STANFORD UNIVERSITY

HAZARDOUS CHEMICAL WASTE MANAGEMENT REFERENCE GUIDE FOR LABORATORIES

JANUARY 1998

Department of Environmental Health and Safety

(650) 725-7520

NOTICE

This reference guide is intended to provide guidance regarding the management of hazardous chemical wastes generated in laboratories at Stanford. This guide is based, in part, upon existing federal and state hazardous waste management laws and regulations. In some instances, guidelines presented in this manual extend beyond the minimum management standards mandated by law. Such guidelines are designed to create straightforward management practices and to ensure full compliance with applicable laws and regulations.

In addition, federal, state, and local hazardous waste management laws and regulations change over time. Similarly, the interpretation of such laws and regulations by regulatory agencies may change over time. Accordingly, it is important that persons generating hazardous chemical wastes remain alert to regulatory developments and comply with changes in guidelines that may be developed by Stanford's Environmental, Health and Safety Department.

URL>>> http://www.stanford.edu/dept/EHS/

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Introduction

MODULE OVERVIEW

This reference guide was developed to reflect changes in the hazardous chemical waste management program that have occurred since the Stanford Safety Manual was last updated. This guide accompanies a chemical waste management training program that has been prepared by the Department of Environmental Health and Safety. In this reference guide, emphasis has been placed on chemical waste procedures for the specialized operations of university research laboratories.

The purpose of the training program and guidance manual is to provide instruction to all laboratory waste producers in procedures that are required to meet city, county, state and federal chemical waste management regulations.

DEFINITIONS

Hazardous waste is defined as a waste, or a combination of wastes, which because of its quantity, concentration, or physical or chemical characteristics may pose a substantial present or potential threat to human health or the environment when improperly treated, stored, disposed of, transported, or otherwise managed.

OBJECTIVES

- Recognize your responsibility for the correct identification, minimization, containment and disposal of hazardous chemical waste.

Identification

- Determine whether a material must be considered a hazardous chemical waste by using the *Radioactive-Chemical-Biological Hierarchy*, the *Non-Hazardous Waste List*, and the *Empty Container Decision Tree*.
- Correctly complete a Hazardous Waste label.
- Determine hazard category.

Minimization

- Learn ways of reducing chemical wastes and their costs in the lab by modifying procedures for inventory, purchasing, accumulation and solvent recycling.

Containment and Storage

- Determine what type of primary and secondary container to choose for a given hazardous chemical waste.
- Set up an accumulation plan.

Disposal

- Determine if a non-hazardous chemical waste can be placed in the solid waste stream (e.g. general trash) or safely disposed of down the drain.
- Determine whether to schedule a blanket pickup or to use a standard pickup request form.
- Correctly complete a *Standard Hazardous Chemical Waste Pickup Form* (BHS-101).
- Correctly complete a *Blanket Hazardous Chemical Waste Pickup Form* (BHS-100).

REGULATIONS AND THEIR IMPACT TO STANFORD

Overview

There are numerous governmental regulations that govern how to identify, minimize, contain and dispose of hazardous chemical waste. While neither Stanford, nor EH&S make these rules, EH&S does function as an intermediary between government regulators and the campus community in order to facilitate compliance. EH&S has a staff of professionals who routinely review new and proposed regulations to determine their impact to Stanford.

EH&S has responsibility, with oversight from the University Committee on Health and Safety, to interpret regulatory issues, and to develop and distribute compliance training programs. It is a School's, department's or PI's responsibility to request or conduct the training, and the researcher's responsibility to perform the procedures outlined in the training.

Existing Regulations

The framework for hazardous waste regulation was established in 1976 by the *Federal Resource Conservation and Recovery Act*. This Act introduced the concept that the generator of a waste is responsible for proper waste management from "cradle-to-grave" (i.e., from lab to disposal site). That basic concept remains in force today. Since 1976, this act has changed as hazardous waste management responsibilities have grown. In addition, there are local requirements pertaining to solid waste management and sewer discharges.

Relevant Agencies

The California Department of Toxic Substances Control implements and regulates the hazardous waste program in California. Santa Clara County and the City of Palo Alto have, in turn, been authorized to implement parts of California's hazardous waste program. Thus, city,

county, state and federal regulators all have jurisdiction over hazardous waste management at Stanford.

CHEMICAL WASTE MANAGEMENT IN YOUR LAB

There are two categories of accumulation areas for hazardous chemical waste. Listed below are the distinguishing characteristics as well as the restrictions of each one. This training module and guide is designed to cover only the Satellite Accumulation Area requirements given below. If you operate an area which does not qualify as a SAA you must contact EH&S for additional training.

Satellite Accumulation Area (SAA) Requirements

- Cannot accumulate more than 55 gallons of any single waste.
- Cannot accumulate more than 1 quart of any single extremely or acutely hazardous waste.
- Waste must be stored in the same room it was generated in, or in a room that is under the control of the same Principle Investigator (PI) as the room in which it was generated.
- All rooms from which waste is accumulated must be on the same floor, in nearby rooms.
- Laboratories operating as SAAs may accumulate (hold) waste for only 9 months. Once you submit a pickup request, it may take up to a month to have the waste removed from your lab., so you should submit a pickup request form prior to 8 months.

Waste Accumulation Area (WAA)

(such as an outdoor holding area, this category requires additional training in order to operate.)

- Can accumulate any amount of waste.
- Weekly written inspections must be performed.
- The accumulation area must be posted as a WAA, specially constructed and managed to comply with requirements to store and dispose of wastes.
- Must be managed by personnel trained to meet regulatory requirements with additional training beyond the training presented in this module.
- The accumulation time is limited to 90 days.

Wastes that Cannot be Stored at EH&S

The Environmental Safety Facility is not permitted, nor designed, to store the following types of waste:

- Wastes or materials of unknown composition. Unknown wastes must be analyzed by EH&S. This analysis is expensive and time consuming. Unknown wastes will remain in the lab until analysis is complete.

- Compressed gasses. Follow the instructions in the Minimization and Cost Containment Chart, for managing compressed gas cylinders.

These wastes must be accumulated in the laboratory until transportation off site can be arranged.

Strategies For Handling Chemical Waste

Regulatory compliance is required and every person who generates hazardous waste must be trained. However, compliance approaches for chemical waste management in your lab can be tailored somewhat to the needs of individual departments or laboratories.

For example, custom labels can be created on computers in your department as long as the words “Hazardous Waste” are on the label and items 1 through 5 on the *Stanford Hazardous Waste Label* (see example) are included. This will save you time writing out common waste names and allow a central record-keeping system for the hazardous chemical waste that has been handled in your department.

Another compliance technique might be to divide the hazardous chemical waste management procedures among individuals working on a common investigation or in a common lab. Follow the regulations presented in this reference guide in the way that works best in your department.

Spill Response and Handling Emergencies

If you have an unauthorized release of hazardous waste or hazardous materials into the environment (soil, sewer, or surface water) call EH&S, 5-7520. If a contained spill, fire or explosion occurs, refer to the Emergency Response Decision Chart in Appendix C, and follow general emergency guidelines in the *Stanford Safety Manual,* Chapter 6, Preventing and Handling Emergencies.

EH&S SUPPORT SERVICES

EH&S provides the following services to laboratories, in addition to training:

- Consultations to help characterize waste.
- Consultations on waste minimization and pollution prevention.
- Consultations on waste accumulation and disposal.
- Consultation on if you can treat your chemical waste on the bench top, so that it becomes a non-hazardous waste. Call 5-7520 for a process-specific consultation.

EH&S arranges for transportation and disposal of all hazardous wastes generated at Stanford, and is responsible for the related administration process and documentation, required by hazardous waste regulations.

COMMON QUESTIONS ABOUT CHEMICAL WASTE ADDRESSED BY THIS TRAINING PROGRAM

Q: *What should I consider as a waste?*

A : A material that has no intended use or reuse.

