Caltech

HAZARDOUS WASTE MANAGEMENT GUIDE

Revision: 2022

OFFICE OF ENVIRONMENT, HEALTH, AND SAFETY

CALIFORNIA INSTITUTE OF TECHNOLOGY

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Contents

CHAPTER ONE – OVERVIEW

INTRODUCTION

The California Institute of Technology recognizes its responsibility to ensure that we manage all activities involving hazardous wastes, and are conducting our work in a manner that provides for the safety of its employees, students, visitors, environment, and future sustainability in the pursuit of research.

To fulfill these responsibilities, the specific guidelines in this reference guide have been developed and implemented to promote the safe management of these hazardous wastes throughout all of the Institute's operations and ensure the proper disposition of these wastes through recycling or termination.

APPLICABLE REGULATIONS

There are several major regulations applicable to the proper management of environmental waste.

Resource Conservation and Recovery Act (RCRA)

The Federal RCRA laws require that generators of hazardous waste comply with the requirements under Title 40 of the Code of Federal Regulations, part 262.

The regulations require that anyone that produces hazardous waste must properly identify the chemical or biological dangers of the material first. Once the waste has been characterized, it must be properly managed where it was "generated", and then transported to a RCRA permitted Treatment, Storage, or Disposal Facility (TSDF).

Toxic Substances Control Act (TSCA)

In addition to the RCRA, Federal law also enacted a special set of laws regarding substances that had long term effects on both human and environmental health. Of particular note, TSCA requires that we properly identify sources of PolyChlorinated Biphenyls (PCBs) and Asbestos.

PCBs are generally found as preservatives in oils used in older electrical equipment such as transformers and light ballasts. However, they can be found in other types of

equipment as well. Normally, there will be some identification that the equipment contains PCBs.

Asbestos can be found as thermal insulation, fireproofing, and in structural support members in some of the buildings on campus and around older pipes as addressed in the Institute's Asbestos Management Program.

California Environmental Protection Laws

The State of California has enacted additional laws that further regulate hazardous wastes beyond the Federal requirements (CA Title 22, Division 4.5, Chapter 12). Wastes such as used motor oil or those materials which cause widespread aquatic environmental damage are treated as hazardous wastes for State purposes.

HOW DOES THIS AFFECT ME AT THE INSTITUTE?

Everyone at the Institute has a responsibility to make sure that if they create a hazardous chemical or biological waste, they are to to properly identify them as hazardous wastes. By working together, we can ensure that the Institute stays compliant with all laws and regulations, thereby ensuring a bright environmental and sustainable future for all.

While this manual references biohazardous waste material, you should refer to the Institute Biosafety manual for a more comprehensive discussion on the handling and disposal of biohazardous waste in accordance with regulations found in the California State Medical Waste Management Act.

CHAPTER TWO: HAZARDOUS WASTE DETERMINATION

OVERVIEW

This chapter identifies those chemicals classified as hazardous and require disposal through the Institute Hazardous Waste Program administered by the Environment, Health, and Safety (EHS) Office.

For the purposes of the Program, a "waste" is defined as a material that you have decided that you no longer need or want in your work area that you want to dispose of. **If that material is, or has come in contact with, a hazardous chemical, biological, or radiological substance, it is classified as a "hazardous waste".** Hazardous wastes are exclusively handled through the EHS Hazardous Waste Program.

Identification, or determination, of a hazardous waste is based on whether the material is:

(a) a listed hazardous waste under the regulation; or

(b) tested to show that it exhibits one of the forty characteristics of hazardous waste.

The following are some examples of hazardous wastes that are routinely generated on campus that are to be managed through the EHS Hazardous Waste Program:

- Solvents (for example, benzene, toluene, acetone, THF).
- PCB Electric Light Ballasts.
- Old chemicals in research labs that should be discarded.
- Discarded Paint.
- Used Motor Oil.

The above list is not all inclusive. When in doubt, contact the EHS Office to check if you have a hazardous waste for disposal.

LISTED WASTES

Under Federal and State regulation, a "Listed Hazardous Waste" is a waste generated from a process that is "listed" in the regulation. For example: solvents that have been

used in cleaning. The actual list ranges from general (non-specific) processes to hazardous wastes generated from specific processes.

An example of a listed general process waste would be solvents that have been used in research analysis and are now being disposed (spent solvents).

An example of a listed specific process waste would be heavy ends from the distillation from ethylene.

Usually, most of the listed wastes generated at the Institute are classified under the general process as defined above.

(Reference: Title 22, Division 4.5, Chapter 11, §§66261.30-66260.35)

CHARACTERISTIC WASTES

In addition to "Listed Hazardous Waste", the Institute must also determine if any "Hazardous Waste Characteristics" are exhibited by the waste. There are typically four areas of characteristics:

1. Flammable: Wastes that have a flashpoint less than 141°F or are oxidizers.

2. Corrosive: Wastes have a pH<2 or a pH>12.5

3. Reactive: Wastes that are shock sensitive or become reactive when they come in contact with air, water, or certain common chemicals.

4. Toxic: Wastes that exhibit a threat to human or environmental health because it is:

- A toxic metal or pesticide;
- Exhibits oral toxicity;
- Is a known carcinogen or mutagen; or is
- Toxic to aquatic species.

(Reference: Title 22, Division 4.5, Chapter 11, §§66261.20-66261.24)

AM I CREATING HAZARDOUS WASTE?

If your work at the Institute generates a waste that has chemical, biological, or radiological properties, then chances are, you are creating hazardous waste.

It is important for each of us to be responsible in keeping track of what materials are going into a waste container for several reasons.

First, it is a personal and workplace safety issue. Mixing various materials together is never a good idea. Keep wastes which are compatible together. Likewise, separate any incompatible wastes.

Second, when you keep track of what goes in the waste container, it helps both you and the Institute maintain an environmentally sustainable place for Caltech to support and maintain its goals for research.

UNKNOWN HAZARDOUS WASTES

When an unknown waste is discovered, an attempt must be made by the Group to identify its contents immediately. In the event the waste cannot be identified, then an analysis to identify the unknown waste will be performed.

Any analysis performed under EHS review will be conducted for the specific laboratory or location in which it was discovered. Divisions/Departments and research groups are directly responsible for those costs.

NON-HAZARDOUS WASTES

A waste is determined to be non-hazardous if it is listed on the Non-Hazardous Waste List, located in Appendix B. If you are using a chemical that is on this list, then dispose of it in the manner described. All chemicals not listed must be regarded as hazardous and be managed and disposed of as a hazardous waste.

CHAPTER THREE: HAZARDOUS WASTE HANDLING AND DISPOSAL REQUIREMENTS

OVERVIEW

The Institute's policy regarding responsibilities and procedures concerning the handling and disposal of hazardous waste is necessary because the Institute can be inspected annually by Federal, State, or local regulatory agencies to ensure compliance with hazardous waste regulations. Failure to meet all of the regulations can lead to a Notice of Violation and potential costly fines.

RESPONSIBILITIES

PRINCIPAL INVESTIGATORS

Principal Investigators (PI's) have the primary responsibility for ensuring that their laboratory personnel follow the Institute's procedures for the handling and disposal of hazardous waste(s). Specifically, PI's are responsible for ensuring:

• Only authorized personnel have access to their laboratory operations;

• All authorized laboratory personnel have received appropriate hazardous waste training;

• All authorized laboratory personnel follow Institute hazardous waste procedures;

• Training on their hazardous waste disposal areas in the laboratory, including waste containment and requests for removal; and

• Appropriate personnel protective equipment (PPE) is available and worn when necessary. NOTE: The Chemical Hygiene Plan will assist personnel in determining PPE requirements.

LABORATORY PERSONNEL

Laboratory personnel are responsible for:

• Making the initial determination when a material becomes a hazardous waste;

• Using appropriate laboratory practices to properly identify research materials and wastes generated from experimentation including but not limited to the proper labeling and tagging of containers;

• Following all requirements for hazardous waste generated from experimentation including but not limited to the tagging the waste containers and date the first drop/item of waste was created;

• Ensuring lab procedures for placing hazardous wastes in the designated areas are completed; and

• Following Institute procedures governing the handling and disposal of hazardous waste.

FACILITIES PERSONNEL

Facilities personnel are responsible for:

• Making the initial determination when a material becomes a hazardous waste;

• Placing the “Hazardous Waste Marking” on all hazardous waste containers along with the date the first drop/item of waste enters the container; and

• Following Institute procedures governing the handling and disposal of hazardous waste.

EHS

The EHS Office is available to provide support in all areas of hazardous waste operations, including:

• Providing training and/or training materials to faculty and laboratory personnel who generate hazardous waste;

• Transportation of hazardous waste from Satellite Accumulation Areas (SAA) to the Waste Accumulation Facility (WAF);

• Final hazardous waste identification and disposition;

• Performing analytical or hazard characterization testing as needed; and

• Managing the Institute's hazardous waste to approved hazardous waste Treatment, Storage, and Disposal Facilities (TSDF).

HAZARDOUS WASTE ACCUMULATION AREAS

There are two categories of accumulation areas at the Institute for hazardous waste. The first category are Satellite Accumulation Areas (SAA) which are typically found in laboratories and work areas that create and collect small amounts of hazardous waste as a part of their ongoing operations.

The second category is the 90-Day Waste Accumulation Facility. All hazardous wastes generated on campus are managed by EHS and taken to the 90 Day Hazardous Waste Facility.

