization	Incorporates 40 CFR 270 by reference (Part 270).
☑ Recycling	Incorporates 40 CFR 261 by reference (Part 261).
☑ Treatment in Accumulation Containers	Follows EPA interpretation.
☑ Small Boilers and Industrial Furnaces	Incorporates 40 CFR 266 by reference (Part 266).

Special Considerations

None.

MS Department of Environmental Quality (MDEQ)
Hazardous Waste Division
P.O. Box 10385
Jackson, MS 39289-0385
Phone: 601/961-5171
http://www.deq.state.ms.us/newweb/homepages.nsf

A single free copy of MS's Hazardous Waste Management Regulations can be obtained from the Hazardous Waste Division. A copy of the regulations is available on the Internet at MDEQ's website listed above.

Missouri

Hazardous Waste Program Description

Definition of "Hazardous Waste": Incorporates 40 CFR 261 by reference with changes (e.g., adds dioxin wastes and modifies F020-F027 listings (25-4.261)).

Hazardous Waste Generator Status: Incorporates 40 CFR 262 by reference with some changes (2-5.262).

Regulatory Allowances for On-Site Waste Minimization

☑ Domestic Sewage Exclusion	Incorporates 40 CFR 261 by reference (25-4.261).
☑ Elementary Neutralization	See 25-7.270(2)(A)3.
☑ Recycling	Incorporates 40 CFR 261 by reference (25-4.261). Also, 25-9.020(2) exempts facilities recycling < 1000 kg/month from 25-9; however, such facilities must notify the DNR.
☑ Treatment in Accumulation Containers	Follows EPA interpretation.
☑ Small Boilers and Industrial Furnaces	Incorporates 40 CFR 266 by reference (25-7.266).

Special Considerations

- Waste can remain in satellite accumulation for no more than one year (25-5.262(2)(C)).
- Central accumulation areas must have containment systems (25-5.262(2)(C)).
- Generators are subject to annual fees (25-12).
- PCB wastes are regulated by MO DNR (25-13).

MO Department of Natural Resources (DNR)
Office of Pollution Control
Hazardous Waste Program
P.O. Box 176
Jefferson City, MO 65102
Phone: 573/751-3176
http://www.dnr.state.mo.us/homednr.htm

MO's hazardous waste management regulations are in Title 10 of the Code of State Regulations, Title 25 (10 CSR 25). A hard copy of the regulations can be purchased from the Secretary of State (573/751-4015). An electronic copy can be accessed for free on the Internet at http://mosl.sos.state.mo.us/csr/10csr.htm.

Montana

Hazardous Waste Program Description

Definition of "Hazardous Waste": Waste determination varies from federal but hazardous waste lists and characteristics are similar to federal (see 17.54, Subchapter 3).

Hazardous Waste Generator Status: Same as federal (see 17.54, Subchapter 4).

Regulatory Allowances for On-Site Waste Minimization

☑ Domestic Sewage Exclusion	See 17.54.307.
☑ Elementary Neutralization	See 17.54.105.
☑ Recycling	See 17.54.309.
☑ Treatment in Accumulation Containers	Follows Epa interpretation.
☑ Small Boilers and Industrial Furnaces	Same as 40 CFR 266 (17.54.1112).

Special Considerations

- SQGs and LQGs are subject to annual reporting requirements and annual fees (17.54.403 and .404, respectively).
- Generators must maintain logbooks detailing hazardous waste generated (17.54.421(9)).

MT Department of Environmental Quality
Permitting and Compliance Division
Air and Waste Management Bureau
P.O. Box 200901
Helena, MT 59620-0901
Phone: 406/444-3490
http://www.deq.state.mt.us/

MT's hazardous waste regulations are in Title 17 of the Administrative Rules of Montana (ARM), Chapter 54. A single free copy of the regulations is available from the Air and Waste Management Bureau. In early 2000, the regulations will be available on the Internet at the MDEQ site.

Nebraska

Hazardous Waste Program Description

Definition of "Hazardous Waste": Same as federal (see Chapter 3)

Hazardous Waste Generator Status: Same as federal (for CESQGs see Chapter 8; for SQGs see Chapter 9; and for LQGs see Chapter 10).

Regulatory Allowances for On-Site Waste Minimization

☑ Domestic Sewage Exclusion	See Chapter 2-008.01.
☑ Elementary Neutralization	See Chapter 12-001.03E.
☑ Recycling	See Chapter 7-005. Chapter 5-004.01 specifies that Director may regulate recycling processes on a case-by-case basis.
☑ Treatment in Accumulation Containers	Follows EPA interpretation.
☑ Small Boilers and Industrial Furnaces	Incorporates 40 CFR 266.108 by reference (Chapter 7-008.03).

Special Considerations

- If a generator is a LQG at any time during the reporting period, then he must prepare and submit a biennial report (Chapter 4-005.01A).

NE Department of Environmental Quality (NDEQ)
Waste Management Division
Permits and Compliance Section
1200 N. St. Suite 400
P.O. Box 98922
Lincoln, NE 68509-8922
Phone: 402/471-4217 or 402/471-8308 (Compliance Assistance)
http://www.deq.state.ne.us/

NE's hazardous waste regulations are in Title 128 of the Nebraska Administrative Code (NAC). A single free copy of the regulations is available from the RCRA Section. An unofficial copy of Title 128 can be accessed for free on the Internet at http://www.deq.state.ne.us/RuleandR.nsf/Pages/Rules.