Q: *How do I determine the type of waste a mixture of chemical and biological waste is?*

A : See the *Radiological-Chemical-Biological Hierarchy*.

Q: *How am I supposed to know what is considered hazardous? The rules don't seem to make sense!*

A : All chemical wastes are hazardous unless they appear on the *Non-Hazardous Waste List*. Check the list for your waste and dispose of it as described if your waste is listed. If your waste is not listed, handle it as hazardous. If you think the waste should be characterized as non-hazardous, call EH&S (5-7520).

Q: *How do I handle used containers? Do I look up the former contents on the Non-Hazardous Waste List?*

A : No. Use the *Empty Container Decision Tree* to determine if your container is hazardous.

Q: *How can I be sure the label is filled out correctly?*

A : New labels have instructions on the back for each numbered item. Chapter 1 of *The Hazardous Chemical Waste Management Reference Guide for Laboratories* has more detailed instructions.

Q: *How do I determine the hazard category of mixes?*

A : Use your knowledge of the constituents and information found in *the Chemical Safety Database*. The database lists hazard categories for specific chemicals and mixes. If your mixture is not on the database, use it to look up the constituents, then use the ***Determining the Primary Hazard Category*** sheet to help you make a professional judgment call on the correct category. If you are still unsure, check toxic.

Q: *How would I access the Chemical Safety Database?*

A : Refer to the *Stanford Safety Manual* for instructions on how to access the Chemical Safety Database.

Q: *The Chemical Safety Database doesn't have hazard categories that are the same as the ones on the Stanford Hazardous Waste label. What do you expect us to do?*

A : Use the *Determining the Primary Hazard Category* sheet to match the database classifications to label categories.

Q: *I have never heard of waste minimization. What is it?*

A : The *Minimization and Cost Containment Chart* has all the legal requirements that you as a producer of hazardous chemical waste are responsible for implementing. These requirements were enacted in 1991. Your department has probably implemented many of the requirements which you may not associate with the term, "minimization."

Q: *I hear conflicting information about using containers. Where do I get information??*

A : Use the *Container Compatibility and Accumulation Criteria Chart* to check your responsibilities in regard to containers.

Q: *Where can I find containers that are the right size or construction?*

A : The *Locating Commonly Used Hazardous Waste Containers Chart* has a list of containers available on campus and where to find them.

Q: *How long can waste be stored in the lab?*

A : Nine months. The *Container Compatibility and Accumulation Criteria Chart* has detailed information on this.

Q: *Nine months is much too long for me to accumulate many of my wastes. What can I do?*

A : You can complete a *Blanket Hazardous Chemical Waste Pickup Form* (BHS-100*)* to request automatic pickups as long as they need to occur at least every 2 months, the volume is significant (greater than 5 gallons per month) and your waste does not vary significantly in composition, or you can always request a pickup any time before 8 months.

Q: *How will I know how to fill out the Blanket Hazardous Chemical Waste Pickup form?*

A : A sample of a completed form is in the Hazardous Chemical Waste *Management Reference Guide for Laboratories* along with detailed instructions for each numbered item.

Q: *How do I get rid of the waste containers that I have been storing?*

A : You will need to fill out a *Standard Hazardous Chemical Waste Pickup Form* (BHS-101). A sample of a completed form is in the ***Hazardous Chemical Waste Management Reference Guide for Laboratories*** along with detailed instructions for each item.

1 • Identification of Hazardous Chemical Waste

OBJECTIVES

Do you know how to do the following? If you do, skip ahead to *Minimization of Hazardous Waste* section. If you do not, continue on in this section.

- Determine whether a material must be considered a hazardous chemical waste by using the *Radiological-Chemical-Biological Hierarchy*, the *Non-Hazardous Waste List*, and the *Empty Container Decision Tree*.
- Correctly fill out a *Stanford Hazardous Waste Label*.
- Determine the correct hazard category.

OVERVIEW

In order to properly manage hazardous chemical waste you must first learn the various identification steps, in order to:

1. Determine if a material is now as a waste.
2. Know if your waste is a chemical waste.
3. Determine if it is hazardous.
4. Get information about the specific hazard category and identify it in order to complete a hazardous waste label.

The identification section of this training introduces you to resource materials that will help make these determinations.

RECOGNIZING WASTES

Remember that the requirements described in this guide do not apply until a material becomes a waste. A waste is defined as a material that has no intended use or reuse.

After you have determined that you have generated waste, use the *Radiological-Chemical-Biological-Waste Hierarchy* to identify the regulations that govern waste management. Use *the Non-Hazardous Waste List* and the *Empty Container Decision Tree* to identify what must be regarded as hazardous.

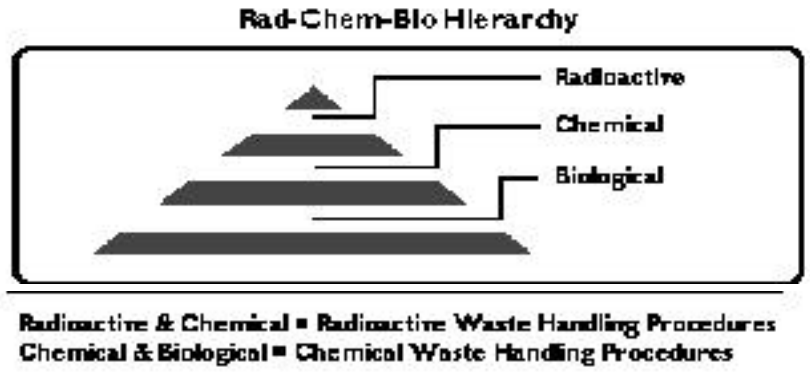
Handling Mixed Waste

A mixed waste is one that contains radiological or biological waste in addition to the chemical waste. Mixed wastes must be handled differently. There is a hierarchy of mixed wastes that determines that radiological properties, when present, are the most important factors in determining waste handling; chemical properties are the second most important factors for

determining waste handling and biological properties are third. This reference guide is for the management of pure chemical waste only.

If a substance is a mixture of radiological and chemical materials, it must be handled as a radiological waste, call 5-7520 or 5-7529 for instructions.

If a substance is a mixture of chemical and biological material it must be managed through Stanford's Chemical Waste Program, call 5-7520 or 5-7529 for instructions.



Non-Hazardous Waste List

California state law mandates that any waste chemical or hazardous material is a hazardous waste unless it meets a set of criteria. EH&S evaluates wastes to determine if they meet the criteria.

If a chemical waste is determined by EH&S to be a non-hazardous waste it is added to the *Non-Hazardous Waste List*. If you are using a chemical that is on the list, you can dispose of it as described. All chemicals not on this list must be regarded as hazardous and be managed and disposed of as hazardous chemical waste.

