

HAZARDOUS WASTE MANAGEMENT REFERENCE GUIDE

Prepared by

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CHAPTER ONE OVERVIEW

INTRODUCTION

The California Institute of Technology recognizes its responsibility to ensure that all activities involving hazardous waste are conducted in such a manner that provides for the safety of its employees, students, and the environment.

In order for the Institute 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 the Institute's operations.

REGULATIONS

The Resource Conservation and Recovery Act of 1976 (RCRA) requires generators of hazardous waste to comply with the regulatory requirements contained in Title 40 of the Code of Federal Regulations Part 262 (40 CFR Part 262). This Part requires generators to ensure and fully document that the hazardous waste they produce is properly identified, managed, and transported to a RCRA-permitted treatment, storage or disposal (TSD) facility. The California Environmental Protection Agency (Cal EPA) is the state authority, which regulates hazardous waste in California. The Cal EPA regulations (Title 22, Division 4.5, Chapter 12) are more extensive than the equivalent Federal Environmental Protection Agency (EPA) regulations.

CHAPTER TWO HAZARDOUS WASTE DETERMINATION

This chapter identifies those chemicals, which are classified as hazardous and require disposal through the Environment, Health, and Safety Office (EH&S). The identification or determination of a hazardous waste is based on two important premises – listing and testing characteristics. Listing a substance, as a hazardous waste is an EPA activity while the testing for a hazardous characteristic is a generator (Caltech) requirement. Upon request, the EH&S Office will perform analytical testing, using EPA protocols, to determine if a substance exhibits a hazardous characteristic.

For the purposes of this program, a “waste” is defined as a material that has no intended use or reuse. Contaminated chemicals, chemicals in deteriorating containers, and any other chemical(s) that are no longer used or useful should be considered as a waste.

LISTED HAZARDOUS WASTES

Federal and state regulations list several categories of substances, which have toxic, carcinogenic, mutagenic, or have teratogenic effects in humans, or have an adverse impact on the environment. These substances are listed by specific sources, non-specific sources, discarded commercial chemical products, container and spill residuals, or are considered acutely or extremely hazardous. The list of hazardous wastes in California can be found at [§ 66261.2](#).

CHARACTERISTIC HAZARDOUS WASTES

Certain substances, which are not specifically listed as a hazardous waste, are still regulated as a hazardous waste because they exhibit one or more of the following characteristics:

- **Ignitable** – A waste exhibits the ignitable characteristic if it is a liquid with a flash point of less than 140° Fahrenheit. This includes solvents such as methanol, ethanol, ethers, and acetonitrile.
- **Corrosive** – A waste exhibits the corrosive characteristic if it is aqueous with a pH less than or equal to 2 or greater than or equal to 12.5.
- **Reactive** – A waste exhibits the reactive characteristic if it is unstable, explosive, water or air reactive, a strong oxidizer, an organic peroxide, or contains cyanide or sulfide bearing materials that release toxic gases in contact with acids.
- **Toxic** – A waste exhibits the characteristic if it contains toxic metals or pesticides; exhibit oral toxicity, contain a known carcinogen or known mutagen; or are toxic to aquatic species.

UNKNOWN HAZARDOUS CHEMICALS OR WASTE

All hazardous waste that is picked up by the Environment, Health, and Safety Office (EH&S) must be completely labeled and identified. Principal Investigator's (PI's) and their group members, Facilities personnel, and any other person or entity that produces hazardous waste is responsible for accurately labeling and identifying all wastes under their control. When an unknown waste is discovered, an attempt must be made by the group to identify its contents immediately. In the event that someone cannot identify the waste, then the Institute's hazardous waste contractor will perform an analysis to identify the unknown waste. Any analysis performed by the Institute's hazardous waste contractor will be conducted in the laboratories or location in which it was discovered. The cost of the

analysis will be billed back to the appropriate party.

NON-HAZARDOUS WASTES

A waste is determined to be non-hazardous if it is listed on the Non-Hazardous Waste List, located in Appendix A. If you are using a chemical that is on this list then you can dispose of it in the manner described on the list. 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

This chapter describes the Institute's procedures regarding the handling and disposal of hazardous waste. The California Institute of Technology can be inspected annually by state, federal, or local regulatory agencies for compliance with hazardous waste violations. Failure to meet all of these regulations can lead to a Notice of Violation and/or fines from these agencies.