GENERAL REQUIREMENTS

SATELLITE ACCUMULATION AREAS

The following are SAA requirements:

• Must be waste generated as a part of work in research or facility operations;

• Cannot accumulate more than 55 gallons total of all hazardous wastes;

• Cannot accumulate more than one quart of any single extremely or acutely hazardous waste. The list is available in Appendix A of this manual.

• Waste must be stored in an area at or near the point of generation and should be under the control of the person generating the waste;

• All rooms from which hazardous waste is accumulated must be on the same floor, in nearby rooms;

• All containers used should be compatible with the hazardous waste and should be in good condition to contain the material and should be kept closed when not in use; and

• All hazardous waste containers must be tagged with an EHS hazardous waste tag in research areas or alternatively with the Hazardous Waste markings in Facilities areas.

• Accumulation of hazardous waste begins when the first drop enters the waste container. The container can be used only for 9 months or when the container is full, whichever is sooner. After that time the waste must be identified to EHS office for disposal.

• When waste is ready for pickup, the container should be properly sealed to prevent any of the internal material from spilling or otherwise exiting the container. An AIM Work Request should be placed through the AiM Customer Portal for pickup as necessary.

RESEARCH AREAS

For research areas, EHS will coordinate with the PI, faculty, and staff members to determine the best location for their SAAs. Where secondary trays are needed for containment, research personnel will place SAA stickers on the trays/bins only.

NOTE: If a fume hood is used, SAA stickers should not be placed on the fume hood itself and only on the trays containing the hazardous waste containers.

90 DAY HAZARDOUS WASTE ACCUMULATION FACILITY

All hazardous wastes collected from the various research and facility operations' SAAs are collected by EHS on a schedule based on waste requests placed through the AiM Customer Portal and established weekly schedule.

NOTE: Research labs that generate large quantities of hazardous waste should contact the EHS Office and discuss the possibility of being added to the weekly schedule.

The 90 Day Waste Accumulation Facility holds consolidated solvents and lab packed chemical waste. Shipments of hazardous waste will be shipped out of 90 Day area as necessary.

CHOOSING THE RIGHT CONTAINER AND STORAGE

It is important to use the proper container when collecting hazardous waste(s). A hazardous waste collected in the wrong container could pose a danger to laboratory personnel, EHS personnel and Institute property. EHS will provide 2 gallon Jerri cans for the collection of solvent waste. For all other wastes, it is the responsibility of the person generating the waste to place it into a proper container for waste accumulation and storage.

Generally, the best containers for the accumulation of hazardous waste are the ones that originally held the material.

Please use the following guidelines when collecting hazardous wastes:

• Use a separate container for each hazardous waste;

• Use an appropriate container size to accommodate the amount of waste being generated;

• Use containers that are constructed of a material that is compatible with the hazardous waste(s) being contained;

• Use containers which are in good condition and otherwise leak proof;

• Use only hazardous waste containers that are non-leaking and can be tightly capped;

• Never completely fill any container containing liquid hazardous waste. Allow at least two inches of air space near the top of the container to prevent pressure buildup;

• Unless the transfer of hazardous waste to a container is occurring, no containers may be open during the accumulation period. In the event that a funnel will be used for the transfer of a hazardous waste into a container, the EHS Office recommends the use of a Nalgene Safety Waste Funnel. This funnel can be purchased in the VWR stockroom.

• Containers must be labeled with a Caltech Hazardous Waste Tag. The start date of the accumulation should

be filled out the FIRST day and time that the container is being used.

For biohazardous serological pipettes and sharps boxes (both chemical hazardous and biohazardous), step cans and appropriate bio bins can be purchased at the BI or Alles stockrooms located at the Institute. For more information, please contact the Institute Biosafety Officer.

LABELING THE CONTAINER

All hazardous waste containers shall be labeled with a Caltech Hazardous Waste Tag available upon request to safety@caltech.edu. See sample on following page. If the listing of substances will not fit on the initial hazardous waste tag, then a continuation sheet may be used in conjunction with the initial hazardous waste tag. In either case the tag must be completely filled out with the following:

• When the first drop/item of hazardous waste is placed in the container, the tag must be dated and physically attached to the container. This is identified on the tag as the “Date Waste is First Generated”;

• The chemical composition of the waste must be listed on the tag. Formulas, chemical structures and abbreviations are not acceptable for substance identification;

• All constituents in solid and liquid mixtures must be identified, and to the extent possible, the top three constituent concentrations listed (estimates are acceptable);

• The physical state must be indicated as either a gas, liquid, or solid. More than one physical state can be marked off on the tag; and

• One or more hazard class(s) must be identified on the tag. If the presence of an oxidizer, sulfide, or cyanide is present, it must be indicated specifically on the tag. The hazard class can be found on the Safety Data Sheet (SDS) for that substance. SDS’s are located on the EHS office website or can be found on-line at http://www.msds.com/ and http://sigmaaldrich.com.

• Hazardous waste containers that are ready to be picked up must have the “ready for pickup” box checked off on the top of the hazardous waste tags. Bottles that are not checked off will not be collected as this signifies that the bottle is still in use by the lab.

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Ready for X Pick-up

CALTECH
Pasadena, CA
HAZARDOUS WASTE

Complete and Attach to Container When Waste Is First Generated

Date Waste Is First Generated: 9/15/2016

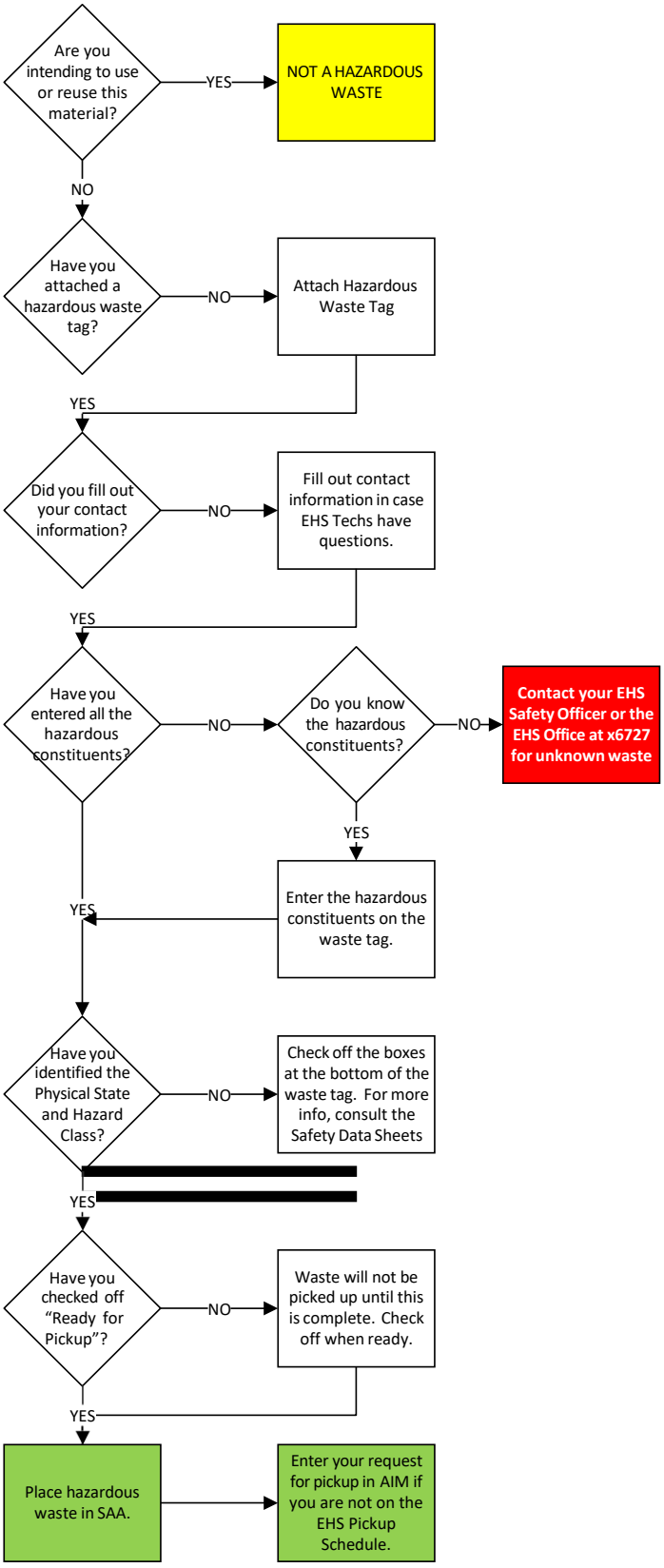
PI / E-mail: JSMITH@caltech.edu
Safety Officer / E-mail: BDoe@caltech.edu
Contact Person / E-mail: CFrank@caltech.edu
Lab Location: Schlinger B199
Phone Number: x9999

Substance Identification
Do Not Abbreviate / No Chemical Formulas

Component (Write Additional Below)	%
Isopropyl Alcohol	10
benzene	20
toluene	70

Physical State
☐ Gas ☑ Liquid ☐ Solid

Hazard Class (check at least one)
☐ Asbestos ☑ Flammable ☐ Corrosive
☐ Reactive ☐ Poison ☐ Oxidizer
☐ Other (specify): _____



SEGREGATION OF CHEMICALS/ INCOMPATIBLE WASTES

Caution must be exercised in any area where hazardous chemicals or waste are accumulated to assure incompatible materials are segregated appropriately. Segregate by the chemical or waste hazard class, not alphabetically. Consult the chemicals' Safety Data Sheet (SDS) or any other chemical information resources, such as the Merck Index or Hawley's Chemical Dictionary, for compatibility information. The following are examples of incompatible chemicals:

- Flammables and Oxidizers;
- Elemental Metals and Hydrides;
- Cyanides and Acids;
- Sulfides and Acids;
- Bases and Acids;
- Flammables and Acids;
- Chlorine Compounds and Acids;
- Elemental Metals and Acids;
- Chlorine Compounds and Amines;
- Air or Water Reactives and Anything;
- Organic Peroxides and Anything.