The *Non-Hazardous Waste List* can be found on the EH&S Web Pages. The URL is

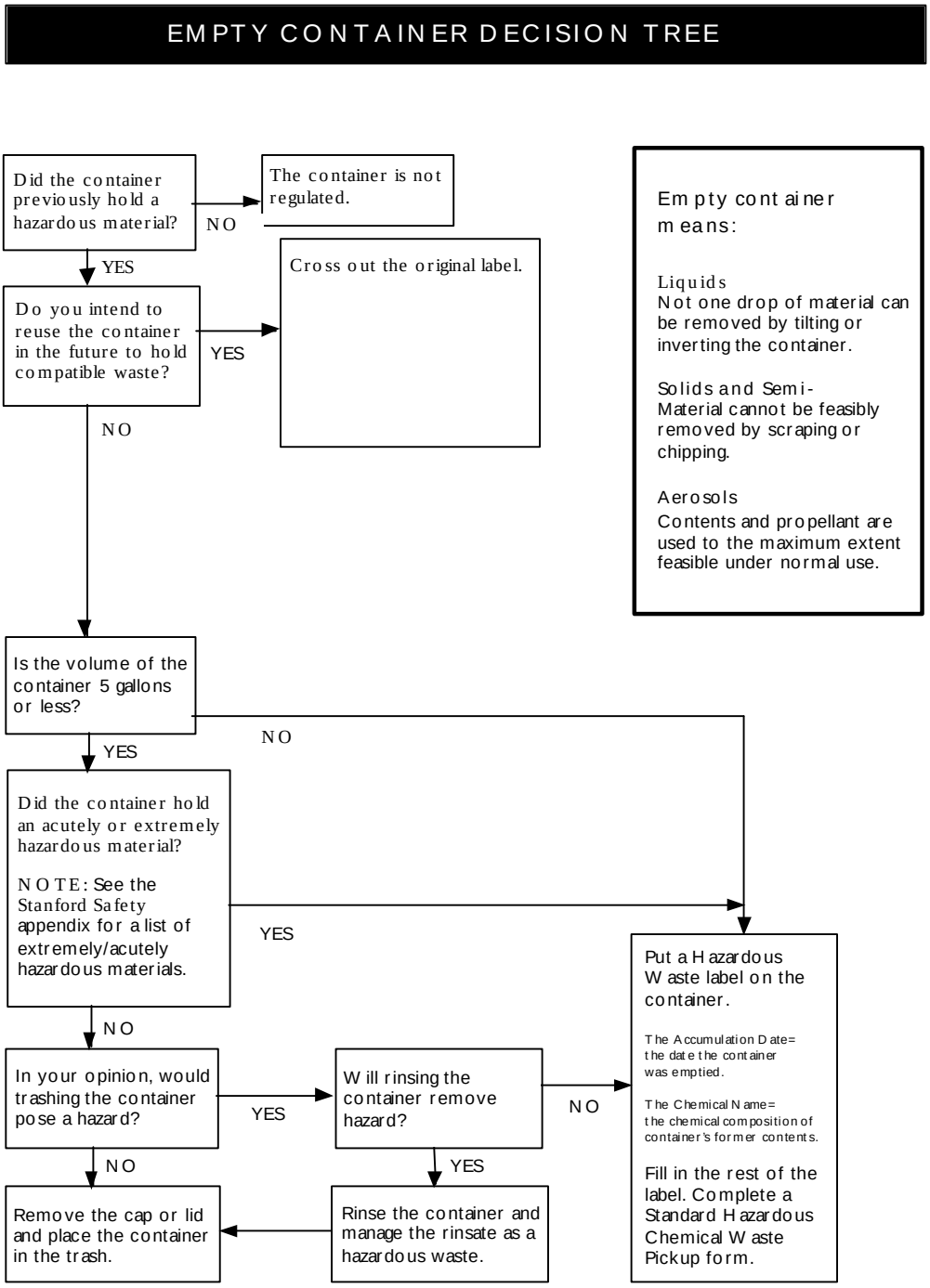
http://www.stanford.edu/dept/EHS/prod/enviro/waste/nohaz.html

The *Non-Hazardous Waste List* will be updated as more chemicals and concentrations are tested. EH&S cannot afford to evaluate all chemical wastes that are generated by campus laboratories. However, if you generate 10 gallons or more per month of a waste that you suspect should not be treated as hazardous, call EH&S (5-7520) to request that an evaluation be conducted.

Empty Container Decision Tree

Chemical waste materials must be handled as hazardous unless they are on the *Non-Hazardous Waste List*. Used hazardous materials containers are an exception, however. They have their own resource for hazard determinations, which is the *Empty Container Decision Tree*.

To properly use the *Empty Container Decision Tree*, the container must be truly empty. Not a drop of liquid, nor any solid residue that could be scraped out, may be present.



HAZARDOUS WASTE LABEL

All hazardous chemical waste must be properly labeled. Most of Stanford's regulatory citations for waste are due to absent or incorrectly filled out labels. The labels have instructions on the back. Always attach completed labels to primary waste containers, never to secondary containers.

Instructions for each point on these labels follow below. Hazardous Waste labels can be ordered from EH&S, or produced in your department. They must contain the words, "Hazardous Waste" and the information requested in items 1 through 5 as shown to the right.


HAZARDOUS WASTE
STANFORD UNIVERSITY
Instructions on Reverse Side

1 ACCUMULATION DATE
Date waste first generated: ____ ____ ____
mo. day year

2 GENERATOR INFORMATION
Name _____ Phone _____
Dept. _____ Bldg. _____ Room _____
(Waste Location)

3 CHEMICAL NAME(S) If a mixture, list ALL chemicals and concentrations/volume %. Use full chemical names – no formulas or abbreviations.
% conc or ppm

4 PHYSICAL STATE
(check one)
___ Solid
___ Liquid
___ Solid/Liquid
___ Gas

5 HAZARD CATEGORY
(check primary hazard)
___ Corrosive
___ Flammable
___ Oxidizer
___ Air/Water reactive
___ Toxic

6 DATE MOVED TO WAA ____ ____ ____
mo. day year

For EH&S Use Only
Trans ID # _____
Bldg/Rm _____

HOW TO FILL OUT THE LABEL

1 Accumulation Date

The accumulation date tracks compliance with regulations on disposal time limits. Fill in the month, day and year.

The regulations define accumulation date as:

1 the date that a NEW container receives a drop of a CHEMICAL WASTE, or

2 the date that a HAZARDOUS MATERIALS container is emptied (check the Empty Container Decision Tree to determine if it needs to be managed as hazardous waste), or

3 the date that YOU DECIDE original containers of stock chemicals are no longer needed in your laboratory.

This means the accumulation date is always "today's date," the date you make a determination or decision.

2 Generator Info

This section defines the person who produced waste material. The information you provide can be used to track the waste back to you from a disposal site if there are problems with it later. You must provide the exact location (bldg./room) where the waste was generated. Do not use the location of your office unless the waste is generated in your office.

3 Chemical Name

In the first column, list the chemical name of each constituent; write the name in full, do not use formulas or abbreviations. A brand name may be used, but you must have a MSDS for the material available in your lab. List all known constituents, including water if the waste is aqueous. (In the past you may have excluded non-hazardous constituents, however, for full compliance they do need to be listed.)

In the second column, labeled “% conc. or ppm,” indicate by some means the relative concentrations of the listed constituents. There are many ways to meet the requirements of this section of the label. All methods must fully detail 100% of the constituents in the container.

Given below are three approaches, which you may use to track the contents of your waste container while it is being filled. Another standard method for describing the waste can be developed in your lab to meet your needs; some discussion, particularly when mixtures of waste are combined, may be needed.

Approach 1 When the primary container holds only one waste mixture, simply estimate the concentration of the constituents and put it right on the label.

Approach 2 If you place various waste mixtures into one container, you may be able to accurately estimate the concentration of the final mixture simply by tracking which constituents are added to the container. To ensure that the estimation is reasonably accurate (to within a few percent) you should consider factors such as the number of researchers adding waste to the container, the length of time it takes to fill the container and the number of chemicals added to the container. Make a list of all the chemicals that you might add to the container (example given in Appendix D). Place a copy of this list on the container when you put a hazardous waste label (with sections 1,2,4 & 5 completed) on it. As you add waste to the container, place a check mark next to the names of the chemicals that you are adding. When the container is full or nearing the end of accumulation time, someone from the research group will have to estimate the final % concentration of the checked constituents and enter it onto the label.

Approach 3 When approaches 1 and 2 will not accurately describe the waste, you can track the volume and percentages of each waste that is added to the container on a separate list, then use this information to complete the label. Attach a blank piece of paper to the container when you place a hazardous waste label (with sections 1,2,4 & 5 completed) on it. Each time you add waste to the container, write on the sheet the mass or volume and quantitative description of the waste. For example, an entry might read “400 ml of 60% chloroform / 40% methylene chloride” (example given in Appendix D). When the container is full or nearing the end of accumulation time, the research group will be able to calculate the concentration or volume of each constituent and enter it onto the hazardous waste label. Be sure to complete the attachment sheet each time waste is added; remember, an inspector will cite you for not completing the label if it is obvious that the volume of waste on the attachment sheet is less than in the container!