Nevada

Hazardous Waste Program Description

Definition of "Hazardous Waste": Incorporates 40 CFR 261 by reference and adds wastes such as mixtures containing >10% of a P- or U-listed chemical (444.8565).

Hazardous Waste Generator Status: Same as federal. Incorporates 40 CFR 262 by reference and makes some modifications (444.8632).

Regulatory Allowances for On-Site Waste Minimization

☑ Domestic Sewage Exclusion	Incorporates 40 CFR 261 by reference (444.8632).
☑ Elementary Neutralization	Incorporates 40 CFR 270 by reference (444.8632).
☑ Recycling	Incorporates 40 CFR 261 by reference (444.8632) and adds a specific exemption for generators (444.8455(4.00)).
☑ Treatment in Accumulation Containers	Follows EPA interpretation.
☑ Small Boilers and Industrial Furnaces	Incorporates 40 CFR 266 by reference (444.8632).

Special Considerations

- A generator must include on the label of each hazardous waste container the EPA hazardous waste number (444.8671).
- A generator who generates more than 100 kilograms of hazardous waste per month and accumulates hazardous waste on site must maintain a written record of inspections conducted of containers and tanks (444.8677).
- PCB wastes are regulated by DCNR (444.960).

NV Division of Environmental Protection
Solid Waste Branch, Waste Management Bureau
333 W. Nye Lane
Carson City, NV 89706-0851
Phone: 775/687-4670
http://www.state.nv.us/ndep/

NV's hazardous waste regulations are in Nevada Administrative Code (NAC) Chapter 444 (Sections 842 through 960). The regulations can be purchased for a small fee from the Legislative Council Bureau, 775/684-6835, or a copy can be accessed for free on the Internet at http://www.state.nv.us/ndep/admin/nrs.htm.

New Hampshire

Hazardous Waste Program Description

Definition of "Hazardous Waste": Similar to federal but adds NH listed hazardous wastes (402); revises definition of corrosivity characteristic to include non-aqueous solutions (403.04); and adds mixtures of P-listed chemicals and carcinogens at concentrations exceeding 5 ppm (404.01).

Hazardous Waste Generator Status: NH recognizes SQGs (generally < 100 kg hazardous waste per month: subject to 508) and a full quantity generators (FQGs; generally > 100 kg hazardous waste per month or > 1 kg acutely hazardous waste: subject to 509).

Regulatory Allowances for On-Site Waste Minimization

☒ Domestic Sewage Exclusion	See 401.03(a)(1): only exempts domestic sewage – not mixtures.
☒ Elementary Neutralization	See 351.04(a)(5) and 353.04: limited permit provisions apply.
☑ Recycling	The recycling process is exempt from regulation (802.02(b)), but aspects of Chapter 800 apply.
☑ Treatment in Accumulation Containers	Allowed if all generator provisions in Chapter 500 are met (verbal interpretation).
☑ Small Boilers and Industrial Furnaces	Generators who burn hazardous waste as fuel are subject to 806.05 including notification to DES.

Special Considerations

- Generator storage area provisions include container specifications, containment requirements, and more (507.01).
- Satellite accumulation area provisions include operator training requirements, and more (509.03).
- Generators are subject to quarterly reporting and fees (512.02) and FQGs are subject to annual reporting (512.03).

NH Department of Environmental Services (DES)
Waste Management Division, Hazardous Waste Compliance Section
6 Hazen Dr.
Concord, NH 03302-0095
Phone: 603/271-3644
http://www.des.state.nh.us/descover.htm

NH's Hazardous Waste Rules (Env-Wm Chapters 100 to 1000) are available from the DES Public Information and Permitting Office for $20 (603/271-2975). An unofficial copy can be accessed for free on the Internet at http://www.des.state.nh.us/pub-open.htm.

New Jersey

Hazardous Waste Program Description

Definition of "Hazardous Waste": Same as federal. Incorporates 40 CFR 261 by reference (7:26G-5.1).

Hazardous Waste Generator Status: Same as federal. Incorporates 40 CFR 262 by reference (7:26G-6.1).

Regulatory Allowances for On-Site Waste Minimization

☑ Domestic Sewage Exclusion	Incorporates 40 CFR 261 by reference (7:26G-5.1).
☑ Elementary Neutralization	Incorporates 40 CFR 270 by reference (7:26G-12.1).
☑ Recycling	Incorporates 40 CFR 261 by reference (7:26G-5.1).
☑ Treatment in Accumulation Containers	Follows EPA interpretation.
☑ Small Boilers and Industrial Furnaces	Incorporates 40 CFR 266 by reference (7:26G-10.1).

Special Considerations

- Generators submitting biennial reports are subject to fees which vary depending to the quantity of hazardous waste manifested off-site (7:26G-3.3).

NJ Department of Environmental Protection (NJDEP)
Division of Solid and Hazardous Waste
401 E. Sate St., P.O. Box 414
Trenton, NJ 08625-0414
Phone: 609/633-1418
http://www.state.nj.us/dep/dshw/

NJ's Hazardous Waste Regulations are in Title 7 of the New Jersey Administrative Code (NJAC), Chapter 26G. The regulations are available for a fee from West Publishing Group, 800/808-9378, or can be accessed for free on the Internet at http://www.state.nj.us/dep/dshw/resource/rules.htm.