Biological and radiological hazardous wastes must be segregated and stored in their own containers. Please contact EHS at x6727 for additional guidance.

SCHEDULING A WASTE PICKUP

There are generally two methods to schedule a hazardous waste pickup.

Research areas that generate high volumes of hazardous waste are placed on a recurring schedule that is determined by the hazardous waste type (chemical or biological). Please contact EHS at x6727 to have a Safety Engineer come to your laboratory and make an assessment.

The second method is through the AiM Customer Portal. Login to your Caltech Access Account at access.caltech.edu and click on the AIM Customer Portal option. Enter all of the appropriate information into the request and the hazardous waste pickup will be scheduled at the first available opportunity.

Please note that in all cases, hazardous wastes must be properly tagged and identified for pickup (the "Ready for Pickup" box must be checked off on the tag). If the hazardous waste tag does not meet proper hazardous waste identification or the Ready for Pickup box is not checked off, the waste cannot be removed from the lab because regulatory compliance has not been met.

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CHAPTER FOUR: OTHER SPECIFIC WASTE REQUIREMENTS

UNKNOWN CHEMICAL WASTES

Any Campus Hazardous Waste Generator is responsible for ensuring all chemicals and wastes under their control are identified and clearly labeled. In the event that a chemical is found and its contents unknown, then the following steps should be taken:

- Make an attempt to identify the contents of the container. As applicable, speak to other lab members or facilities personnel to determine who and how this waste was generated;
- If the contents still cannot be identified, attach a hazardous waste tag to the container and write the word “UNKNOWN” in the description section.
- Notify the EHS Office that you have an unknown hazardous waste and that you require waste characterization services. You will need to provide a PTA number for the cost of a waste characterization, which is charged per container;
- Leave the unknown container(s) in the SAA where it was generated until all waste characterization work is completed;
- When the waste has been characterized, EHS will either provide additional instructions or remove the hazardous waste container.

CHEMICAL CLEANOUTS

Chemical cleanouts refer to the process where outdated or unwanted chemicals are identified for disposal.

It is the responsibility of the PI, Division, or Facilities Manager to ensure that the chemicals for removal are properly segregated and labeled for pickup by EHS. EHS can assist with an initial evaluation of the laboratory and provide labeling and segregation instructions.

EHS Service Request

In the event that the PI, Division, or Facilities Manager does not wish to segregate or label their excess chemicals, EHS can provide contractors to facilitate the laboratory cleanout.

Be advised that the PI, faculty, or Division will be responsible for all contractor charges associated with arranging this service.

Abandoned Laboratories/ Facilities Operations Areas

When an abandoned research area or facilities operations area is discovered that contains hazardous chemicals for disposal, the Division or appropriate Facilities Manager will be notified.

Upon notification, the Division or Facilities Manager will provide a PTA so that EHS can organize contractors as necessary to perform the work to remove the hazardous chemicals and decontaminate the space.

An estimate will be provided to the Division or Facilities Manager for their approval prior to start of work.

GAS CYLINDERS

Gas Cylinders normally come in two sizes. If you have a large cylinder that was ordered from Facilities, these are managed under the Facilities Cylinder Management Program. Contact the Manager for Facilities Logistic Services for more information.

Smaller lecture bottle sized cylinders that will no longer be used are considered hazardous waste. Please contact the EHS Office to obtain more information for their disposal.

EMPTY CONTAINERS

Under current regulations, a chemical container is considered empty when the container has been triple rinsed with a solvent capable of removing the chemical from the container.

The rinsate is also considered a hazardous waste and must be collected for disposal.

Once the container is empty, it may be disposed of as regular trash/glass waste.

GLASS WASTE

If glassware is not contaminated based on the empty container decision tree, then it may be disposed as a non-hazardous

waste. When disposing of glassware that is a non-hazardous waste, the following must be followed:

• Place all glassware in a Broken Glass Disposal Carton. (These may be purchased through the VWR or Biology stockrooms);

• When full, tape the carton's top to seal shut;

• Make sure that there is no penetration of the disposal carton by the glassware enclosed within the carton; and

• Place the carton in a location where your custodian will be able to see it, or request that custodial pick up the carton for disposal using the AiM Customer Portal.

ETHIDIUM BROMIDE

Unwanted ethidium bromide, gels, and working solutions must be disposed of as hazardous waste. EHS will provide 5 gallon buckets for the disposal of gels containing ethidium bromide. Disposal of ethidium bromide into the sanitary sewer (sink drains) is strictly prohibited.

UNIVERSAL WASTE

Universal wastes are hazardous wastes that are more common and pose a lower risk to people and the environment than other hazardous wastes. Federal and State regulations identify universal wastes and provide simplified rules for their handling, recycling, and disposal. The regulations, called the "Universal Waste Rule", are in the California Code of Regulations, Title 22, Division 4.5, Chapter 23, and § 66273.1 et seq.

The following are the Institute's universal wastes and the management practices associated with them:

Batteries

Universal waste batteries include rechargeable nickel-cadmium batteries, alkaline batteries, silver button batteries, mercury batteries, small sealed acid batteries (burglar alarm and emergency light), and carbon zinc batteries.

Containers for the disposal of these batteries are located in most campus buildings.

Cathode Ray Tube (CRTs) and Consumer Electronic Devices

CRT's, such as television picture tubes and non-flat panel computer monitors are considered universal wastes. A typical 17 inch computer monitor contains approximately 2.2 pounds of lead. A 27-inch television can contain up to 8 pounds of lead.

Consumer Electronic Devices (CED's) are electronics that exhibit hazardous characteristics and are considered a universal waste. Examples of CED's include cell phones, computer hard drives, microwaves, computer printers, cordless phones, DVD's, and VCR's.

Prior to disposal of CEDs, the EHS Office strongly recommends that you fully erase or disable units that are capable of storing sensitive information.

Certified destruction of data storage devices (for example, hard drives) is available at the cost of the Division/Department requesting this service.

The EHS Office coordinates the disposal of both CRT's and CED's on a monthly basis. If you would like to dispose of these items, please go to access.caltech.edu and fill out an AIM Work Request to get this issue managed.

Lamps and Fluorescent Tubes

Universal waste lamps include fluorescent tubes, high intensity discharge lamps (HID's), and sodium vapor lamps. Facilities replace universal waste lamps on a recurring basis at the Institute. Once a lamp has been spent, it is collected and consolidated at the E-Waste Container.

Large cardboard boxes, called "coffins" can be provided by the EHS Office. Place all lamps into the coffins to ready them for disposal and contact Transportation using the AiM Customer Portal to move the coffin to the E-Waste Storage Container when ready.

CHAPTER FIVE: WASTE MINIMIZATION

INTRODUCTION

The California Institute of Technology is committed to reducing the amount of hazardous waste generated by Institute operations. Below are a few strategies that will help the Institute in minimizing the generation of hazardous waste.

SUBSTITUTION

Replace toxic or other hazardous materials you use with less hazardous or non-hazardous substances. This is the best way to minimize hazardous waste.

Mercury thermometers can be replaced with alcohol thermometers. The debris and mercury from a thermometer must be dealt with as hazardous waste, while a broken alcohol thermometer can be disposed of as broken glassware. NOTE: The EHS Office provides a mercury thermometer exchange program for those research groups that would like to swap out their mercury thermometers for alcohol ones.

The process for mercury thermometer exchange is that a researcher shall bring the mercury thermometer(s) to the Safety Office and once received, Safety will issue a $50 credit towards a new non-mercury thermometer then notify the VWR Stockroom that researchers may pick-up a replacement. Any amount over $50 will be the responsibility of the researcher and credits cannot be combined.

Chromium and acid-based glassware cleaning solutions can be replaced with alconox or no-chromix glassware cleaners. Toluene-based flammable scintillation cocktails can be replaced with non-flammable cocktails.

RECYCLING AND REDISTRIBUTION

Chemicals that are unused or unopened can often be redistributed to other labs or work areas for reuse, saving both disposal costs and new product costs for someone else.

We encourage communication within members of a Division to discuss availability of reagents to help minimize the unnecessary creation of hazardous waste. If you require assistance, please contact the EHS Office.