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 are to have access to their laboratory operations;
- Laboratory personnel have received adequate hazardous waste training;

- Laboratory personnel follow hazardous waste procedures; and
- Appropriate personnel protective equipment (PPE) is available and worn when necessary. The [Chemical Hygiene Plan](#) can assist personnel in determining PPE requirements.

Laboratory Personnel

Laboratory personnel are responsible for the following:

- Making the initial determination when a material becomes a hazardous waste; and
- Following Institute procedures governing the handling and disposal of hazardous waste.

Facilities Personnel

Facilities personnel are responsible for the following:

- Making the initial determination when a material becomes a hazardous waste; and
- Following Institute procedures governing the handling and disposal of hazardous waste.

EH&S Personnel

The EH&S 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 the Satellite Accumulation Area's (SAA) to the Waste Accumulation Facility's (WAF);
- Final hazardous waste identification and determination;
- Performing analytical or hazard characterization testing as needed; and
- The management of 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 is the Satellite Accumulation Areas (SAA), these are typically laboratories, and the second are the Waste Accumulation Facilities (WAF).

Satellite Accumulation Areas

The following are SAA requirements:

- Cannot accumulate more than 55 gallons of any single hazardous waste;
- Cannot accumulate more than one quart of any single extremely or acutely hazardous waste. The list of extremely hazardous substances can be found at [302 of the Emergency Planning and Community Right-to-Know Act](#) and the list of acutely hazardous substances can be found at [CCR, Title 8, Section 5189](#);
- Waste must be stored in the same room it was generated in, or in a room that is under the control of the same PI as the room in which the hazardous waste was generated;

- All rooms from which hazardous waste is accumulated must be on the same floor, in nearby rooms;
- SAAs laboratories may accumulate hazardous waste for only 9 months. After that time the waste must be given to the EH&S office for disposal.

Waste Accumulation Facility

The WAF facilities are the Institute's main holding facilities for the accumulation of hazardous waste prior to shipment for final disposal. The following are WAF requirements:

- Can accumulate any amount of hazardous waste;
- Weekly written inspections must be performed;
- Accumulation time is limited to 90 days.

HAZARDOUS WASTE CONTAINER MANAGEMENT

Hazardous waste container management is an important part of the Institutes Hazardous Waste Program. The following explains the Institute's guideline in the management of hazardous waste containers:

Labeling Procedures

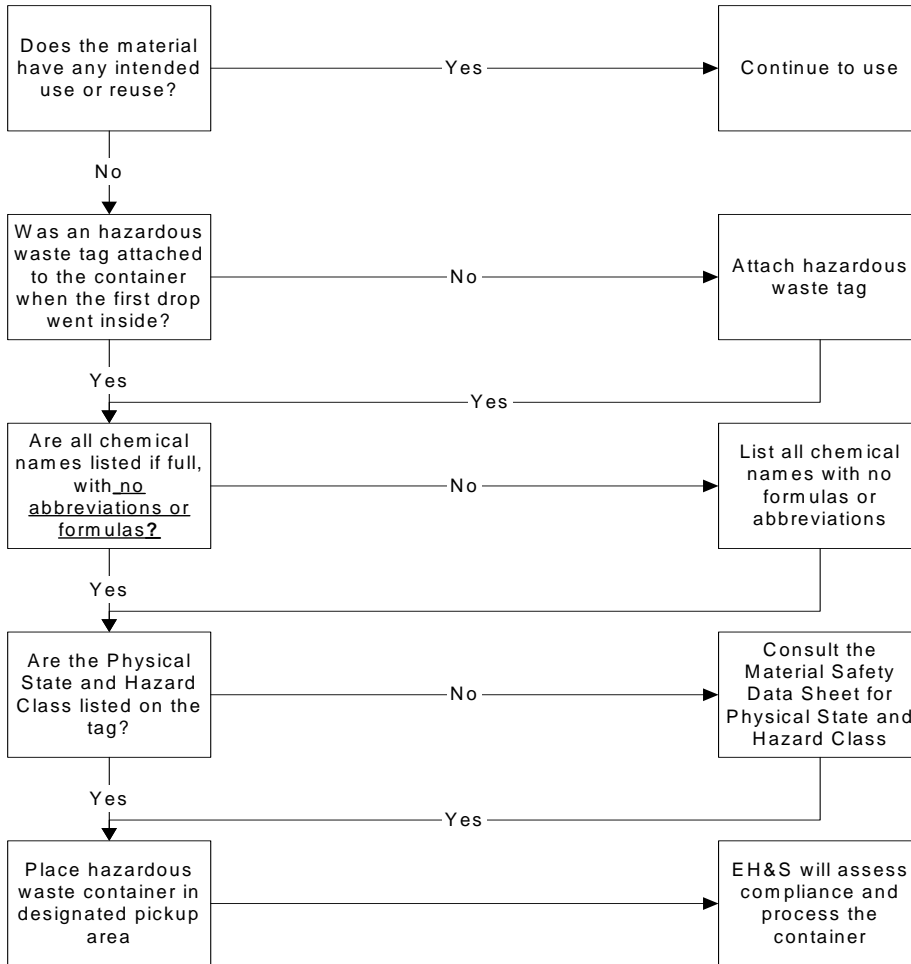
All hazardous waste containers shall be labeled with a Caltech Hazardous Waste Tag (See Appendix B). If the listing of substances will not fit on the initial hazardous waste tag, then a continuation sheet may be used in conjunction with the initial hazardous waste tag. In either case the tag must be completely filled out with the following:

- The tag must be dated and physically attached to the container when the first drop of hazardous waste goes into it.

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 and abbreviations are not acceptable for substance identification;**
- All constituents in solid and liquid mixtures must be identified, and to the extent possible their concentrations listed;
- 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;
- 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 Material Safety Data Sheet (MSDS) for that substance. . MSDS's are located in the EH&S office or can be found on-line at <http://www.hazard.com/>. ; and
- EH&S personnel will sign the certification (Grey Area) portion of the tag, once they determine that the container is properly described and contained for safe handling.

A flowchart illustrates the labeling process.



Proper Containers 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, EH&S personnel and Institute property. EH&S will provide 5 gallon jerricans for the collection of solvent waste, otherwise it is the responsibility of the person generating the waste to provide a proper container for the accumulation and storage of it. 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 match the amount of waste being generated;
- All containers must be constructed of a material that is compatible with the hazardous waste(s) being contained;
- All hazardous waste containers must be non-leaking and 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 EH&S Office has 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.

Segregation

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 Material Safety Data Sheet (MSDS) 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.

Pickup Of Hazard Wastes And Materials

A movement of hazardous waste between a SAA to the WAF occurs in two ways. The first is done through scheduled pickups for selected buildings. Scheduled pickups are done by the EH&S office on a weekly basis in the following buildings:

	Monday	Tuesday	Wednesday	Thursday	Friday
Morning	Church	Noyes	Church	B.I.	Bio. Waste
	Crellin		Crellin		
Afternoon	Keck	Alles	B.B.B.	Braun	Spaulding
		Church (Bio.)	N. Mudd	Mead	Steele
		Kerckhoff		Physical Plant	Watson
					Moore

The second is done on a call-in basis. Persons who generate hazardous waste and are not part of the scheduled pickup program, will call the EH&S office at x6727 and request a pickup of hazardous waste from that location. They will be asked to provide the following information:

- Name, location, and phone number:
- Identification and quantity of the waste/material to be picked up;
- Physical State;
- Hazard Class; and
- Whether the waste/material has an Institute Hazardous Waste Tag affixed to the container(s) to be picked up.

CHAPTER FOUR OTHER SPECIFIC WASTE REQUIREMENTS

UNKNOWN CHEMICAL (S)

Hazardous Waste Generators are responsible for assuring that 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 apply:

- Make an attempt to identify the contents of the container. Never guess or assume as to the contents of the container;
- If the contents still cannot be identified then attach a hazardous waste tag to the container and indicate on the label that the material is unknown;
- Notify the EH&S office or an EH&S technician that there is an unknown chemical to be analyzed. EH&S will ask for an account number to perform a subsequent analysis of the unknown material. The current cost of an analysis of an unknown material is \$100.00;
- The unknown chemical will remain in the location in where it was generated until the composition of the material is known.