Regardless of the approach you use to track the contents of the container, there are several acceptable ways of expressing the waste concentration of the final mixture. The chart on the next page gives examples of 3 different ways to describe one waste. You may come up with your own method as long as you indicate 100% of the constituents in the container.

EXAMPLES OF HOW TO DESCRIBE CHEMICAL NAMES ON A LABEL		
CHEMICAL NAME	% CONC OR PPM	
Example #1		
Chloroform/Methylene Chloride	(60/40)	400 ml.
Acetonitrile/water	(90/10)	800 ml.
Zinc/water	(50 ppm)	600 ml.
80% Methanol	water remainder	2,200 ml.
Example #2		
Chloroform/Methylene Chloride	(60/40)	10%
Acetonitrile/water	(90/10)	20%
Zinc/water	(50 ppm)	600 ml.
80% Methanol	water remainder	55%
Example #3		
Chloroform		6%
Methylene Chloride		4%
Acetonitrile		18%
Zinc		7.5 ppm
Methanol		44%
water		28%

4 Physical State — Check only one. Information on physical state is legally required. The labels and forms need to be explicitly marked. Check solid/liquid if the waste is two phase.

5 Hazard Category — Check only one. Check the one that is the most hazardous, also known as the primary hazard. Use your best judgment, the Chemical Safety Database and the Determining the Primary Hazard Category sheet, or a Material Safety Data Sheet to decide on the hazard category. If no hazard can be clearly identified, check toxic.

6 Date Moved to WAA — Do not fill in. This section will be completed by the person who actually transports the waste to the WAA. It applies only to areas identified and posted as Waste Accumulation Areas.

ADDITIONAL SOURCES OF INFORMATION

Two important additional sources of information when identifying a waste in order to manage it correctly include consulting the waste generator as well as the *Chemical Safety Database*.

The Waste Generator

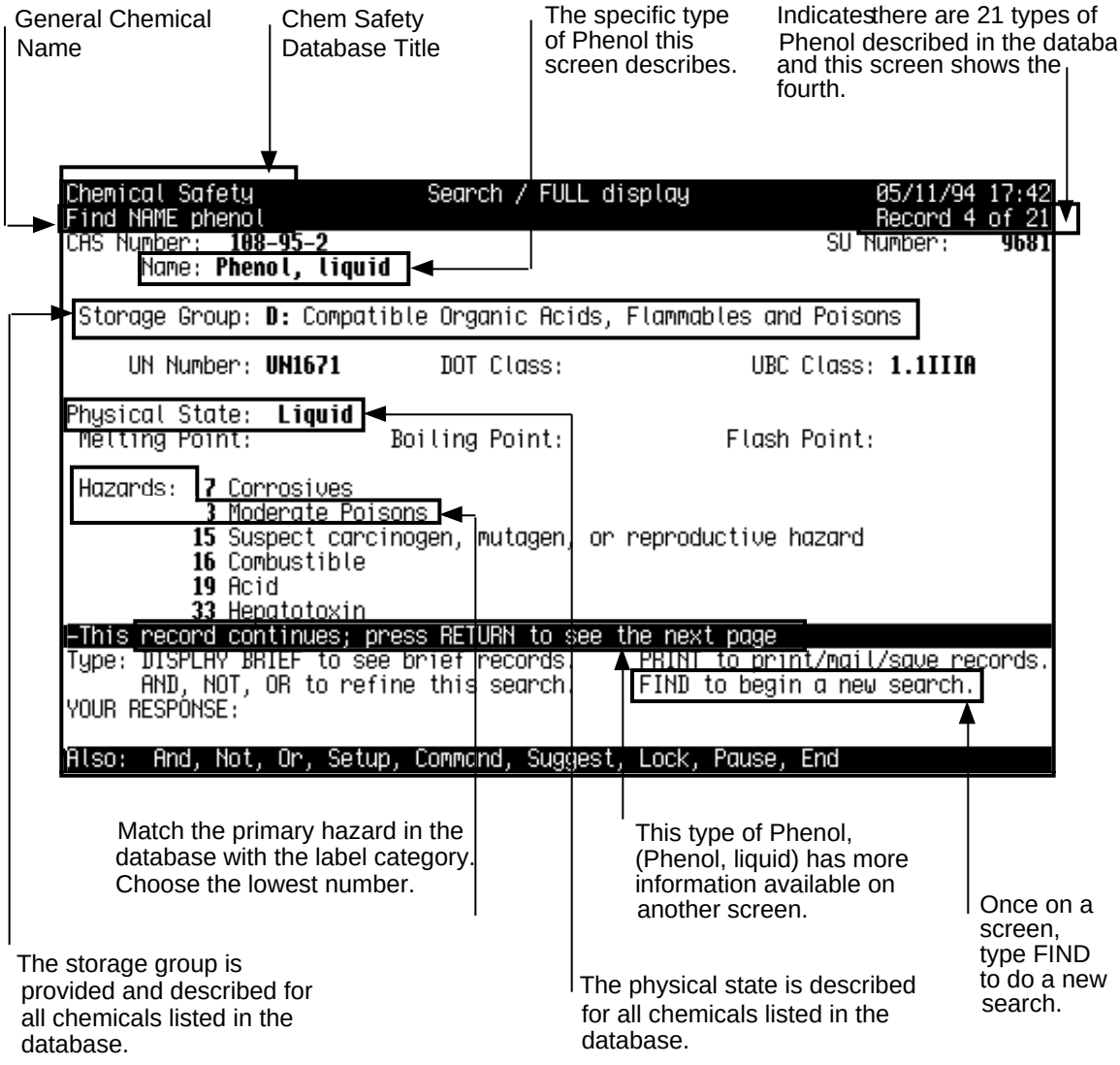
The waste generator is the person who created the waste material. The waste generator is responsible for hazardous waste determination.

Chemical Safety Database

The hazard category can be difficult to determine for accurate labeling. EH&S has created a resource that includes a listing of hazard classes for chemicals, known as the *Chemical Safety Database*. This database was created to assist you in identifying and segregating hazardous chemicals for accumulation. It:

- Allows searches of chemicals by name, Stanford ID number, Chemical Abstract Services (CAS) number or phonetic name.
- Lists physical properties, storage group and hazard class (primary hazard first).
- Is found on two campus electronic information services: Prism and Folio. Instructions on how to access these may be found in the *Stanford Safety Manual.*
- The database is especially useful for determining the appropriate hazard category for hazardous waste labels.

Chemical Safety Database Screen Example



Determining the Primary Hazard Category

The *Determining the Primary Hazard Category* reference on the following page is helpful for identifying the primary hazard category of a waste. Use this reference along with the *Chemical Safety Database*. The *Determining the Primary Hazard Category* reference matches the 40 hazard classes in the database with the five hazard categories found on the hazardous waste label. It also contains information for making hazard determinations for dilutions and mixes.

DETERMINING THE PRIMARY HAZARD CATEGORY

Convert Chemical Safety Database hazard classifications to categories on a Hazardous Waste label:

1. Find the chemical constituent(s) in the Chemical Safety Database. See page 4-20 of the *Stanford Safety Manual* to learn how to access the database. Unless otherwise noted, chemical concentrations are 100%.

2. Use the chart below to convert the lowest numbered hazard classification given in the database to the hazard category on the label. The lowest numbered classification = the primary hazard. Ignore the numbers in the first row. They do not refer to a chemical hazard.