EXPERIMENTAL DESIGN STRATEGIES

The Institute encourages researchers to actively consider experimental designs where hazardous chemicals are rendered non harmful as a part of the experiment process.
Federal and State laws permit limited treatment of hazardous waste

if it is created as a part of benchtop research work. (Please refer to 40 CFR 263.34 and California AB966 for more information.) Generally, the law allows for this when:

- The treatment occurs in a laboratory;
- The purpose of the treatment is to minimize the generation of hazardous waste or enhance safety in the laboratory;
- The procedure and treatment methods shall be in accordance with the current version of the National Academy Press's "Prudent Practices in the Laboratory", National Research Council procedures, or other peer-reviewed scientific publications;
- The quantity of waste being treated in one batch does not exceed 5 gallons of liquid or 18 kilograms of solid or semi-solid material;
- The hazardous waste to be treated is from one experiment, or a set of experimental processes, and is of similar composition with no mixing of incompatible wastes;
- The person conducting the treatment process is one of the originators of the experimental process and is adequately trained in the treatment method;
- The bench top treatment is conducted within 10 working days of completion of the laboratory process; and
- The person conducting the bench top treatment complies with all requirements for management and disposal of the waste resulting from the treatment.

DISPOSAL

The Institute is committed to reducing landfill usage as a means to terminating hazardous materials. Where applicable and appropriate, other methods of hazardous waste management routed for recycling strategies will be used. Where a recycling strategy is unavailable, a strategy involving incineration of the hazardous materials will be used to reduce chemical contamination and mitigate risk.

CHAPTER SIX: EMERGENCY AND SPILL RESPONSE

INTRODUCTION

This section provides information to all persons at the Institute on how to respond to emergencies and what necessary steps should be taken when hazardous materials are spilled or released to the environment.

IMMEDIATE RESPONSE

For all emergencies involving fire, explosion, or hazardous materials:

IMMEDIATELY CALL x5000 OR 626-395-5000 FOR SECURITY TO PROVIDE EMERGENCY ASSISTANCE.

Thereafter, proceed with the following steps:

1. Alert the people in the area of the incident;

2. Evacuate the area (if necessary); and

3. Provide information to Caltech Security and emergency personnel as soon as possible.

4. Notify your PI or supervisor after speaking with Caltech Security.

INSTITUTE EMERGENCY RESPONSE GUIDE

The Caltech Emergency Response Guide is a compilation of information on how to respond to various emergencies. The Guides are posted in every laboratory and throughout most buildings on campus.

Should you require an additional copy of the Caltech Emergency Response Guide, please contact the EHS Office at x6727 or at safety@caltech.edu.

GENERAL SPILL PROCEDURES FOR SMALL SPILLS (<1 GALLON)

FOR SMALL SPILLS, IF YOU ARE UNSURE OF THE SPILLED MATERIALS' CHEMICAL OR HAZARDOUS NATURE ON THE GROUND, PLEASE CONTACT THE EHS OFFICE AT x6727 AND ASK FOR ASSISTANCE.

Small spills are considered to be anything one gallon or less. You should only clean up spills where you understand the hazardous nature of the material spilled on the ground and you are wearing the appropriate personal protective equipment to perform the task.

Appropriate spill kits are strongly recommended in areas of work where chemicals or other hazardous materials are used. The spill containment materials should be adjusted for the type of materials present in the laboratory or operational workspace.

For example, if the area works predominately with acids, the spill kit should contain packages of soda-ash and aqueous absorbing spill mats and spill booms.

After performing a spill clean-up, containerize all spill materials using the AiM Customer Portal to request a hazardous waste pickup.

If you require additional information regarding the type of spill kits that should be available in your area, please contact your EHS Safety Engineer or contact the EHS Office.

Additional information on spill response can be found on the following link:

https://emergencypreparedness.caltech.edu/Procedures/Spill

GENERAL RESPONSE FOR ALL OTHER SPILLS

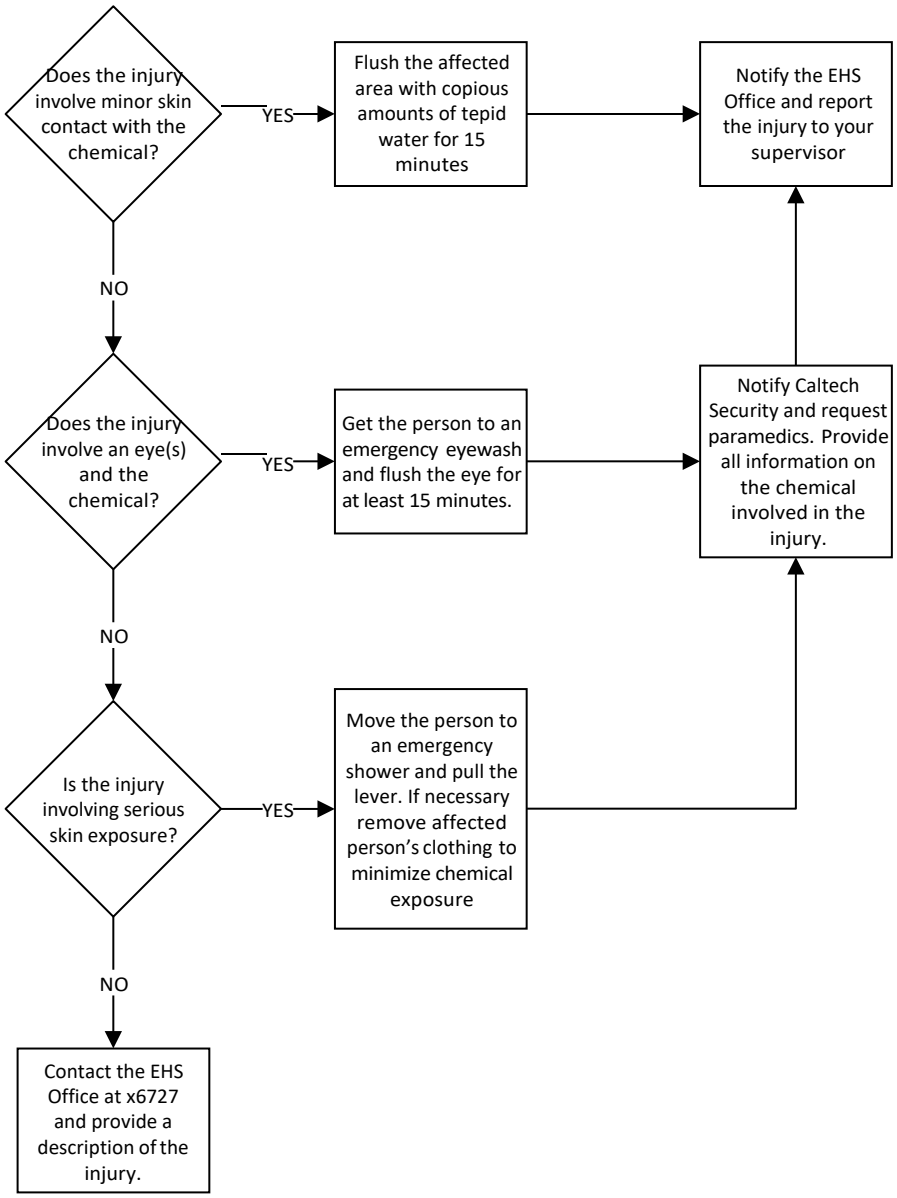
For all other spills, please follow these instructions:

1. Gather as much information about the spill as possible. You will be asked questions about:
   - The amount of material spilled on the ground;
   - Whether the material is flammable, acidic, basic, reactive, oxidizing, or toxic;
   - If there is a Safety Data Sheet (SDS) available for review;
   - The lab room and building number; and
   - The nearest phone number you can be contacted at.

2. If the time is between 8:00am and 5:00pm, contact the EHS Office at x6727 or 626-395-6727 and inform EHS personnel that a spill has occurred and you require assistance.
3. If the time is before 8:00am or after 5:00pm, contact Caltech Security at x5000 or 626-395-5000.

INJURIES INVOLVING A CHEMICAL

For all injuries involving a chemical, please use the following flowchart to determine the appropriate course of action.



CHAPTER SEVEN: HAZARDOUS WASTE GENERATOR TRAINING

INTRODUCTION

The EHS Office is committed to providing training regarding compliance in managing hazard waste. This training consists of three components, which are described briefly in this section. Please contact the EHS Office for individual or group training.

HAZARD AWARENESS

This component covers the hazards associated with hazardous waste in work areas.

Corrosives (Acids and Bases): Materials that corrode skin or metal.
• Examples: Hydrochloric Acid, Sodium Hydroxide

Flammables (and Combustibles): Materials that readily ignite and burn vigorously.
• Examples: Methanol, Ethers, Petroleum Oil

Oxidizers (and Organic Peroxides): Materials that release oxygen or intensify a fire.
• Examples: Concentrated Hydrogen Peroxide, Potassium Permanganate

Air or Water Reactives (and Pyrophorics): Materials that react violently with air or water.
• Examples: Butyl Lithium, Phosphorus Trichloride

Toxics (Poisons, Carcinogens, Mutagens): Materials that contain toxic metals or pesticides; exhibit oral toxicity, contain a known mutagen; or are toxic to the aquatic species.
• Examples: Mercury, Ethyl Acetate, Formaldehyde

SAFE WORK PRACTICES

This component covers the appropriate work practices for handling hazardous wastes.

1. A chemical or material becomes a waste when you no longer intend to use or reuse the chemical or material.

2. Each chemical or material waste must be managed as a hazardous waste unless it is listed on the Caltech "Non- Hazardous Waste List."

3. All hazardous waste containers must be:

- In good condition with no leaks or cracks;

- Kept closed except when adding waste into the container;
- Segregated from other incompatible wastes;
- Stored in secondary containment; and
- Attached with a fully completed hazardous waste tag.