New Mexico

Hazardous Waste Program Description

Definition of "Hazardous Waste": Same as federal. Incorporates 40 CFR 261 by reference (20 NMAC 4.200).

Hazardous Waste Generator Status: Same as federal. Incorporates 40 CFR 262 by reference (20 NMAC 4.300).

Regulatory Allowances for On-Site Waste Minimization

☑ Domestic Sewage Exclusion	Incorporates 40 CFR 261 by reference (20 NMAC 4.200).
☑ Elementary Neutralization	Incorporates 40 CFR 270 by reference (20 NMAC 4.900).
☑ Recycling	Incorporates 40 CFR 261 by reference (20 NMAC 4.200).
☒ Treatment in Accumulation Containers	Must request case-by-case approval from Department.
☑ Small Boilers and Industrial Furnaces	Incorporates 40 CFR 266 by reference (20 NMAC 4.700).

Special Considerations

- Generators must pay "annual business fees" to the Department (20 NMAC 4.3).

NM Environment Department
Water and Waste Management Division
Hazardous Waste and Radioactive Materials Bureau
P.O. Box 26110
Santa Fe, NM 87502-6110
Phone: 505/827-1557
http://www.nmenv.state.nm.us/

NM's Hazardous Waste Management Regulations are in Title 20 of the New Mexico Administrative Code (NMAC), Chapter 4. A copy of the regulations is available for a fee from the Bureau or a copy can be downloaded from the Internet at the Department site listed above.

New York

Hazardous Waste Program Description

Definition of "Hazardous Waste": Same as federal with the addition of PCB wastes (6 NYCRR 371).

Hazardous Waste Generator Status: Same as federal (6 NYCRR 372).

Regulatory Allowances for On-Site Waste Minimization

☑ Domestic Sewage Exclusion	See 6 NYCRR 371.1(e)(1).
☑ Elementary Neutralization	See 6 NYCRR 373-1.1(d)(1)(xii).
☑ Recycling	See 6 NYCRR 371.1(g)(3).
☑ Treatment in Accumulation Containers	See 6 NYCRR 373-1.1(d)(1)(ix).
☑ Small Boilers and Industrial Furnaces	See 6 NYCRR 374-1.8(i).

Special Considerations

- SQGs must place waste in secondary containment if they (1) are located above a sole source aquifer and (2) have accumulated more than 185 gallons of liquid hazardous waste (6 NYCRR 372.2(a)(8)(iii)(f)).
- DEC requires some generators to write waste reduction plans and have the plans approved by DEC.
- Generators in New York must file quarterly returns with the New York State Department of Taxation and Finance and pay appropriate assessments. However, if the assessment attributable to a site is $27.00 or less for a particular quarter, it is not necessary to file a quarterly return for that site or pay the assessment for that quarter

NY Department of Environmental Conservation (NYDEC)
Division of Solid and Hazardous Materials
50 Wolf Rd.
Albany, NY 12233-7251
Phone: 518/489-8988
http://www.dec.state.ny.us/website/dshm/index.html

NY's hazardous waste management regulations are in 6 NYCRR Parts 370, 371, 372, 373, 374 and 376 (the Part 370 series). A single free copy of the regulations can be obtained from the Bureau of Program Management, 518/457-0532. The Business Council of New York Sate has posted the hazardous waste regulations on the Internet at http://www.bcnys.org/new/pdf/env_rcra.htm.

North Carolina

Hazardous Waste Program Description

Definition of "Hazardous Waste": Same as federal. Incorporates 40 CFR 261 by reference (13A.0106-1-72).

Hazardous Waste Generator Status: Same as federal. Incorporates 40 CFR 262 by reference (13A.0107-1-28).

Regulatory Allowances for On-Site Waste Minimization

☑ Domestic Sewage Exclusion	Incorporates 40 CFR 261 by reference (13A.0106-1-72).
☑ Elementary Neutralization	Incorporates 40 CFR 270 by reference (13A.0113-1-69).
☑ Recycling	Incorporates 40 CFR 261 by reference (13A.0106-1-72).
☑ Treatment in Accumulation Containers	DENR policy by verbal interpretation (effective 1998).
☑ Small Boilers and Industrial Furnaces	Incorporates 40 CFR 266 by reference (13A.0111-1-57).

Special Considerations

- Generators must keep inspection records for 3 years (13A.0107-1-28).
- SQG and LQG pay annual fees: $25 for SQGs and $500 plus tonnage fee for LQGs (13A.0117-1-01).
- Solid waste landfills cannot accept CESQG (NC Solid Waste regulations).

NC Department of Environmental and Natural Resources (DENR)
Division Waste Management
Hazardous Waste Section
P.O. Box 29603
Raleigh, NC 27611-9603
Phone: 919/733-2178
http://wastenot.enr.state.nc.us/

NC's Hazardous Waste Management Regulations are in Title 15A of the North Carolina Administrative Code (NCAC), Chapter 13A. A free copy of the regulations is available from the Hazardous Waste Section. The regulations are not currently available on the Internet.

North Dakota

Hazardous Waste Program Description

Definition of "Hazardous Waste": Similar to federal (33-24-2).