HAZARD CATEGORY	
DATABASE CLASSIFICATION	LABEL HAZARD CATEGORY
1, 8, 9, 10, 11, 18, 24, 25, 26	Ignore these non-chemical hazards
7, 19, 20	Corrosive
6, 16	Flammable
5	Oxidizer
4, 13	Air/water reactive
Any other	Toxic

Take the concentration of a hazardous waste constituent into account when determining the hazard category of a mixture.

While some mixtures may contain many constituents, most will have only one or two in large concentrations. Use your best judgment to determine the hazard category. Look up the highest concentration chemical constituents first. To determine if the primary hazard listed in the database may have changed due to mixing, follow the six guidelines below.

1. If a constituent of a waste has a classification of corrosive and the pH of the waste mixture is >5 and <10, then the waste is not corrosive. You can get pH paper at Chem Stores or use a pH meter.

2. If a constituent is a flammable liquid and the flash point of the mixture is >140 degrees F, then the mixture is not flammable. Qualitatively evaluate the waste to determine this. For example, Ethanol/water mixtures <10% are not flammable.

3. If a constituent is a flammable solid yet so diluted that it will not sustain combustion, then it is not flammable.

4. If a constituent is aqueous and has a database classification of 4, then it is not water reactive.

5. If a constituent is in contact with the air and has a database classification of 13, then it is not pyrophoric.

6. If there is no clear primary hazard for a mixture, then it is toxic.

Material Safety Data Sheets (MSDS)

Material Safety Data Sheets, which are available from the vendor or from the Dept. of Environmental Health and Safety, provide information about the physical characteristics of a chemical which can be useful in determining the hazards of a chemical waste. MSDSs also contain important emergency response information. You can get training on the use of the MSDSs from your department's Chemical Safety Training Program.

You will want to use the MSDSs, together with the *Stanford Safety Manual*, as well as your professional knowledge and judgment, to determine both the hazard category and the storage group. MSDSs are maintained differently in each department. Check with your department or principle investigator if you are unsure of where to find them.

Stanford Safety Manual

The *Stanford Safety Manual* has very detailed information on managing hazardous materials in Chapter 4. Chemical waste is considered to be hazardous material and must meet the standards that apply to all other hazardous materials. The *Stanford Safety Manual* has a chapter on preventing and handling emergencies as well as detailed descriptions of all the services that EH&S provides. The *Stanford Safety Manual* should be available in each lab, if not order one by calling EH&S (5-7520).

SELF EVALUATION ON WASTE IDENTIFICATION (see Appendix B for answers)

1. *The University relies on the _____ to make the initial determination of whether a waste is hazardous and to label the waste accordingly.*

   a. Department of Environmental Health and Safety
   b. Principal Investigator
   c. Researcher
   d. Lab Safety Partner

2. *The definition of a waste is _____..*

   a. A material that has no intended use or reuse
   b. A material that has a lapsed expiration date
   c. Any material that has been processed
   d. A material that has no current use

3. *What unique reference tool is available at Stanford for determining if a chemical waste is hazardous?*

   a. Non-Hazardous Waste List
   b. *Stanford Safety Manual*
   c. MSDS
   d. PRISM

4. *Stanford has incurred its most numerous regulatory citations for absent or incorrectly filled out _____ .*

   a. Chemical names
   b. Labels
   c. Accumulation dates
   d. Disposal forms

5. *On a Hazardous Waste label, Accumulation Date is always "today's date" because it is:*

   a. The date a new container receives a drop of a chemical waste
   b. The date you decide processed materials have no further use
   c. The date you decide unused reagent chemicals are no longer needed
   d. All of the above

6. *To determine which hazard category to check on the label use: .*

   a. Your knowledge and professional judgment
   b. The Chemical Safety Database
   c. Determining the Primary Hazard Category
   d. All of the above

7. *If no hazard can be clearly identified, the default hazard category is _____ .*

   a. Corrosive
   b. Flammable
   c. Oxidizer
   d. Toxic

2 • Minimization of Hazardous Chemical Waste

OBJECTIVES

Do you know how to do the following? (If so, skip ahead to the *Containment of Hazardous Chemical Waste* section. If not, continue on here with *Minimization of Hazardous Waste*.)

- Recognize your responsibility in regard to minimization of hazardous chemical waste.
- Recognize ways to reduce waste while using chemicals in the lab by modifying inventory, purchasing, accumulation and recycling procedures.
- Recognize that limiting quantity and mixtures of wastes reduces costs in transportation, treatment and disposal.

OVERVIEW

Stanford is required to develop and implement a plan to minimize the quantity and toxicity of its hazardous waste. Part of this plan requires that the individual researcher take responsibility to minimize his or her waste. Refer to the *Minimization and Cost Containment Chart* for these requirements.

Minimizing the quantity and toxicity of chemical wastes and mixtures saves money, reduces long-term liability and minimizes the amount of waste generated at the university. It also reduces the costs of specialized transportation and treatment measures.

MINIMIZATION AND COST CONTAINMENT

Refer to the *Minimization and Cost Containment Chart* at the start of each investigation until you become accustomed to integrating the procedures it describes. Plan to generate waste in small amounts, at low risk in terms of hazard category, and at a low disposal cost.

Integrate minimization techniques into all laboratory activities involving chemicals: inventory, purchasing, use, accumulation and solvent recycling.

Manufacturers' Recommended Expiration Date

If a chemical has passed its expiration date it needs to be evaluated to make sure it is not now a waste. Use the following guidelines for making this determination.

- If the chemical is usable for its originally intended purpose, and is still within specifications, it is not a waste.
- If the chemical can be re-certified, or tested and is within specifications, it is not a waste.
- The useful life of peroxide forming compounds such as ethers and tetrahydrofuran is measured from the time the original container is opened and depends on the amount of exposure to air. Once opened, follow the disposal guidelines found in the *Stanford Safety Manual.*

MINIMIZATION AND COST CONTAINMENT

ACTIVITY	EXAMPLE/EXPLANATION
• Inventory •	
Dispose of expired or unused chemicals.	When you leave the University do not leave unidentified and unneeded materials behind..
Maintain good condition of labels and containers.	Clean up at the end of every day to avoid creating excess wastes.
Check inventory before ordering to avoid duplication.	
• Purchasing •	
Buy reusable gas cylinders. It costs $1,000 - $2,000 each to dispose of lecture bottles and cylinders. Some vendors will not take them back.	Return cylinders to manufacturers if valves are defective or for refills. Get specialty fills in larger cylinders that can be returned.
Purchase only as much as you need.	Bulk discounts may cost more due to eventual removal costs.
Check catalogs for quantity choices.	Select the container size appropriate for your use.
• Use •	
Reduce the scale of the experiment.	Use micro scale glassware.
Share unused portions with other researchers.	
Return unused chemicals to vendor.	Even if you are not reimbursed, Stanford saves disposal costs. Make sure the container is labeled and in good condition.
Use alternate research methods.	Know hazards of chemicals. Choose less hazardous materials for investigations and plan to use them.
Select less hazardous chemicals.	Less hazardous substitutes are available for degreasing, glass washing and preserving biological specimens. Non-mercury containing thermometers are available, and minimize hazardous waste from thermometer breakage.
Reuse chemicals before disposal if possible.	
• Accumulation •	
Segregate non-halogenated and halogenated solvents.	Treatment procedures have different costs. Segregation allows some solvents to be recycled.
Segregate acids from mixtures of acids and metals.	Keep hydrochloric acid separate from sulfuric acid contaminated with copper.
• Solvent Recycling •	
Call EH&S (5-7520) to discuss the potential of recycling your solvents. EH&S treats some solvents on site at the waste management facility.	A mixed waste of Ethanol and Xylene yields recycled Xylene.