4. Hazardous wastes may be accumulated for a period of up to 9 months. After that time, please submit a hazardous waste pick up request as discussed in Chapter 3 of this manual.

ACCIDENT RESPONSE

This section covers the steps to take in case of an accident involving hazardous materials or waste.

1. If the accident is a fire, explosion, or health threatening incident:

- Call Security at extension 5000 or 626-395-5000;
- Alert people in the area;
- Evacuate the area; and
- Remain near the area to provide information to emergency personnel.

2. In case of eye or skin contact with a hazardous material or waste:

- Immediately flush the affected area with water for a minimum of 15 minutes;
- Notify your Supervisor or Advisor; and
- If it is a serious skin or eye exposure, use an emergency shower or eyewash and notify Security at extension 5000 or 626-395-5000.

3. You may cleanup small chemical spills, if the following apply:

- You are knowledgeable of the hazards of the material involved in the spill, and
- You can clean it up using available personal protective equipment.
- If you are unsure about the hazards or do not have the

appropriate personal protective equipment, please contact the EHS Office for assistance.

4. Call Security at extension 5000 or 626-395-5000 for assistance in a chemical spill, if:

- The spill is not contained in a fume hood or on a laboratory bench, and

- The spill may result in an environmental impact by entering a sink or floor drain, or by contaminating the soil.

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APPENDIX A: LIST OF EXTREMELY HAZARDOUS AND ACUTELY HAZARDOUS MATERIAL

LIST OF ACUTELY HAZARDOUS MATERIALS (Subject to updates in 8 CCR 5189)

CHEMICAL NAME	CAS *	TQ **
Acetaldehyde	75-07-0	2500
Acrolein (2-Propenal)	107-02-8	150
Acrylyl Chloride	814-68-6	250
Allyl Chloride	107-05-1	1000
Allylamine	107-11-9	1000
Alkylaluminums	Varies	5000
Ammonia, Anhydrous	7664-41-7	10000
Ammonia solutions (> 44% ammonia by weight	7664-41-7	15000
Ammonium Perchlorate	7790-98-9	7500
Ammonium Permanganate	7787-36-2	7500
Arsine (also called Arsenic Hydride)	7784-42-1	100
Bis(Chloromethyl) Ether	542-88-1	100
Boron Trichloride	10294-34-5	2500
Boron Trifluoride	7-2-7637	250
Bromine	7726-95-6	1500
Bromine Chloride	13863-41-7	1500
Bromine Pentafluoride	7789-30-2	2500
Bromine Trifluoride	7787-71-5	15000
3-Bromopropyne (also called Propargyl Bromide)	106-96-7	100
Butyl Hydroperoxide (Tertiary)	75-91-2	5000
Butyl Perbenzoate (Tertiary)	614-45-9	7500
Carbonyl Chloride (see Phosgene)	75-44-5	100
Carbonyl Fluoride Cellulose Nitrate (concentration > 12	9004-70-0	2500
Chlorine	7782-50-5	1500
Chlorine Dioxide	10049-04-4	1000
Chlorine Pentrafluoride	13637-63-3	1000

CHEMICAL NAME	CAS *	TQ **
Chlorine Trifluoride	7790-91-2	1000
Chlorodiethylaluminum (also called Diethylaluminum Chloride)	96-10-6	5000
1-Chloro-2,4-Dinitrobenzene	97-00-7	5000
Chloromethyl Methyl Ether	107-30-2	500
Chloropicrin	76-06-2	500
Chloropicrin and Methyl Bromide mixture	None	1500
Chloropicrin and Methyl Chloride mixture	None	1500
Cumene Hydroperoxide	80-15-9	5000
Cyanogen	460-19-5	2500
Cyanogen Chloride	506-77-4	500
Cyanuric Fluoride	675-14-9	100
Diacetyl Peroxide (Concentration > 70%)	110-22-5	5000
Diazomethane	334-88-3	500
Dibenzoyl Peroxide	94-36-0	7500
Diborane	19287-45-7	100
Dibutyl Peroxide (Tertiary)	110-05-4	5000
Dichloro Acetylene	7572-29-4	250
Dichlorosilane	4109-96-0	2500
Diethylzinc	557-20-0	10000
Diisopropyl Peroxydicarbonate	105-64-6	7500
Dilaluroyl Peroxide	105-74-8	7500
Dimethyldichlorosilane	75-78-5	1000
Dimethylhydrazine, 1,1-	57-14-7	1000
Dimethylamine, Anhydrous	124-40-3	2500
2,4-Dinitroaniline	97-02-9	5000
Ethyl Methyl Ketone Peroxide (also Methyl Ethyl Ketone Peroxide) >60% concentration		
Ethyl Nitrite	109-95-5	5000
Ethylamine	75-04-7	7500
Ethylene Fluorohydrin	371-62-0	100
Ethylene Oxide	75-21-8	5000
Ethyleneimine	151-56-4	1000

CHEMICAL NAME	CAS *	TQ **
Fluorine	7782-41-4	1000
Formaldehyde (Formalin)	50-00-0	1000
Furan	110-00-9	500
Hexafluoroacetone	684-16-2	5000
Hydrochloric Acid, Anhydrous	7647-01-0	500
Hydrofluoric Acid, Anhydrous	7664-39-3	1000
Hydrogen Bromide	10035-10-6	5000
Hydrogen Chloride	7647-01-0	5000
Hydrogen Cyanide, Anhydrous	74-90-8	1000
Hydrogen Fluoride	7664-39-3	1000
Hydrogen Peroxide (>52% by weight)	7722-84-1	7500
Hydrogen Selenide	7783-07-5	150
Hydrogen Sulfide	7783-06-4	1500
Hydroxylamine	7803-49-8	2500
Iron, Pentacarbonyl	13463-40-6	250
Isopropylamine	75-31-0	5000
Ketene	463-51-4	100
Methacrylaldehyde	78-85-3	1000
Methacryloyl Chloride	920-46-7	150
Methacryloyloxyethyl Isocyanate	30674-80-7	100
Methyl Acrylonitrile	126-98-7	250
Methylamine, Anhydrous	74-89-5	1000
Methyl Bromide	74-83-9	2500
Methyl Chloride	74-87-3	15000
Methyl Chloroformate	79-22-1	500
Methyl Ethyl Ketone Peroxide (>60% Concentration)	1338-23-4	5000
Methyl Fluoroacetate	453-18-9	100
Methyl Fluorosulfate	421-20-5	100
Methyl Hydrazine	60-34-4	100
Methyl Iodide	74-88-4	7500
Methyl Isocyanate	624-83-9	250
Methyl Mercaptan	74-93-1	5000
Methyl Vinyl Ketone	79-84-4	100
Methyltrichlorosilane	75-79-6	500

CHEMICAL NAME	CAS *	TQ **
Nickel Carbonly (Nickel Tetracarbonyl)	13463-39-3	150
Nitric Acid (>94.5% by weight)	7697-37-2	500
Nitric Oxide	10102-43-9	250
Nitroaniline (para Nitroaniline	100-01-6	5000
Nitromethane	75-52-5	2500
Nitrogen Dioxide	10102-44-0	250
Nitrogen Oxides (NO; NO 2; N2O4;N2O3)	10102-44-0	250
Nitrogen Tetroxide (also called Nitrogen Peroxide)	10544-72-6	250
Nitrogen Trifluoride	7783-54-2	5000
Nitrogen Trioxide	10544-73-7	250
Sulfuric Acid, Fuming	8014-95-7	1000
Osmium Tetroxide	20616-12-0	100
Oxygen Difluoride	7783-41-7	100
Ozone	10028-15-6	100
Pentaborane	19624-22-7	100
Peracetic Acid (Acetic Acid >60%, Peroxyacetic Acid)	79-21-0	1000
Perchloric Acid (concentration > 60%)	7601-90-3	5000
Perchloromethyl Mercaptan	594-42-3	150
Perchloryl Fluoride	7616-94-6	5000
Peroxyacetic Acid (Acetic Acid concentration >60%)	79-21-0	1000
Phosgene (also called Carbonyl Chloride)	75-44-5	100
Phosphine (Hydrogen Phosphide)	7803-51-2	100
Phosphorus Oxychloride (also called Phosphoryl Chloride)	10025-87-3	1000
Phosphorus Trichloride	12-2-7719	1000
Phosphoryl Chloride (also called Phosphorus Oxychloride)	10025-87-3	1000
Propargyl Bromide	106-96-7	100
Propyl Nitrate	627-3-4	2500
Sarin	107-44-8	100

CHEMICAL NAME	CAS *	TQ **
Selenium Hexafluoride	7783-79-1	1000
Stibine (Antimony Hydride)	7803-52-3	500
Sulfur Dioxide (liquid)	9-5-7446	1000
Sulfur Pentafluoride	5714-22-7	250
Sulfur Tetrafluoride	7783-60-0	250
Sulfur Trioxide (also called Sulfuric Anhydride)	11-9-7446	1000
Sulfuric Anhydride (also called Sulfur Trioxide)	11-9-7446	1000
Tellurium Hexafluoride	7783-80-4	250
Tetrafluoroethylene	116-14-3	5000
Tetrafluorohydrazine	10036-47-2	5000
Tetramethyl Lead	75-74-1	1000
Thionyl Chloride	9-7-7719	250
Trichloro (chloromethyl) Silane	1558-25-4	100
Trichloro (dichlorophenyl) Silane	27137-85-5	2500
Trichlorosilane	10025-78-2	5000
Trifluorochloroethylene	79-38-9	10000
Trimethyoxysilane	2487-90-3	1500