Hazardous Waste Generator Status: Same as federal (33-24-02-05 for CESQGs and 33-24-3 for SQGs and LQGs).

Regulatory Allowances for On-Site Waste Minimization

☑ Domestic Sewage Exclusion	See 33-24-02-04(1)(a).
☑ Elementary Neutralization	See 33-24-06-01(2)(b)(5).
☑ Recycling	See 33-24-02-06.
☑ Treatment in Accumulation Containers	Per verbal interpretation and 33-24-03-01(2).
☑ Small Boilers and Industrial Furnaces	See 33-24-05-533.

Special Considerations

None.

ND Department of Health
Division Waste Management
Hazardous Waste Section
P.O. Box 5520
Bismark, ND 58506-5520
Phone: 701/328-5166
http://www.health.state.nd.us/ndhd/environ/wm/index.htm

ND's Hazardous Waste Management Rules are in the North Dakota Administrative Code (NDAC), Article 33-24. The regulations are available from the Department at a cost of $40 prepaid. A copy of the regulations can be accessed for free on the Internet at http://www.health.state.nd.us/ndhd/environ/wm/hwp/hwrules.htm

Ohio

Hazardous Waste Program Description

Definition of "Hazardous Waste": Same as federal (see 3745-51-20 through 35).

Hazardous Waste Generator Status: Same as federal (see 3745-51-05 for CESQG and 3745-52-34 for LQG and SQG).

Regulatory Allowances for On-Site Waste Minimization

☑ Domestic Sewage Exclusion	See 3745-51-04(A)(1).
☑ Elementary Neutralization	See 3745-50-45(C)(5).
☑ Recycling	See 3745-51-06(C)(1).
☑ Treatment in Accumulation Containers	See 3745-50-45(C)(1) and 3745-52-34(A) and (D).
☑ Small Boilers and Industrial Furnaces	OH has not yet adopted 40 CFR 266, Subpart H, so EPA's BIF rule is in effect. OH has requirements for incinerators (3745-57-40) and hazardous waste burned for energy recovery (3745-58-40).

Special Considerations

None.

OH Environmental Protection Agency (Ohio EPA)
Division Hazardous Waste Management
Lazarus Government Center
P.O. Box 1049
Columbus, OH 43216-1049
614/644-2917
http://www.epa.state.oh.us/

OH's Hazardous Waste Management Rules are in Chapter 3745 of the Ohio Administrative Code (OAC). A copy of the regulations is available for a fee from Ohio EPA's Legal Section, 614/644-3037. A copy of the regulations can be accessed for free on the Internet at http://www.epa.state.oh.us/dhwm/dhwmrules/index1.htm.

Oklahoma

Hazardous Waste Program Description

Definition of "Hazardous Waste": Same as federal. Incorporates 40 CFR 261 by reference (OAC 252:205-3-2(c)).

Hazardous Waste Generator Status: Same as federal. Incorporates 40 CFR 262 by reference (OAC 252:205-3-2(d)).

Regulatory Allowances for On-Site Waste Minimization

☑ Domestic Sewage Exclusion	Incorporates 40 CFR 261 by reference (OAC 252:205-3-2(c)).
☑ Elementary Neutralization	Incorporates 40 CFR 270 by reference (OAC 252:205-3-2(j)).
☑ Recycling	Incorporates 40 CFR 261 by reference (OAC 252:205-3-2(c)).
☑ Treatment in Accumulation Containers	Follows EPA interpretation.
☑ Small Boilers and Industrial Furnaces	Incorporates 40 CFR 266 by reference (OAC 252:205-3-2(h)).

Special Considerations

- SQG and LQG must pay annual fees and LQGs are subject to disposal plan fees (OAC 252:205-3-2(c)).
- OK Solid Waste Statute prohibits landfills from accepting hazardous waste from CESQGs.

OK Department of Environmental Quality
Division Hazardous Waste Management
P.O. Box 1677
Oklahoma City, OK 73101-1677
Phone: 405/702-5100
http://www.deq.state.ok.us/

OK's Hazardous Waste Management Regulations are in Title 252 of the Oklahoma Administrative Code, Chapter 205 (OAC 252:205). A free copy of the regulations is available from the Division of Hazardous Waste or the regulations can be accessed for free on the Internet at http://www.deq.state.ok.us/rules/rulesindex.htm.

Oregon

Hazardous Waste Program Description

Definition of "Hazardous Waste": Incorporates all federal hazardous wastes by reference and adds certain warfare agent wastes and residues including those containing ≥ 3% of P-listed chemical or ≥ 10% of U-listed chemical (OAR 340-101).

Hazardous Waste Generator Status: Same as federal (OAR 340-102).

Regulatory Allowances for On-Site Waste Minimization

☑ Domestic Sewage Exclusion	Incorporates 40 CFR 261 by reference (OAR 340-100-0002).
☑ Elementary Neutralization	Incorporates 40 CFR 270 by reference (OAR 340-100-0002).
☑ Recycling	Incorporates 40 CFR 261 by reference (OAR 340-100-0002).
☑ Treatment in Accumulation Containers	Follows EPA interpretation.
☑ Small Boilers and Industrial Furnaces	Incorporates 40 CFR 266 by reference (OAR 340-100-0002).