LABORATORY CLEANOUTS

Laboratory clean-outs involves the removal of excess amounts of chemicals. These clean-outs occur when the laboratory is being closed down, is moving, or has an excess accumulation of chemicals being stored. It is the responsibility of the PI and or division to assure that all material from a laboratory clean out is properly segregated and labeled for pickup by EH&S staff. EH&S will assist the PI or division by doing an initial evaluation of the laboratory and provide labeling and segregation instructions as needed.

In the event that the PI or division does not wish to segregate or label their excess chemicals, then EH&S can assist by providing personnel or contractors to facilitate the laboratory clean out. **The PI or division will be responsible for labor charges associated with providing the personnel or contractor to facilitate the laboratory cleanout.**

GAS CYLINDERS

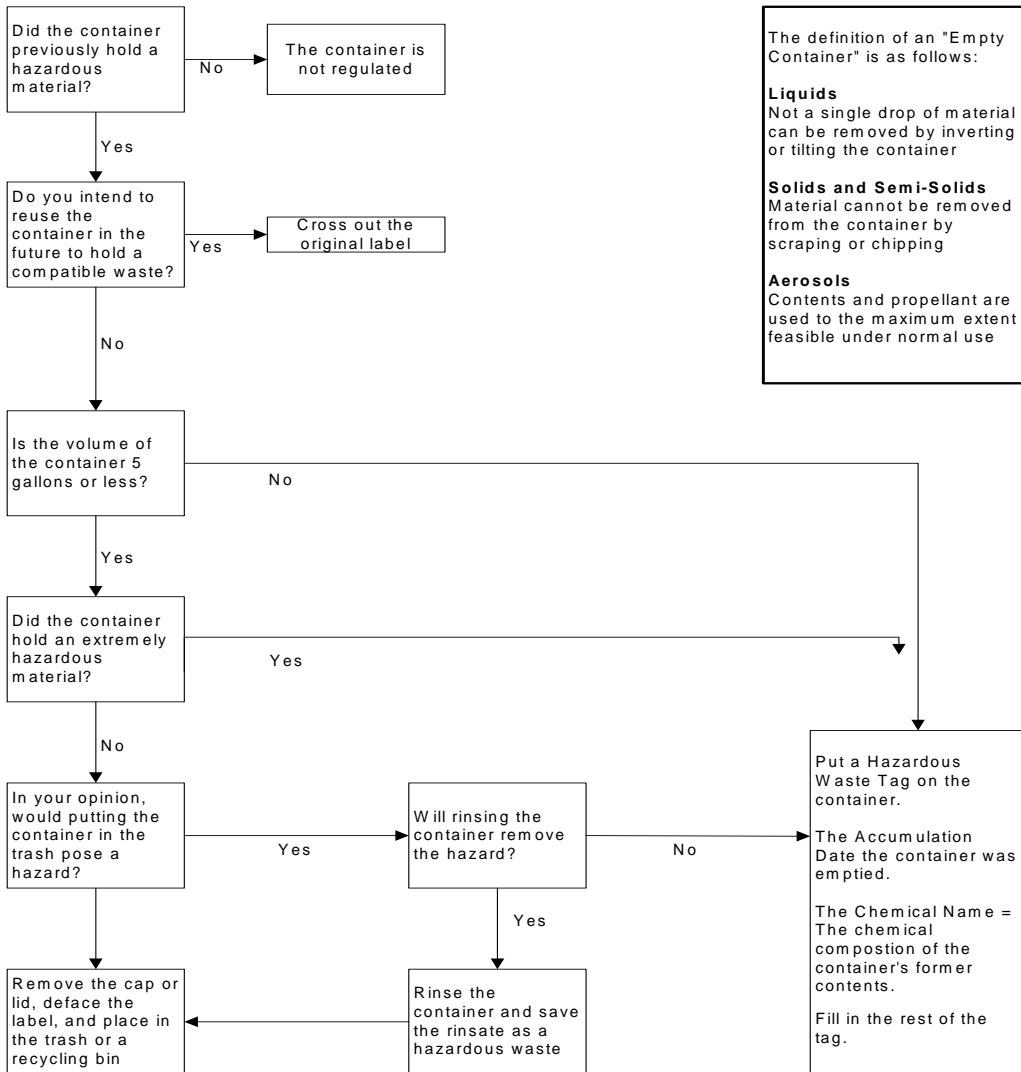
There are two types of gas cylinders commonly used at Caltech, refillable and non-refillable (lecture bottle). Both of these cylinders have different methods used to manage them for removal from the laboratories.