LIST OF EXTREMELY HAZARDOUS SUBSTANCES (Subject to Updates in 40 CFR 302)

Chemical Name	CAS No.	Threshold planning quantity (Pounds)
Acetone Cyanohydrin	75-86-5	1,000
Acetone Thiosemicarbazide	1752-30-3	1,000/10,000
Acrolein	107-02-8	500
Acrylamide	79-06-1	1,000/10,000
Acrylonitrile	107-13-1	10,000
Acrylyl Chloride	814-68-6	100
Adiponitrile	111-69-3	1,000
Aldicarb	116-06-3	100/10,000
Aldrin	309-00-2	500/10,000
Allyl Alcohol	107-18-6	1,000
Allylamine	107-11-9	500

Chemical Name	CAS No.	Threshold planning quantity (Pounds)
Aluminum Phosphide	20859-73-8	500
Aminopterin	54-62-6	500/10,000
Amiton	78-53-5	500
Amiton Oxalate	3734-97-2	100/10,000
Ammonia	7664-41-7	500
Amphetamine	300-62-9	1,000
Aniline	62-53-3	1,000
Aniline, 2,4,6-Trimethyl-	88-05-1	500
Antimony Pentafluoride	7783-70-2	500
Antimycin A	1397-94-0	1,000/10,000
ANTU	86-88-4	500/10,000
Arsenic Pentoxide	1303-28-2	100/10,000
Arsenous Oxide	1327-53-3	100/10,000
Arsenous Trichloride	7784-34-1	500
Arsine	7784-42-1	100
Azinphos-Ethyl	2642-71-9	100/10,000
Azinphos-Methyl	86-50-0	10/10,000
Benzal Chloride	98-87-3	500
Benzenamine, 3-(Trifluoromethyl)-	98-16-8	500
Benzene, 1-(Chloromethyl)-4-Nitro-	100-14-1	500/10,000
Benzenearsonic Acid	98-05-5	10/10,000
Benzimidazole, 4,5-Dichloro-2-(Trifluoromethyl)-	3615-21-2	500/10,000
Benzotrichloride	98-07-7	100
Benzyl Chloride	100-44-7	500
Benzyl Cyanide	140-29-4	500
Bicyclo[2.2.1]Heptane-2-Carbonitrile, 5-Chloro-6-((((Methylamino)Carbonyl)Oxy)Imino)-, (1s-(1-alpha,2-beta,4-alpha,5-alpha,6E))-	15271-41-7	500/10,000
Bis(Chloromethyl) Ketone	534-07-6	10/10,000
Bitoscanate	4044-65-9	500/10,000
Boron Trichloride	10294-34-5	500
Boron Trifluoride	7/2/7637	500

Chemical Name	CAS No.	Threshold planning quantity (Pounds)
Boron Trifluoride Compound With Methyl Ether (1:1)	353-42-4	1,000
Bromadiolone	28772-56-7	100/10,000
Bromine	7726-95-6	500
Cadmium Oxide	1306-19-0	100/10,000
Cadmium Stearate	2223-93-0	1,000/10,000
Calcium Arsenate	7778-44-1	500/10,000
Camphechlor	8001-35-2	500/10,000
Cantharidin	56-25-7	100/10,000
Carbachol Chloride	51-83-2	500/10,000
Carbamic Acid, Methyl-, O-(((2,4-Dimethyl-1, 3-Dithiolan-2-yl)Methylene)Amino)-	26419-73-8	100/10,000
Carbofuran	1563-66-2	10/10,000
Carbon Disulfide	75-15-0	10,000
Carbophenothion	786-19-6	500
Chlordane	57-74-9	1,000
Chlorfenvinfos	470-90-6	500
Chlorine	7782-50-5	100
Chlormephos	24934-91-6	500
Chlormequat Chloride	999-81-5	100/10,000
Chloroacetic Acid	79-11-8	100/10,000
Chloroethanol	107-07-3	500
Chloroethyl Chloroformate	627-11-2	1,000
Chloroform	67-66-3	10,000
Chloromethyl Ether	542-88-1	100
Chloromethyl Methyl Ether	107-30-2	100
Chlorophacinone	3691-35-8	100/10,000
Chloroxuron	1982-47-4	500/10,000
Chlorthiophos	21923-23-9	500
Chromic Chloride	10025-73-7	1/10,000
Cobalt, ((2,2′-(1,2-Ethanediylbis (Nitrilomethylidyne)) Bis(6-Fluorophenolato))(2-)-N,N′,O,O′)-	62207-76-5	100/10,000
Cobalt Carbonyl	10210-68-1	10/10,000
Colchicine	64-86-8	10/10,000

Chemical Name	CAS No.	Threshold planning quantity (Pounds)
Coumaphos	56-72-4	100/10,000
Coumatetralyl	5836-29-3	500/10,000
Cresol, o-	95-48-7	1,000/10,000
Crimidine	535-89-7	100/10,000
Crotonaldehyde	4170-30-3	1,000
Crotonaldehyde, (E)-	123-73-9	1,000
Cyanogen Bromide	506-68-3	500/10,000
Cyanogen Iodide	506-78-5	1,000/10,000
Cyanophos	2636-26-2	1,000
Cyanuric Fluoride	675-14-9	100
Cycloheximide	66-81-9	100/10,000
Cyclohexylamine	108-91-8	10,000
Decaborane(14)	17702-41-9	500/10,000
Demeton	8065-48-3	500
Demeton-S-Methyl	919-86-8	500
Dialifor	10311-84-9	100/10,000
Diborane	19287-45-7	100
Dichloroethyl ether	111-44-4	10,000
Dichloromethylphenylsilane	149-74-6	1,000
Dichlorvos	62-73-7	1,000
Dicrotophos	141-66-2	100
Diepoxybutane	1464-53-5	500
Diethyl Chlorophosphate	814-49-3	500
Digitoxin	71-63-6	100/10,000
Diglycidyl Ether	7/5/2238	1,000
Digoxin	20830-75-5	10/10,000
Dimefox	115-26-4	500
Dimethoate	60-51-5	500/10,000
Dimethyl Phosphorochloridothioate	2524-03-0	500
Dimethyl sulfate	77-78-1	500
Dimethyldichlorosilane	75-78-5	500
Dimethylhydrazine	57-14-7	1,000
Dimethyl-p-Phenylenediamine	99-98-9	10/10,000
Dimetilan	644-64-4	500/10,000
Dinitrocresol	534-52-1	10/10,000
Dinoseb	88-85-7	100/10,000
Dinoterb	1420-07-1	500/10,000

Chemical Name	CAS No.	Threshold planning quantity (Pounds)
Dioxathion	78-34-2	500
Diphacinone	82-66-6	10/10,000
Diphosphoramide, Octamethyl-	152-16-9	100
Disulfoton	298-04-4	500
Dithiazanine Iodide	514-73-8	500/10,000
Dithiobiuret	541-53-7	100/10,000
Emetine, Dihydrochloride	316-42-7	1/10,000
Endosulfan	115-29-7	10/10,000
Endothion	4/3/2778	500/10,000
Endrin	72-20-8	500/10,000
Epichlorohydrin	106-89-8	1,000
EPN	2104-64-5	100/10,000
Ergocalciferol	50-14-6	1,000/10,000
Ergotamine Tartrate	379-79-3	500/10,000
Ethanesulfonyl Chloride, 2-Chloro-	1622-32-8	500
Ethanol, 1,2-Dichloro-, Acetate	10140-87-1	1,000
Ethion	563-12-2	1,000
Ethoprophos	13194-48-4	1,000
Ethylbis(2-Chloroethyl)Amine	538-07-8	500
Ethylene Fluorohydrin	371-62-0	10
Ethylene Oxide	75-21-8	1,000
Ethylenediamine	107-15-3	10,000
Ethyleneimine	151-56-4	500
Ethylthiocyanate	542-90-5	10,000
Fenamiphos	22224-92-6	10/10,000
Fensulfothion	115-90-2	500
Fluenetil	4301-50-2	100/10,000
Fluorine	7782-41-4	500
Fluoroacetamide	640-19-7	100/10,000
Fluoroacetic Acid	144-49-0	10/10,000
Fluoroacetyl Chloride	359-06-8	10
Fluorouracil	51-21-8	500/10,000
Fonofos	944-22-9	500
Formaldehyde	50-00-0	500
Formaldehyde Cyanohydrin	107-16-4	1,000
Formetanate Hydrochloride	23422-53-9	500/10,000
Formothion	2540-82-1	100