Special Considerations

- Generators accumulating in excess of 100 containers, must place the waste in a storage unit that meets the requirements of 40 CFR 264.175 (OAR 340-102-0034).
- SQGs and LQGs are subject to quarterly reporting requirements (OAR 340-102-0041)
- SQGs and LQGs are required to pay fees annually to ORDEQ (OAR 340-102-0065).

OR Department of Environmental Quality (ORDEQ)
Waste Management and Cleanup Division
811 6th Ave.
Portland, OR 97204
Phone: 503-229-5913
http://www.deq.state.or.us/wmc/hw/hw.htm

OR's hazardous waste regulations are in Chapter 340 of the Oregon Administrative Rules. For a free copy, call ORDEQ or check out their website at http://www.deq.state.or.us/wmc/hw/resliboar.html.

Pennsylvania

Hazardous Waste Program Description

Definition of "Hazardous Waste": Same as federal. However, PA has a special program for "residual wastes" which include industrial, mining and agricultural wastes that are not hazardous wastes.

Hazardous Waste Generator Status: Same as federal.

Regulatory Allowances for On-Site Waste Minimization

☑ Domestic Sewage Exclusion	Incorporates federal citation by reference (40 CFR 261.4(a)(1)).
☑ Elementary Neutralization	Allowed with a permit-by-rule (25 PA Code 270a.60(b)(1)).
☑ Recycling	Allowed with a permit-by-rule (25 PA Code 270a.60(b)(4)).
☑ Treatment in Accumulation Containers	Allowed with a permit-by-rule (25 PA Code 270a.60(b)(2)).
☑ Small Boilers and Industrial Furnaces	Incorporates 40 CFR 266.108 by reference (25 PA Code 266a.20).

Special Considerations

- CESQGs may not dispose of hazardous or residual waste landfills within the state (261a.5(b)).
- Any generator that generates more than 1,000 kg hazardous waste in any month, must prepare a written source reduction strategy (262a.100).

PA Department of Environmental Protection (PADEP)
Bureau of Land Recycling and Waste Management
Division of Hazardous Waste Management
P.O. Box 8471
Harrisburg, PA 17105-8471
Phone: 717/787-6239
http://www.dep.state.pa.us

PA's hazardous waste regulations are in Title 25 of the PA Code, Chapters 260-270a. For a free copy, call PADEP or check out their website at http://www.pacode.com/secure/data/025/articleIDVII_toc.html.

Rhode Island

Hazardous Waste Program Description

Definition of "Hazardous Waste": Incorporates all federal hazardous wastes by reference (3.25) and adds several Rhode Island-specific characteristic wastes (3.53).

Hazardous Waste Generator Status: RIDEM recognizes generators as a single category (5.00). RIDEM has no provisions for CESQGs or SQGs.

Regulatory Allowances for On-Site Waste Minimization

☑ Domestic Sewage Exclusion	Provided for in RI Hazardous Waste Management Act (23-19.1-5).
☑ Elementary Neutralization	See 7.01A.3.
☑ Recycling	Excepts activities listed in 40 CFR 261.6 from permitting (7.01A.2.).
☒ Treatment in Accumulation Containers	Prohibited (5.07).
☑ Small Boilers and Industrial Furnaces	RI has not yet adopted 40 CFR 266, Subpart H, so EPA's BIF rule is in effect. RI specifically excepts activities listed in 40 CFR 266 from permitting (7.01A.2.).

Special Considerations

- All generators are subject to LQG requirements.
- All hazardous waste containers (except those in satellite accumulation areas) must be labeled with constituents, waste codes, generator name and address, date of containerization and more (5.04).

RI Department of Environmental Management (RIDEM)
Office of Waste Management
235 Promenade Street
Providence, RI 02908
Phone: 401/222-2797
http://www.state.ri.us/dem/

RI's Rules and Regulations for Hazardous Waste Management are available for free from the Office of Waste Management or the regulations can be accessed for free on the Internet at http://www.state.ri.us/dem/regs.htm#WM.

South Carolina

Hazardous Waste Program Description

Definition of "Hazardous Waste": Same as federal (see 61-79.261).

Hazardous Waste Generator Status: Same as federal (see 61-79-261.5 and 61-79.262).

Regulatory Allowances for On-Site Waste Minimization

☑ Domestic Sewage Exclusion	See 61-79.261.4(a)(1).
☑ Elementary Neutralization	See 61-79.270.1(c)(2).
☑ Recycling	See 61-79.261.6(c)(1).
☑ Treatment in Accumulation Containers	Follows EPA interpretation.
☑ Small Boilers and Industrial Furnaces	See 61-79.266.108.

Special Considerations

- Generators may not stack hazardous waste containers more than two high (61-79.262.34(a)(5)).
- Certain training requirements apply to personnel at satellite accumulation areas (61-79.262.34(c)(1)(iii)).
- DHEC has no provision allowing SQGs to accumulate hazardous waste on site for 270 days (61-79.262.34(f)).
- LQGs are subject to quarterly reporting requirements (61-79.262.41).

SC Department of Health and Environmental Control (DHEC)
Bureau of Land and Waste Management
2600 Bull Street
Columbia, SC 29201
Phone: 803/896-4254
http://www.state.sc.us/dhec/eqc/

SC's Hazardous Waste Management Regulations (R.61-79) can be purchased for $25 from DHEC's Freedom of Information Office, 803/898-3882. The regulations can be accessed for free on the Internet at http://www.state.sc.us/dhec/eqc/ (download files c061d through c061g).