SELF-EVALUATION ON MINIMIZATION (see Appendix B for answers)

1. *The University relies on the researcher to make determinations on how to minimize waste because he/she:*

   a. Is best able to make such a determination
   b. Has knowledge of the composition of all materials
   c. Has knowledge of the chemical analysis and processes involved in the investigation
   d. All of the above

2. *By minimizing the amount of waste and mixes created, the researcher helps keep* _____ *of transportation, treatment and disposal of wastes down.*

   a. Regulations
   b. Management
   c. Costs
   d. Effects

3. *There are five lab activities involving chemicals into which you should integrate minimization techniques. Four are listed below. What is the missing activity?*

   - Checking chemical inventories
   - Use of chemicals
   - Accumulating hazardous wastes
   - Solvent recycling
   - _____

   a. Purchasing
   b. Setting up
   c. Cleaning up
   d. Documenting

4. *When collecting waste in the laboratory a good way to reduce the expense of waste management is to:*

   a. Put non-halogenated and halogenated solvents in separate primary and secondary containers
   b. Plan to recycle solvents
   c. Put acids and mixtures of acids and metals in separate primary containers
   d. All of the above

5. *Return unneeded chemicals and _____ to save unnecessary expenses.*

   a. Catalogs to vendors
   b. Refillable gas cylinders to manufacturers
   c. Empty containers to vendors
   d. All of the above

3 • Containment of Hazardous Chemical Waste

OBJECTIVES

Do you know how to do the following? If you do, go on to the Disposal of Hazardous Chemical Waste section. If not, continue on here.

- Determine which primary and secondary container to choose for a given hazardous waste.
- Locate an appropriate primary and secondary container.
- Comply with accumulation requirements.

OVERVIEW

There are resource materials to guide you when selecting containers: the *Container Compatibility and Accumulation Criteria Charts* and the *Locating Commonly Used Hazardous Waste Containers Chart*.

CONTAINERS, COMPATIBILITY AND ACCUMULATION

It is the individual researcher's responsibility to obtain primary and secondary containers in good condition that are compatible with the wastes stored in them. Primary and secondary containers must meet all criteria on the *Container Compatibility and Accumulation Criteria Charts*.

Container Criteria

Follow the criteria from the *Container Compatibility and Accumulation Criteria Charts* when selecting primary and secondary containers. Almost any container with a proper closure will work for storing hazardous chemical waste as long as these criteria are met. Remember to attach hazardous waste labels to the primary containers only.

• Container Criteria •	
PRIMARY CONTAINERS	SECONDARY CONTAINERS
• Screw caps or tight lids are required. • No parafilms or foil for seals. • Open only when adding waste. • No leaks when inverted. • No beakers, coffee cans or flasks! • No rust or leaks. • For solids: sealable plastic bags are OK.	• Required for all wastes except immobile solids (e.g., gloves, large chunks of material and gas cylinders). • For solids: boxes and containers with lids are OK. • For liquids: tubs, barrels and trays are OK. • If holding a single primary container, then must hold 110% of the volume of that container. • If holding more than one container, then must hold 150% of the volume of largest container or 110% of the combined volume of all containers, whichever is greater.

Compatibility

Follow the regulations on container compatibility. Wastes within primary containers must be segregated according to minimization and cost containment guidelines in addition to meeting the compatibility regulations. These guidelines have been incorporated into the *Container Compatibility and Accumulation Criteria Charts*.

A secondary container can only hold primary containers of compatible wastes. All waste accumulated in a common secondary container must be from the same storage group. Storage group information on most chemicals can also be found in the Chemical Safety Database. Compatible waste and non-waste chemicals can be accumulated in the same secondary container if space is limited in your lab.

• Compatibility Criteria •
Waste must be compatible with: • The original contents of a container. • The container. • Other wastes in the container. • Wastes in all primary containers that are stored in a common secondary container.
Put acids and mixtures of acids and metals in separate primary and secondary containers.
Don't put: • Hydrofluoric acid in glass. • Strong solvents in plastic. • Strong acids in metal. • Chem waste in red bio waste bag.
Put primary containers in secondary containers, segregated by storage group.

Accumulation Criteria

The accumulation period begins when a Hazardous Waste label is completed and placed on a container.

Accumulate all hazardous chemical waste in secondary containment except solids such as gloves, large chunks of solid material and gas cylinders.

Secondary containers must be able to hold 110% of the volume of a container accumulated in it. If more than one container is placed in it, then it must be able to hold 150% of the volume of the largest single container or 110% of the combined volume of the containers placed in it, whichever is greater.

There are no regulations limiting where waste should be placed, provided that they remain under the control of one PI, thus they should be put where it makes best sense for the lab. Wastes and non-wastes may be stored together.

In order for Stanford to meet the regulatory time limits for waste accumulation, laboratories may accumulate waste for only 9 months. Once you submit a pickup request, it may take up to a month to have the waste removed from your lab. Thus, you should submit a pickup request form prior to 8 months. This allows EH&S time to pickup your waste and time to transport the waste off site in the most cost effective and efficient manner.

• Accumulation Criteria •
May be placed in flammables or corrosives cabinets.
No more than 55 gallons of waste may be accumulated at an LSAA or SAA at any one time. No more than 1 quart of extremely or acutely hazardous waste may be stored at an LSAA or SAA.
Place in cabinet under bench, shelf with earthquake protection, flammables or corrosives cabinets, hood, floor space, refrigerator. Place as close to generator, as possible.
In order for Stanford to meet the regulatory time limits for waste accumulation, laboratories may accumulate waste for only 9 months. Once you submit a pickup request, it may take up to a month to have the waste removed from your lab. Thus, you should submit a pickup request form prior to 8 months. This plan allows EH&S about 1 month to pickup your waste and enough time to transport the waste off site in the most cost effective and efficient manner.

LOCATING HAZARDOUS WASTE CONTAINERS

Containers may be obtained from campus stores or off campus. The chart below lists containers that are commonly desired and where to get them on campus. EH&S provides a variety of container types and sizes on request., at no charge. Call them at 5-7520.

At times the container you need will not be available on campus. Appropriate containers can be found at discount or other off-campus stores.

LOCATING COMMONLY USED HAZARDOUS WASTE CONTAINERS			
Volume	Closure Type	Material of Construction	Where to Obtain
0.5 L	cap	glass	Chem & Bio Stores
1 L	cap	glass	Chem & Bio Stores
2 L	cap	glass	Chem & Bio Stores
2.5 gal	cap	plastic	EH&S
5 gal	cap	plastic	EH&S
5 gal	lid	plastic	EH&S
5 gal	lid	metal	EH&S
16 gal	lid with ring and bolt	plastic	EH&S
30 gal	lid with ring and bolt	plastic	EH&S
55 gal	lid with ring and bolt	metal	EH&S
55 gal	bung	metal	EH&S

SELF-EVALUATION ON CONTAINMENT (see Appendix B for answers)

1. *It is the researcher's responsibility to obtain primary and secondary containers that are in good condition and are _____ with the wastes accumulated in them.*
   a. Compatible
   b. Lockable
   c. Unbreakable
   d. Expandable

2. *Wastes accumulated in the same container must meet two criteria. They must be:*
   a. Segregated per minimization/cost containment guidelines and have a pH between 2 and 12.5
   b. Segregated per minimization/cost containment guidelines and neutralize each other
   c. Segregated per minimization/cost containment guidelines and be compatible with each other
   d. Compatible with each other and have a pH between 2 and 12.5

3. *Secondary containment is required for _____ and mobile solids that could readily disperse if released from primary containers.*
   a. Gases
   b. Liquids
   c. Sludges
   d. Contaminated gloves

4. *The same secondary container can hold:*
   a. Wastes and non-wastes
   b. Wastes and non-wastes from different storage groups
   c. 90% of the combined volume of the primary containers it holds
   d. Wastes from different storage groups

5. *The Locating Commonly Used Hazardous Waste Containers chart can be:*
   a. Used to identify containers that are hazardous
   b. Used to locate on-campus sources of containers with the volume and material construction you need
   c. Used to match containers to hazardous waste
   d. Used to locate the nearest vendor off campus who sells appropriate containers

6. *Match the characteristics in the list at right to the containers on the left by writing the letters of the characteristics under the container names.*

CONTAINERS	CHARACTERISTICS
PRIMARY CONTAINERS	a. For liquids, tubs, barrels and trays are OK b. No rust or leaks c. No leaks when inverted or tipped d. Screw caps or tight lids are required e. For solids, boxes and containers with lids are OK f. No beakers, coffee cans or flasks!
SECONDARY CONTAINERS	g. For solids, sealable plastic bags are OK h. Required for all wastes except immobile solids (e.g., gloves, large chunks of material, gas cylinders) i. Open only when adding waste j. No parafilms for seals

True or False?