Chemical Name	CAS No.	Threshold planning quantity (Pounds)
Formparanate	17702-57-7	100/10,000
Fosthietan	21548-32-3	500
Fuberidazole	3878-19-1	100/10,000
Furan	110-00-9	500
Gallium Trichloride	13450-90-3	500/10,000
Hexachlorocyclopentadiene	77-47-4	100
Hexamethylenediamine, N,N′-Dibutyl-	11/4/4835	500
Hydrazine	302-01-2	1,000
Hydrocyanic Acid	74-90-8	100
Hydrogen Chloride (gas only)	7647-01-0	500
Hydrogen Fluoride	7664-39-3	100
Hydrogen Peroxide (Conc >52%)	7722-84-1	1,000
Hydrogen Selenide	7/5/7783	10
Hydrogen Sulfide	6/4/7783	500
Hydroquinone	123-31-9	500/10,000
Iron, Pentacarbonyl-	13463-40-6	100
Isobenzan	297-78-9	100/10,000
Isobutyronitrile	78-82-0	1,000
Isocyanic Acid, 3,4-Dichlorophenyl Ester	102-36-3	500/10,000
Isodrin	465-73-6	100/10,000
Isofluorphate	55-91-4	100
Isophorone Diisocyanate	4098-71-9	500
Isopropyl Chloroformate	108-23-6	1,000
Isopropylmethyl-pyrazolyl Dimethylcarbamate	119-38-0	500
Lactonitrile	78-97-7	1,000
Leptophos	21609-90-5	500/10,000
Lewisite	541-25-3	10
Lindane	58-89-9	1,000/10,000
Lithium Hydride	7580-67-8	100
Malononitrile	109-77-3	500/10,000
Manganese, Tricarbonyl Methylcyclopentadienyl	12108-13-3	100
Mechlorethamine	51-75-2	10
Mephosfolan	950-10-7	500

Chemical Name	CAS No.	Threshold planning quantity (Pounds)
Mercuric Acetate	1600-27-7	500/10,000
Mercuric Chloride	7487-94-7	500/10,000
Mercuric Oxide	21908-53-2	500/10,000
Methacrolein Diacetate	10476-95-6	1,000
Methacrylic Anhydride	760-93-0	500
Methacrylonitrile	126-98-7	500
Methacryloyl Chloride	920-46-7	100
Methacryloyloxyethyl Isocyanate	30674-80-7	100
Methamidophos	10265-92-6	100/10,000
Methanesulfonyl Fluoride	558-25-8	1,000
Methidathion	950-37-8	500/10,000
Methiocarb	2032-65-7	500/10,000
Methomyl	16752-77-5	500/10,000
Methoxyethylmercuric Acetate	151-38-2	500/10,000
Methyl 2-Chloroacrylate	80-63-7	500
Methyl Bromide	74-83-9	1,000
Methyl Chloroformate	79-22-1	500
Methyl Hydrazine	60-34-4	500
Methyl Isocyanate	624-83-9	500
Methyl Isothiocyanate	556-61-6	500
Methyl Mercaptan	74-93-1	500
Methyl Phenkapton	3735-23-7	500
Methyl Phosphonic Dichloride	676-97-1	100
Methyl Thiocyanate	556-64-9	10,000
Methyl Vinyl Ketone	78-94-4	10
Methylmercuric Dicyanamide	502-39-6	500/10,000
Methyltrichlorosilane	75-79-6	500
Metolcarb	1129-41-5	100/10,000
Mevinphos	7786-34-7	500
Mexacarbate	315-18-4	500/10,000
Mitomycin C	50-07-7	500/10,000
Monocrotophos	6923-22-4	10/10,000
Muscimol	2763-96-4	500/10,000
Mustard Gas	505-60-2	500
Nickel Carbonyl	13463-39-3	1
Nicotine	54-11-5	100
Nicotine Sulfate	65-30-5	100/10,000

Chemical Name	CAS No.	Threshold planning quantity (Pounds)
Nitric Acid	7697-37-2	1,000
Nitric Oxide	10102-43-9	100
Nitrobenzene	98-95-3	10,000
Nitrocyclohexane	1122-60-7	500
Nitrogen Dioxide	10102-44-0	100
Nitrosodimethylamine	62-75-9	1,000
Norbormide	991-42-4	100/10,000
Organorhodium Complex (PMN-82-147)		10/10,000
Ouabain	630-60-4	100/10,000
Oxamyl	23135-22-0	100/10,000
Oxetane, 3,3-Bis(Chloromethyl)-	78-71-7	500
Oxydisulfoton	7/6/2497	500
Ozone	10028-15-6	100
Paraquat Dichloride	1910-42-5	10/10,000
Paraquat Methosulfate	2074-50-2	10/10,000
Parathion	56-38-2	100
Parathion-Methyl	298-00-0	100/10,000
Paris Green	12002-03-8	500/10,000
Pentaborane	19624-22-7	500
Pentadecylamine	2570-26-5	100/10,000
Peracetic Acid	79-21-0	500
Perchloromethylmercaptan	594-42-3	500
Phenol	108-95-2	500/10,000
Phenol, 2,2′-Thiobis(4-Chloro-6-Methyl)-	4418-66-0	100/10,000
Phenol, 3-(1-Methylethyl)-, Methylcarbamate	64-00-6	500/10,000
Phenoxarsine, 10,10′-Oxydi-	58-36-6	500/10,000
Phenyl Dichloroarsine	696-28-6	500
Phenylhydrazine Hydrochloride	59-88-1	1,000/10,000
Phenylmercury Acetate	62-38-4	500/10,000
Phenylsilatrane	2097-19-0	100/10,000
Phenylthiourea	103-85-5	100/10,000
Phorate	298-02-2	10
Phosacetim	4104-14-7	100/10,000

Chemical Name	CAS No.	Threshold planning quantity (Pounds)
Phosfolan	947-02-4	100/10,000
Phosgene	75-44-5	10
Phosphamidon	13171-21-6	100
Phosphine	7803-51-2	500
Phosphonothioic Acid, Methyl-, O-Ethyl O-(4-(Methylthio) Phenyl) Ester	2703-13-1	500
Phosphonothioic Acid, Methyl-, S-(2-(Bis(1Methylethyl)Amino)Ethyl) O-Ethyl Ester	50782-69-9	100
Phosphonothioic Acid, Methyl-, O-(4-Nitrophenyl) O-Phenyl Ester	2665-30-7	500
Phosphoric Acid, Dimethyl 4-(Methylthio)Phenyl Ester	3254-63-5	500
Phosphorothioic Acid, O,O-Dimethyl-S-(2-Methylthio) Ethyl Ester	2587-90-8	500
Phosphorus	7723-14-0	100
Phosphorus Oxychloride	10025-87-3	500
Phosphorus Pentachloride	10026-13-8	500
Phosphorus Trichloride	12/2/7719	1,000
Physostigmine	57-47-6	100/10,000
Physostigmine, Salicylate (1:1)	57-64-7	100/10,000
Picrotoxin	124-87-8	500/10,000
Piperidine	110-89-4	1,000
Pirimifos-Ethyl	23505-41-1	1,000
Potassium Arsenite	10124-50-2	500/10,000
Potassium Cyanide	151-50-8	100
Potassium Silver Cyanide	506-61-6	500
Promecarb	2631-37-0	500/10,000
Propargyl Bromide	106-96-7	10
Propiolactone, Beta-	57-57-8	500
Propionitrile	107-12-0	500
Propionitrile, 3-Chloro-	542-76-7	1,000
Propiophenone, 4-Amino-	70-69-9	100/10,000
Propyl Chloroformate	109-61-5	500

Chemical Name	CAS No.	Threshold planning quantity (Pounds)
Propylene Oxide	75-56-9	10,000
Propyleneimine	75-55-8	10,000
Prothoate	2275-18-5	100/10,000
Pyrene	129-00-0	1,000/10,000
Pyridine, 2-Methyl-5-Vinyl-	140-76-1	500
Pyridine, 4-Amino-	504-24-5	500/10,000
Pyridine, 4-Nitro-,l-Oxide	1124-33-0	500/10,000
Pyriminil	53558-25-1	100/10,000
Salcomine	14167-18-1	500/10,000
Sarin	107-44-8	10
Selenious Acid	7783-00-8	1,000/10,000
Selenium Oxychloride	7791-23-3	500
Semicarbazide Hydrochloride	563-41-7	1,000/10,000
Silane, (4-Aminobutyl)Diethoxymethyl-	3037-72-7	1,000
Sodium Arsenate	7631-89-2	1,000/10,000
Sodium Arsenite	7784-46-5	500/10,000
Sodium Azide ($Na(N_3)$)	26628-22-8	500
Sodium Cacodylate	124-65-2	100/10,000
Sodium Cyanide (Na(CN))	143-33-9	100
Sodium Fluoroacetate	62-74-8	10/10,000
Sodium Selenate	13410-01-0	100/10,000
Sodium Selenite	10102-18-8	100/10,000
Sodium Tellurite	10102-20-2	500/10,000
Stannane, Acetoxytriphenyl-	900-95-8	500/10,000
Strychnine	57-24-9	100/10,000
Strychnine Sulfate	60-41-3	100/10,000
Sulfotep	3689-24-5	500
Sulfoxide, 3-Chloropropyl Octyl	3569-57-1	500
Sulfur Dioxide	9/5/7446	500
Sulfur Tetrafluoride	7783-60-0	100
Sulfur Trioxide	11/9/7446	100
Sulfuric Acid	7664-93-9	1,000
Tabun	77-81-6	10
Tellurium Hexafluoride	7783-80-4	100
TEPP	107-49-3	100
Terbufos	13071-79-9	100