South Dakota

Hazardous Waste Program Description

Definition of "Hazardous Waste": Same as federal. Incorporates 40 CFR 261 by reference (74:28:22:01).

Hazardous Waste Generator Status: Same as federal. Incorporates 40 CFR 262 by reference (74:28:23:01).

Regulatory Allowances for On-Site Waste Minimization

☑ Domestic Sewage Exclusion	Incorporates 40 CFR 261 by reference (74:28:27:01).
☑ Elementary Neutralization	Incorporates 40 CFR 270 by reference (74:28:26:01).
☑ Recycling	Incorporates 40 CFR 261 by reference (74:28:22:01).
☑ Treatment in Accumulation Containers	Follows EPA interpretation.
☑ Small Boilers and Industrial Furnaces	Incorporates 40 CFR 266 by reference (74:28:27:01).

Special Considerations

- Wastes containing polychlorinated biphenyls in concentrations $\geq$ 50 parts per million are subject to specific SD regulations (74:28:22:01 and 74:28:31).

SD Department of Environment and Natural Resources (DENR)
Waste Management Program
523 E. Capitol Avenue, Foss Building
Pierre, SD 27505-3181
Phone: 605/773-3153
http://www.state.sd.us/denr/denr.html

SD's hazardous waste regulations are in Administrative Rule of South Dakota 74:28, and federal hazardous waste regulations are adopted by reference. A free copy of the regulations is available from DENR or the regulations can be accessed for free on the Internet at http://www.state.sd.us/state/legis/lrc/rules/7428.htm.

Tennessee

Hazardous Waste Program Description

Definition of "Hazardous Waste": Same as federal (see 1200-1-11.02).

Hazardous Waste Generator Status: Same as federal (see 1200-1-11.02(1)(e) and 1200-1-11.03).

Regulatory Allowances for On-Site Waste Minimization

☑ Domestic Sewage Exclusion	See 1200-1-11.02(1)(d).
☑ Elementary Neutralization	See 1200-1-11.07(1)(b)(4)(iv).
☑ Recycling	See 1200-1-11.02(1)(f)(3).
☑ Treatment in Accumulation Containers	DEC specifies that the term "accumulation" includes storage and treatment. See 1200-1-11.03(4)(e)(1) and 1200-1-11.07(1)(b)(4)(i).
☑ Small Boilers and Industrial Furnaces	See 1200-1-11.07(1)(j).

Special Considerations

None.

TN Department of Environment and Conservation (DEC)
Division of Solid and Hazardous Waste Management
401 Church Street
L&C Tower, 5th Floor
Nashville, TN 37243-1535
Phone: 615/532-0850
http://www.state.tn.us/environment/

TN Hazardous Waste Management Regulations are contained in "Rules of Tennessee Department of Environment and Conservation," Chapter 1200-1-11. A single complimentary copy of the regulations is available to TN generators from DEC. The regulations can be accessed for free on the Internet at http://www.state.tn.us/sos/rules/1200/1200-01/1200-01.htm.

Texas

Hazardous Waste Program Description

Definition of "Hazardous Waste": Same as federal; however, TNRCC regulates various classes of non-hazardous waste (e.g., Class I, II and III: see 335.501 through 515).

Hazardous Waste Generator Status: Similar to federal (see 335.61 through 335.78).

Regulatory Allowances for On-Site Waste Minimization

☑ Domestic Sewage Exclusion	See 335.1(123), definition of "solid waste."
☑ Elementary Neutralization	See 335.41(d)(1).
☑ Recycling	See 335.24.
☑ Treatment in Accumulation Containers	Follows EPA interpretation.
☑ Small Boilers and Industrial Furnaces	Incorporates 40 CFR 266.108 by reference. See 335.221(a)(19). Section 335.6(i) reiterates the one-time notification requirement.

Special Considerations

None.

TX Natural Resource Conservation Commission (TNRCC)
Industrial and Hazardous Waste Permits Section
P.O. Box 13087, MC 129
Austin, TX 78711-3087
Phone: 512/239-6412
http://www.tnrcc.state.tx.us/

TX's Hazardous Waste Management Regulations are in Title 30 of the Texas Administrative Code, Chapter 335 (30 TAC 335). A single free copy can be obtained from TNRCC's Publications Office, 512/239-0028. The regulations can be accessed for free on the Internet at http://www.tnrcc.state.tx.us/oprd/rules/indxpdf5.html#335.

Utah

Hazardous Waste Program Description

Definition of "Hazardous Waste": Same as federal but adds certain nerve, military and chemical agents (see R315-2-9 through 11).

Hazardous Waste Generator Status: Same as federal (see R315-2-5 and R315-5-10).

Regulatory Allowances for On-Site Waste Minimization

☑ Domestic Sewage Exclusion	See R315-2-4(a)(1).
☑ Elementary Neutralization	See R315-3-3(n)(5).
☑ Recycling	Incorporates 40 CFR 261.6 by reference. See R315-2-6.
☑ Treatment in Accumulation Containers	Follows EPA interpretation. Also, see R315-3-3(n)(1).
☑ Small Boilers and Industrial Furnaces	40 CFR 266, subpart H is incorporated by reference (see R315-14-7).