___7. Accumulation limits are as follows: Waste may not be accumulated in a laboratory area for more than 9 months. Allow up to a month for EH&S to act after you submit a pickup request form. Accumulation periods begin when a Hazardous Waste label is completed and placed on a container.

4 • Disposal of Hazardous Chemical Waste

OBJECTIVES

Do you know how to do the following? If so, you are finished with this module. If not, please continue.

- Determine if a chemical waste is not hazardous and therefore can be placed in the solid waste stream (i.e., normal trash) or poured down the drain.
- Determine whether to schedule a blanket pickup or to use a standard pickup request form.
- Correctly fill out a *Standard Hazardous Chemical Waste Pickup Form* (BHS-101).
- Correctly fill out a *Blanket Hazardous Chemical Waste Pickup Form* (BHS-100).

OVERVIEW

There are three resources for waste disposal:

- *The Non-Hazardous Waste List*
- *The Blanket Hazardous Chemical Waste Pickup Form* (BHS-100)
- *The Standard Hazardous Chemical Waste Pickup Form* (BHS-101).

NON-HAZARDOUS WASTE LIST AND TREATMENT GUIDE

All chemical wastes generated in laboratories are presumed by the State of California to be hazardous waste. Stanford may rebut this presumption by reviewing available information regarding the material, or by testing. EH&S compares the results of the review/testing to the definitions established by the State of California for toxicity, ignitability, corrosivity and reactivity.

The Non-Hazardous Waste List describes disposal methods permitted for chemical wastes that do not need to be managed as hazardous. This list of chemical wastes considered to be non-hazardous can be accessed on the Web at URL >>>

http://www.stanford.edu/dept/EHS/prod/enviro/waste/nohaz.html

If you believe that your waste is not hazardous but it is not on the list, please contact EH&S at 5-7520 for a hazardous waste determination**.**

Bench treatments (such as neutralization or precipitation) for some hazardous wastes may be allowed. Call EH&S (5-7520) if you think you have a bench treatable waste, a regulatory consultation based on your individual case is required before you can proceed.

FORMS

To dispose of hazardous chemical wastes, the proper forms must be filled out completely and accurately. There are two types of pickups. For a standard pickup use the *Standard Hazardous Chemical Waste Pickup Form* (BHS-101). For a blanket pickup use the *Blanket Hazardous Chemical Waste Pickup Form* (BHS-100).

Use blanket pickup forms if*:*

- You will generate a consistent type of waste and can predict pickup needs.
- You will generate waste amounts that will require frequent (at least every 2 months and at least 5 gallons/month) pickups.

Use standard pickup forms if*:*

- Conditions for using a blanket pickup are not present.

Standard Hazardous Chemical Waste Pickup Form

It is the researcher's responsibility to ensure that accumulation limits on hazardous chemical waste are not exceeded. Containment and disposal regulations are based on time limits rather than container or lab accumulation capacity.

Hazardous chemical waste may not be accumulated for more than 9 months in a lab or shop. Because it may take up to one month for EH&S to respond to your request, a Hazardous Chemical Waste Pickup form should be sent to them prior to 8 months. Researchers may choose to request pickups more frequently than every 8 months. Expect the pickup to occur within a month after EH&S has received your request. If the waste is not picked up, call EH&S (5-7520) to follow up. The waste remains your responsibility until it is picked up.

This reference guide covers how to complete a *Standard Hazardous Chemical Waste Pickup Form*; transfer information from hazardous waste labels and add the additional information required.

UNKNOWN WASTES

If you have a unidentified chemical waste that you want to dispose of, attempt to identify the contents by asking other researchers if they produced the material or know who did. If the original researcher cannot be found, narrow the scope of potential generators.

If your efforts at identifying the waste are unsuccessful, the contents will have to be analyzed at a significant cost. This process can sometimes take several weeks, so please notify EH&S by submitting a *Standard Hazardous Chemical Waste Pickup Form* as soon as an unknown waste is discovered. Unknown wastes cannot be removed from your lab by EH&S until they have been positively identified.

STANDARD HAZARDOUS CHEMICAL WASTE PICKUP

This form is on line now: click here to acess the new form. If you have questions call: 5-7529

Date: _____

Requested by: _____ Phone: _____

Department: _____ Room: _____

Building: _____

◆ Container Type
- C = Paper Carton, Box
- P = Plastic Bottle
- G = Glass Bottle
- M = Metal Can
- B = Plastic Bag (must be double-bagged)

● Volume/Weight
- ML.
- Liter
- Gal.
- Gm.
- Kg./Lb., etc.

■ Hazard Category
- C = Corrosive
- F = Flammable
- O = Oxidizer
- W = Air/Water Reactive
- T = Toxic

Item No.	CONTENTS Use full chemical name(s). List all constituents of mixtures. Do no use abbreviations or formulas.	◆ CONTAINER TYPE					● VOLUME/ WEIGHT	■ HAZARD CATEGORY				
		C	P	G	M	B		C	F	O	W	T
1												
2												
3												
4												
5												
6												
7												
8												
9												
10												
11												

FOR EHS Use Only

Trans ID#: _____ **Assigned:** _____ (Date) **Picked Up:** _____ (Date Time) **Delivered:** _____ (Description)

Picked Up By (initials): _____ **Comments:** (use reverse side if needed)

(Form BHS-101); G\EHS\FYI\Forms\BHS101.doc (2/1/99)

Standard Pickup Request Instructions

Date	Fill in the month, day and year of the date that you filled out and sent in the form.
Requested by	While it is the individual researcher's responsibility to complete the hazardous waste label, a disposal form may be completed by administrative staff. This section needs to be completed by the person who will take responsibility for the disposal procedure. Provide the name, phone number and department of the person requesting the pickup. Provide the building and room number of the location where the waste will be picked up. This may differ from the building or room where the waste was produced as provided on the hazardous waste label.
Contents	Transfer from the hazardous waste label. Follow the directions on the form.
Container Type	Use the legend on the form above. This section helps EH&S locate and pick up the correct containers.
Volume/Weight	Provide the amount in the volume or weight that is appropriate to the situation. If you have more than one container of the same waste, indicate this as shown in the example data on the previous page.
Hazard Category	Transfer from the hazardous waste label. Check the category that is the most hazardous, also known as the primary hazard.

Blanket Hazardous Chemical Waste Pickup Form

If you generate a consistent waste (not highly variable in composition) and need pickups every 2 months or less, and the volume is at least 5 gallons, consider submitting a *Blanket Hazardous Chemical Waste Pickup Form*. This new form allows you to select an automatic pickup interval to match your needs.

This form needs to be filled out only once for a given waste. The waste described on the form should specify a range for constituents and concentrations. Fill out a separate form for each type of waste.

Blanket requests are not applicable to wastes which are not reasonably predictable.
READ THROUGH THE NEXT TWO PAGES TO LEARN HOW TO COMPLETE A *BLANKET HAZARDOUS CHEMICAL WASTE PICKUP FORM*.