Chemical Name	CAS No.	Threshold planning quantity (Pounds)
Tetraethyllead	78-00-2	100
Tetraethyltin	597-64-8	100
Tetramethyllead	75-74-1	100
Tetranitromethane	509-14-8	500
Thallium Sulfate	10031-59-1	100/10,000
Thallous Carbonate	6533-73-9	100/10,000
Thallous Chloride	7791-12-0	100/10,000
Thallous Malonate	2757-18-8	100/10,000
Thallous Sulfate	7446-18-6	100/10,000
Thiocarbazide	2231-57-4	1,000/10,000
Thiofanox	39196-18-4	100/10,000
Thionazin	297-97-2	500
Thiophenol	108-98-5	500
Thiosemicarbazide	79-19-6	100/10,000
Thiourea, (2-Chlorophenyl)-	5344-82-1	100/10,000
Thiourea, (2-Methylphenyl)-	614-78-8	500/10,000
Titanium Tetrachloride	7550-45-0	100
Toluene 2,4-Diisocyanate	584-84-9	500
Toluene 2,6-Diisocyanate	91-08-7	100
Trans-1,4-Dichlorobutene	110-57-6	500
Triamiphos	1031-47-6	500/10,000
Triazofos	24017-47-8	500
Trichloroacetyl Chloride	76-02-8	500
Trichloroethylsilane	115-21-9	500
Trichloronate	327-98-0	500
Trichlorophenylsilane	98-13-5	500
Trichloro(Chloromethyl)Silane	1558-25-4	100
Trichloro(Dichlorophenyl) Silane	27137-85-5	500
Triethoxysilane	998-30-1	500
Trimethylchlorosilane	75-77-4	1,000
Trimethylolpropane Phosphite	824-11-3	100/10,000
Trimethyltin Chloride	1066-45-1	500/10,000
Triphenyltin Chloride	639-58-7	500/10,000
Tris(2-Chloroethyl)Amine	555-77-1	100
Valinomycin	2001-95-8	1,000/10,000
Vanadium Pentoxide	1314-62-1	100/10,000
Vinyl Acetate Monomer	108-05-4	1,000

Chemical Name	CAS No.	Threshold planning quantity (Pounds)
Warfarin	81-81-2	500/10,000
Warfarin Sodium	129-06-6	100/10,000
Xylylene Dichloride	28347-13-9	100/10,000
Zinc, Dichloro(4,4-Dimethyl-5((((Methylamino)Carbonyl) Oxy)Imino)Pentanenitrile)-, (T-4)-	58270-08-9	100/10,000
Zinc Phosphide	1314-84-7	500

APPENDIX B: NON-HAZARDOUS WASTE LIST

Chemical Name	Physical Properties	Amounts	Disposal Method
Acid, pH over 4		Contains only non-metal acid and water	Drain Disposal
Actin		Any Concentration	Liquid: Drain Disposal Solid: Trash
Agar	Transparent Strips, gels, or powder	Any Concentration	Liquid: Drain Disposal Solid: Trash
Agarose		Any Concentration	Liquid: Drain Disposal Solid: Trash
Ethanol (Ethyl Alcohol)	Clear colorless liquid	Alcohol <20%	Drain disposal
Alanine		Any Concentration	Liquid: Drain Disposal Solid: Trash
Albumin, bovine		Any Concentration	Liquid: Drain Disposal Solid: Trash
Ammonium Acetate	White crystals with a slight odor	Any Concentration	Solid: Trash
Ammonium phosphate dibasic	White crystals	Any Concentration	Solid: Trash
Ammonium sulfate	White granules or crystals	Any Concentration	Solid: Trash
Amylase		Any Concentration	Liquid: Drain Disposal Solid: Trash
Amylose		Any Concentration	Liquid: Drain Disposal Solid: Trash
Antifoam A Emulsion		Any Concentration	Liquid: Drain Disposal Solid: Trash
Asparagine		Any Concentration	Liquid: Drain Disposal Solid: Trash

Chemical Name	Physical Properties	Amounts	Disposal Method
Aspartic Acid		Any Concentration	Liquid: Drain Disposal Solid: Trash
Base, pH less than 11		Contains only non-metal base and water	Drain Disposal
Boric Acid		Any Concentration	Liquid: Drain Disposal Solid: Trash
Cage Klenz 250-280	Clear light strawberry liquid	Any Concentration	Drain Disposal
Calcium Acetate	Course white powder	Any Concentration	Solid: Trash
Calcium chloride dehydrate	Course white powder	Any Concentration	Solid: Trash
Calcium Citrate		Any Concentration	Solid: Trash
Calcium Phosphate, Monobasic		Any Concentration	Liquid: Drain Disposal Solid: Trash
Calcium Sulfate	White Powder	Any Concentration	Liquid: Drain Disposal Solid: Trash
Celite (diatomaceous earth)		Any Concentration	Solid: Trash
Collagen		Any Concentration	Liquid: Drain Disposal Solid: Trash
Dextrose Monohydrate		Any Concentration	Liquid: Drain Disposal Solid: Trash
EDTA (acid free)	White crystals	Any Concentration	Solid: Trash
EDTA Disodium salt	White crystals	Any Concentration	Solid: Trash
Egg Albumin		Any Concentration	Liquid: Drain Disposal Solid: Trash
Ferric Citrate	Dark red to brown powder	Any Concentration	Solid: Trash

Chemical Name	Physical Properties	Amounts	Disposal Method
Ferrous Sulfate Hexahydrate	Blue green crystals	Any Concentration	Solid: Trash
Fetal Bovine Serum	Light Brown Clear Liquid	Any Concentration	Liquid: Drain Disposal Solid: Trash
Folic Acid	Yellowish Crystalline Powder	Any Concentration	Liquid: Drain Disposal Solid: Trash
Fructose		Any Concentration	Liquid: Drain Disposal Solid: Trash
Gelatin		Any Concentration	Liquid: Drain Disposal Solid: Trash
Glucose		Any Concentration	Liquid: Drain Disposal Solid: Trash
Glutamic Acid		Any Concentration	Liquid: Drain Disposal Solid: Trash
Glycerol	Clear Oily Liquid	Any Concentration	Drain Disposal
Glycine	White Crystals	Any Concentration	Liquid: Drain Disposal Solid: Trash
Inositol	White Crystals	Any Concentration	Liquid: Drain Disposal Solid: Trash
Lactose Monohydrate	White to off-white powder	Any Concentration	Liquid: Drain Disposal Solid: Trash
L-cysteine	Crystalline Solid	Any Concentration	Liquid: Drain Disposal Solid: Trash
L- glutamic acid	White Crystals	Any Concentration	Liquid: Drain Disposal Solid: Trash
L-histidine	White Crystalline Solid	Any Concentration	Liquid: Drain Disposal Solid: Trash

Chemical Name	Physical Properties	Amounts	Disposal Method
L-leucine	Solid	Any Concentration	Liquid: Drain Disposal Solid: Trash
Lysine hydrochloride	Crystalline Solid	Any Concentration	Liquid: Drain Disposal Solid: Trash
Manganese Chloride	Reddish/pink Crystals	Any Concentration	Solid: Trash
Manganese Sulfate Monohydrate	Clear Pink Liquid	Any Concentration	Solid: Trash
Maltose		Any Concentration	Liquid: Drain Disposal Solid: Trash
Mannitol	White Powder	Any Concentration	Liquid: Drain Disposal Solid: Trash
Niacin	White Crystals	Any Concentration	Liquid: Drain Disposal Solid: Trash
Pectin		Any Concentration	Liquid: Drain Disposal Solid: Trash
Potassium Chloride	White crystals or powder	Any Concentration	Liquid: Drain Disposal Solid: Trash
Potassium Phosphate dibasic	Large White Crystals	Any Concentration	Liquid: Drain Disposal Solid: Trash
Potassium Phosphate monobasic	White powder or granules	Any Concentration	Liquid: Drain Disposal Solid: Trash
Potassium Sulfate	White powder or granules	Any Concentration	Liquid: Drain Disposal Solid: Trash
Riboflavin	Yellow-Orange Solid	Any Concentration	Liquid: Drain Disposal Solid: Trash
Sodium Bicarbonate	White Crystalline Powder	Any Concentration	Liquid: Drain Disposal Solid: Trash
Sodium Carbonate Monohydrate	White Crystalline Powder	Any Concentration	Liquid: Drain Disposal Solid: Trash

Chemical Name	Physical Properties	Amounts	Disposal Method
Sodium Chloride	White Crystals	Any Concentration	Liquid: Drain Disposal Solid: Trash
Sodium Citrate	White Crystals	Any Concentration	Liquid: Drain Disposal Solid: Trash
Sodium Phosphate dibasic anhydrous	White Powder	Any Concentration	Liquid: Drain Disposal Solid: Trash
Sodium Phosphate monobasic, monohydrate	White Crystalline Powder	Any Concentration	Liquid: Drain Disposal Solid: Trash
Sodium Sulfate, anhydrous powder	White Crystalline Powder	Any Concentration	Liquid: Drain Disposal Solid: Trash
Sorbitol	White Crystalline Powder	Any Concentration	Liquid: Drain Disposal Solid: Trash
Sucrose	Crystals	Any Concentration	Liquid: Drain Disposal Solid: Trash
Tetraethylammonium chloride monohydrate	White Crystalline Solid	Any Concentration	Liquid: Drain Disposal Solid: Trash
Thiamine Hydrochloride	White Granular Powder	Any Concentration	Liquid: Drain Disposal Solid: Trash
Tris Base	Clear colorless solution	Any Concentration	Liquid: Drain Disposal
Trypsin	Clear colorless liquid	Any Concentration	Liquid: Drain Disposal
Yeast Extract	Fine Powder	Any Concentration	Solid: Trash