Special Considerations

None.

UT Department of Environmental Quality (DEQ)
Division of Solid and Hazardous Waste
P.O. Box 144880
Salt Lake City, UT 84114-4880
Phone: 801/538-6170
http://www.eq.state.ut.us/

UT's Hazardous Waste Management Regulations can be purchased for $15 from DEQ. The regulations can be accessed for free on the Internet at http://www.eq.state.ut.us/eqshw/hwrules.htm.

Vermont

Hazardous Waste Program Description

Definition of "Hazardous Waste": Similar to federal but modifies characteristic of corrosivity to include wastes that when mixed with water yield a solution with a pH $\leq$2 or $\geq$12.5 (7-205) and adds Vermont-specific listed wastes (e.g., PCBs, coolants, oils, etc.; 7-211).

Hazardous Waste Generator Status: Same as federal (see 7-305 to 308).

Regulatory Allowances for On-Site Waste Minimization

☒ Domestic Sewage Exclusion	Only applies to wastes mixed with "household sewage" (7-203(b)), but mixture rule provides an exemption for mixtures subject to the Clean Water Act (7-203(k)).
☑ Elementary Neutralization	See 7-502(c).
☑ Recycling	See 7-502(k) and 7-605.
☑ Treatment in Accumulation Containers	Follows EPA interpretation.
☑ Small Boilers and Industrial Furnaces	See 7-512, refers to 40 CFR 266, Subpart H.

Special Considerations

- CESQGs are required to obtain an EPA ID number and meet container management and accumulation area design standards (7-306). Also, CESQG waste cannot be sent to a landfill unless the facility is certified to accept CESQG waste.
- LQGs and SQGs must maintain an inventory of waste in "short-term" storage areas and must inspect areas daily (7-311(d)).
- Hazardous waste containers in satellite accumulation areas must be marked with the words "Hazardous Waste" and other words to identify contents (7-310(a)(5)).

VT Department of Environmental Conservation
Waste Management Division
103 South Main St., West Building
Waterbury, VT 05671-0404
Phone: 802/241-3888
http://www.anr.state.vt.us/dec/wmd.htm

VT's Hazardous Waste Management Regulations A single free copy can be obtained by calling the Waste Management Division. The regulations can be accessed on the Internet at http://www.anr.state.vt.us/dec/wastediv/rcra/hazregs/finalreg/finalreg.htm

Virginia

Hazardous Waste Program Description

Definition of "Hazardous Waste": Same as federal. Incorporates 40 CFR 261 by reference (see 20-60-261).

Hazardous Waste Generator Status: Same as federal. Incorporates 40 CFR 261 and 262 by reference (see 20-60-261and 20-60-262).

Regulatory Allowances for On-Site Waste Minimization

☑ Domestic Sewage Exclusion	Incorporates 40 CFR 261 by reference (see 20-60-261).
☑ Elementary Neutralization	Incorporates 40 CFR 261 by reference (see 20-60-270 and 20-60-970B.5).
☑ Recycling	Incorporates 40 CFR 261 by reference (see 20-60-261).
☑ Treatment in Accumulation Containers	Follows EPA interpretation.
☑ Small Boilers and Industrial Furnaces	Incorporates 40 CFR 266 by reference (see 20-60-266).

Special Considerations

- Any facility that accepts CESQG waste must have written permission from DEQ (20-60-261B.5.).
- Generators must notify DEQ 15 days prior to establishing a new hazardous waste accumulation area subject to 40 CFR 262.34 (20-60-260B.4)

VA Department of Environmental Quality (DEQ)
Waste Division
P.O. Box 10009
Richmond, VA 23240-0009
Phone: 804/698-4199
http://www.deq.state.va.us/

VA's Hazardous Waste Management Regulations are in Title of the VA Administrative Code, Chapter 20 (9VAC 20). The regulations can be purchased for a fee from the West Publishing Group, 800/328-9352. The regulations can be accessed for free on the Internet at http://www.deq.state.va.us/info/ftp.html.

Washington

Hazardous Waste Program Description

Definition of "Hazardous Waste": Similar to federal but adds Washington-specific dangerous wastes and extremely hazardous wastes (173-303-080 to 104).

- Hazardous Waste Generator Status: DEC recognizes LQGs and has special provisions for "small quantity generators" (similar to federal CESQGs, see 173-303-070) and "Special accumulation standards" for generators who generate > 220 pounds/month and accumulate ≤ 2200 pounds of dangerous waste on site (173-303-201).

Regulatory Allowances for On-Site Waste Minimization

☑ Domestic Sewage Exclusion	See 173-303-071(3)(a)).
☒ Elementary Neutralization	Permit-by-rule with conditions (173-303-802(5)).
☑ Recycling	See 173-303-120(4).
☑ Treatment in Accumulation Containers	Allowed with certain conditions See 173-303-170.
☑ Small Boilers and Industrial Furnaces	WA has not yet adopted 40 CFR 266, Subpart H, so EPA's BIF rule is in effect. DEC has implemented "Special requirements for dangerous wastes burned for energy recovery" (173-303-510).