BLANKET HAZARDOUS CHEMICAL WASTE PICKUP

Use One Form Per Waste. Send to: Chemical Waste Program, ESF, MC 8007. Phone: 5-7520, Fax: 5-3468

1 TODAY'S DATE: _____ _____ _____ (MO./DAY/YR.)

2 GENERATOR/REQUESTED BY:

NAME _____ PHONE _____

DEPT. _____ BLDG. _____ ROOM _____

3 PROCESS GENERATING WASTES: _____

4 NAME OF WASTE: _____

5 PHYSICAL STATE: SOLID LIQUID SOLID/LIQUID GAS

6 HAZARD CATEGORY: CORROSIVE FLAMMABLE OXIDIZER AIR/WATER REACTIVE TOXIC

7 ANY SPECIAL ROOM ACCESS INSTRUCTIONS: _____

8 FREQUENCY OF PICKUP: WEEKLY MONTHLY OTHER

9 AMOUNT GENERATED: _____

10 CHEMICAL DESCRIPTION

Provide full chemical names. If using a brand name, supply MSDS with this request. Do not use abbreviations or chemical formulas. List all known constituents, including water if the waste is aqueous. Provide estimated percent concentration for each constituent using a range of expected values. Be sure to provide both lower and upper expected concentration for each constituent.

CHEMICAL NAME(S)	**CONCENTRATION**	
	LOWER	UPPER

Does the waste contain any of the following metals, PCBs or Dioxins?

Circle them or check none:

Antimony	Arsenic	Barium	Beryllium	Bromine	Cadmium	Chlorine	Chromium	Cobalt
Copper	Dioxin	Fluorine	Iodine	Lead	Manganese	Mercury	Molybdenum	Nickel
Potassium	Selenium	Silicon	Silver	Sodium	Sulfur	Thallium	Vanadium	Zinc

NONE _____

Do you need another container(s) dropped off? 2.5 GAL. 5 GAL. OTHER _____

Blanket Pickup Request Instructions (one form per waste type)

1 Today's Date	The date you filled out the form. Fill in the month, day and year.
2 Gen./Requested by	While it is the researcher's responsibility to complete the hazardous waste label, a disposal form may be completed by administrative staff. This section needs to be completed by the person who will take responsibility for the disposal procedure. Provide the name, phone number and department of the person requesting the pickup. Provide the building and room number of the location where the waste will be picked up. This may differ from the building or room where the waste was produced as provided on the hazardous waste label.
3 Process	State the activity involved in generating the waste. This is required on a blanket pickup request form because the university needs to keep track of processes and investigations that generated large volumes of waste for reporting purposes.
4 Name of Waste	Provide the "street name" of the waste or a common abbreviation. This will help facilitate the administration of the blanket pickup request process for both your department staff and EH&S.
5 Physical State	Transfer from the hazardous waste label. Circle the appropriate one.
6 Hazard Category	Transfer from the hazardous waste label. Circle the primary hazard.
7 Frequency of Pickup	Circle the appropriate information or write it in. Frequency must be at least every two months to qualify for using a blanket pickup.
8 Amount Generated	Provide the estimated amount in the volume or weight that is appropriate to the situation. Add a range if you anticipate the amount will vary slightly. NOTE: Container type is not requested. This allows different types and sizes of containers to be used in a blanket period. You don't always have to accumulate the waste in the same container type. You do need to generate a consistent waste type and amount.
9 Chemical Description	Follow the directions on the form. The opportunity to list upper and lower concentrations of each chemical constituent allows you to dispose of a range of waste material on a blanket request basis. The upper concentration column must total at least 100%. Circle the metals in your waste. PCBs and dioxins must also be circled. Wastes that contain metals, PCBs and dioxins are more costly to treat. Circling the metals, PCBs and dioxins in your waste accelerates the administration of your blanket pickup request by allowing a quick scan to detect them.

SELF EXAMINATION ON DISPOSAL (see Appendix B for answers*)*

1. *It is the _____ responsibility to see that storage limits on hazardous chemical*
   waste are not exceeded.

   a. Department of Environmental Health and Safety's
   b. Researcher's
   c. Principal investigator's
   d. Lab Safety Partner's

2. *Labs may not accumulate hazardous chemical waste for more than 9 months. However, the maximum length of time researchers should keep their waste before arranging for pickup is _____ because time is needed for EH&S to retrieve it, manage it cost effectively for disposal and prepare the administrative documents required by the regulators.*

   a. 9 months
   b. 3 months
   c. 8 months
   d. 11 months

3. *Non-hazardous waste may be disposed of down the drain or in the garbage as described in the _____.*

   a. Non-Hazardous Waste List
   b. Rad-Chem-Bio Hierarchy
   c. Standard Hazardous Chemical Waste Pickup form
   d. Minimization and Cost Containment chart

4. *Call _____ for a consultation if you wish to treat your waste in the lab to remove or reduce its hazardous properties.*

   a. Your PI
   b. Your Lab Safety Partner
   c. The Palo Alto Treatment Facility
   d. EH&S

5. *When you need to schedule a hazardous chemical waste pickup you will need to decide between standard or blanket types. Which of the following describe criteria for selecting blanket pickups?*

    a. Consistent generation of a waste not highly variable in composition
    b. Frequent (at least every 2 months) generation of the same waste
    c. High volume generation of various waste
    d. Waste accumulated in the same room where it was produced

6. *Regular pickup forms may be completed and sent in at any time. Plan for EH&S to take up to _____ to schedule and pick up your waste.*

    a. 3 months
    b. 8 months
    c. 7 days
    d. 1 month

7. *If the contents of a material are not established, it may have to be considered an unknown. What is the best action to take with an unknown waste?*

    a. Fill out a Standard Hazardous Chemical Waste Pickup form to have the waste picked up.
    b. Find out who may have produced the unknown, determine its composition, label it and arrange for its disposal.
    c. Call EH&S to report it so that they can plan to test it before picking it up.
    d. Call your Lab Safety Partner because it is their responsibility to handle unknowns.

Appendix A

Non-Hazardous Waste List

URL> **http://www.stanford.edu/dept/EHS/prod/enviro/waste/nohaz.html**

or you can reach it by going to the EH&S Home Page at

http://www.stanford.edu/dept/EHS/

click on the Environmental Program then

click on the "List of Non-Hazardous Waste"

Appendix B

Answers to Self-Evaluations on:

IDENTIFICATION

1. c. Researcher
2. a. A material that has no intended use or reuse
3. a. Non-Hazardous Waste List
4. b. Labels
5. d. All of the above
6. d. All of the above
7. d. Toxic

MINIMIZATION

1. d. All of the above
2. c. Costs
3. a. Purchasing
4. d. All of the above
5. b. Refillable gas cylinders to manufacturers

CONTAINMENT

1. a. Compatible
2. c. Segregated per minimization/cost containment guidelines and be compatible with each other
3. b. Liquids
4. a. Wastes and non-wastes
5. b. Used to locate on-campus sources of containers with the volume and material construction you need
6. PRIMARY CONTAINERS
    - b. No rust or leaks
    - c. No leaks when inverted or tipped
    - d. Screw caps or tight lids are required

f. No beakers, coffee cans or flasks!

g. For solids, sealable plastic bags are OK

i. Open only when adding waste

j. No parafilms for seals

SECONDARY CONTAINERS

a. For liquids, tubs, barrels and trays are OK

e. For solids, boxes and containers with lids are OK

h. Required for all wastes except immobile solids (e.g., gloves, large chunks of material, gas cylinders)

7. True

8. True

DISPOSAL

1. b. Researcher's

2. c. 8 months

3. a. Non-Hazardous Waste List

4. d. EH&S

5. a. Consistent generation of a waste not highly variable in composition and
   b. frequent (at least every 2 months) generation of the same waste

6. d. 1 month

7. b. Find out who may have produced the unknown, determine its composition, label it and arrange for its disposal