Special Considerations

- On a case-by-case basis, DEC requires that hazardous waste accumulation areas, including satellite areas, have secondary containment. Also, "new" (since Sept. 30, 1986) accumulation areas must have secondary containment (173-303-200).
- Containers/tanks must be marked with words that identify the major risks associated with waste in the container (173-303-200(1)(d)).

WA Department of Ecology (DEC)
Hazardous Waste and Toxics Reduction Program
P.O. Box 47600
Olympia, WA 98504-7600
Phone: 360/407-6700
http://www.state.sc.us/dhec/eqc/

WA's Dangerous Waste Regulations (Chapter 173-303 WAC) are available for free from DEC. The regulations are not presently available on the Internet.

West Virginia

Hazardous Waste Program Description

Definition of "Hazardous Waste": Same as federal. Incorporates 40 CFR 261 by reference (see 33-20-3.1).

Hazardous Waste Generator Status: Same as federal. Incorporates 40 CFR 261 and 262 by reference (see 33-20-3.1 and 33-20-4.1).

Regulatory Allowances for On-Site Waste Minimization

☑ Domestic Sewage Exclusion	Incorporates 40 CFR 261 by reference (see 33-20-3.1).
☑ Elementary Neutralization	Incorporates 40 CFR 270 by reference (see 33-20-11.1).
☑ Recycling	Incorporates 40 CFR 261 by reference (see 33-20-3.1).
☑ Treatment in Accumulation Containers	DEP must be notified of generator treatment activities (see 33-20-4.2.e).
☑ Small Boilers and Industrial Furnaces	Incorporates 40 CFR 266 by reference (see 33-20-9.1). Subject to air quality rules in 45 CSR 25 (see 33-20-7.1.b).

Special Considerations

- CESQGs sending waste off-site must send hazardous waste to permitted TSDFs or legitimate recycling facilities (see 33-20-3.2).
- CESQGs are subject to notification requirements in Section 4 (see 33-20-3.2).

WV Division of Environmental Protection (DEP)
Office of Waste Management
1356 Hansford St.
Charleston, WV 25301
Phone: 304/558-5929
www.dep.state.wv.us

WV's Hazardous Waste Management Regulations are in Title 33 of the Code of State Regulations, Series 20 (33 CSR 20). A copy can be purchased (for a small copying fee) from the WV Secretary of the State, 304/558-6000. The regulations can be accessed for free on the Internet at http://www.state.wv.us/csr/.

Wisconsin

Hazardous Waste Program Description

Definition of "Hazardous Waste": Same as federal (see NR605.08 and NR605.09).

Hazardous Waste Generator Status: DNR recognizes very small quantity generators (< 100 kg/month; VSG; NR 610.07), SQG (100 to 1000 kg/month; 610.08) and LQG (NR615).

Regulatory Allowances for On-Site Waste Minimization

☑ Domestic Sewage Exclusion	See NR605.05(1)(o).
☑ Elementary Neutralization	See NR630.04(7); some conditions apply.
☑ Recycling	See NR630.04(6) and NR625.
☑ Treatment in Accumulation Containers	See NR630.04(18).
☒ Small Boilers and Industrial Furnaces	Although WI has not yet adopted 40 CFR 266, Subpart H, so EPA's BIF rule is in effect, DNR's facility standards (NR 630) and air regulations apply.

Special Considerations

- VSQGs are subject to container management and labeling provisions. In-state facilities must have DNR approval to accept VSQG waste (NR610.07).
- SQGs accumulating at least 1000 kg but not more than 6000 kg of hazardous waste on site are subject to additional training provisions (NR610.08(1)(v)).
- Generators are subject to manifest fees and annual fees.
- DNR regulates PCB wastes under Chapter 157.

WI Department of Natural Resources (DNR)
Bureau of Waste Management
P.O. Box 7921
Madison, WI 53707-7921
Phone: 608/266-2111
http://www.dnr.state.wi.us/org/aw/wm/index.htm

WI's Hazardous Waste Management Regulations (Environmental Protection Series, NR 600) can be purchased ($26 + tax) from WI Department of Administration, Document Sales, 800/362-7253. The regulations can be accessed on the Internet at http://www.dnr.state.wi.us/org/aw/wm/information/wiacssh.htm.

Wyoming

Hazardous Waste Program Description

Definition of "Hazardous Waste": Same as federal.

Hazardous Waste Generator Status: Same as federal.

Regulatory Allowances for On-Site Waste Minimization

☑	Domestic Sewage Exclusion	See Chapter 2, Section 1(d)(i)(A).
☑	Elementary Neutralization	See Chapter 1, Section 1(h)(iii)(B)(V).
☑	Recycling	See Chapter 2, Section 1 (f); however, the director retains the authority to determine what constitutes sham recycling.
☑	Treatment in Accumulation Containers	Follows EPA interpretation.
☑	Small Boilers and Industrial Furnaces	See Chapter 12, Section 8(i).

Special Considerations

None.

WY Department of Environmental Quality (DEQ)
Solid and Hazardous Waste Management Division
122 W. 25th St.
Cheyenne, WY 82002
Phone: 307/777-7752
http://deq.state.wy.us/shwd.htm

A single free copy of the "Wyoming Hazardous Waste Rules and Regulations" can be obtained from the Solid and Hazardous Waste Management Division. The regulations can be accessed for free on the Internet at http://soswy.state.wy.us/rules/rules.htm.