Refillable gas cylinders are large and have an average of 200 cubic feet of compressed gas in them. These cylinders are owned by the manufacturer and must be returned to them when they are empty. When you have a refillable gas cylinder that is empty, simply call Transportation and they will pickup the cylinder and make sure that it gets back to the proper manufacturer.

Non-refillable gas cylinders (lecture bottles), however, must be managed as hazardous waste, as they are purchased outright. When a lecture bottle is ready to be disposed of, simply attach an EH&S hazardous waste tag and either place it in your designated pickup area or call EH&S for a pickup.

EMPTY CONTAINERS

For a container to be truly empty, not a drop of liquid, or any solid residue that could be scrapped out, may be present. The following is a decision tree to determine whether a container is to be considered empty:



The definition of an "Empty Container" is as follows:

Liquids
Not a single drop of material can be removed by inverting or tilting the container

Solids and Semi-Solids
Material cannot be removed from the container by scraping or chipping

Aerosols
Contents and propellant are used to the maximum extent feasible under normal use

BROKEN GLASSWARE

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 it 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 put up the carton for disposal.

ETHIDIUM BROMIDE

Unwanted ethidium bromide, gels, and working solutions must be disposed of as a hazardous waste. EH&S 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.

Aquatic toxicity testing may be done to determine whether an ethidium bromide waste stream can be considered non-hazardous. Please contact the EH&S Office for further assistance.

UNIVERSAL WASTES

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 the handling,

recycling, and disposal of them. The regulations, called the “Universal Waste Rule”, are in the [California Code of Regulations, Title 22, Division 4.5, Chapter 23, and § 66273.1](#).

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 the following locations:

- Biology Stockrooms
 - a. Alles (Room 181)
 - b. Beckman Behavioral (Room 127)
- Beckman Institute Stockroom (Room 141)
- Chemistry Stockroom (157 Crellin)
- Engineering Stockroom (029 Moore)
- Bookstore (Winnett Center)
- Physical Plant Main Stockroom

Cathode Ray Tubes (CRT’s) and Consumer Electronic Devices (CED’s)

CRT’s, such as television picture tubes and non-flat panel computer monitors are considered universal wastes. A typically 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.

The EH&S 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 do the following:

1. Destroy all information and data located in and on the equipment being given for disposal;
2. Contact EH&S at extension 6727 and indicate the amount of items being picked up and their location;
3. Provide an account number. This account number will be used for the transportation of the items from their stored location to an accumulation area.

Lamps

Universal waste lamps include fluorescent tubes, high intensity discharge lamps (HID's), and sodium vapor lamps. Facilities replace universal waste lamps on a daily basis at the Institute. Once a lamp has been spent, it is collected and consolidated at the following two locations:

1. Safety Annex
2. Safety Storage Trailer.

CHAPTER FIVE WASTE MINIMIZATION

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

SUBSTITUTION

Replace the 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. 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. The EH&S Office keeps an inventory of unused or unopened chemicals that can be redistributed back to the laboratories. Please contact the EH&S Office for a current inventory list.

LABORATORY TREATMENT

Treatment of hazardous waste, in the laboratory, to eliminate or reduce hazardous components is allowable. On September 15, 1998, [Assembly Bill \(AB\) 966](#) was enacted into law. AB966 allows for certain proscribed small scale or benchtop treatments of hazardous (or the hazardous components of mixed) wastes in a laboratory setting. The following is a summary of California State Law benchtop treatment requirements:

- 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 cannot 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.

CHAPTER SIX EMERGENCY AND SPILL RESPONSE

The purpose of this section is to provide information to persons on how to respond to emergencies and the necessary steps to take when chemicals are spilled or released to the environment. .

INSTITUTE EMERGENCY RESPONSE GUIDE

The Caltech Emergency Response Guide is a compilation of information on how to respond to various emergencies. These guides are posted in every laboratory and other strategic locations.

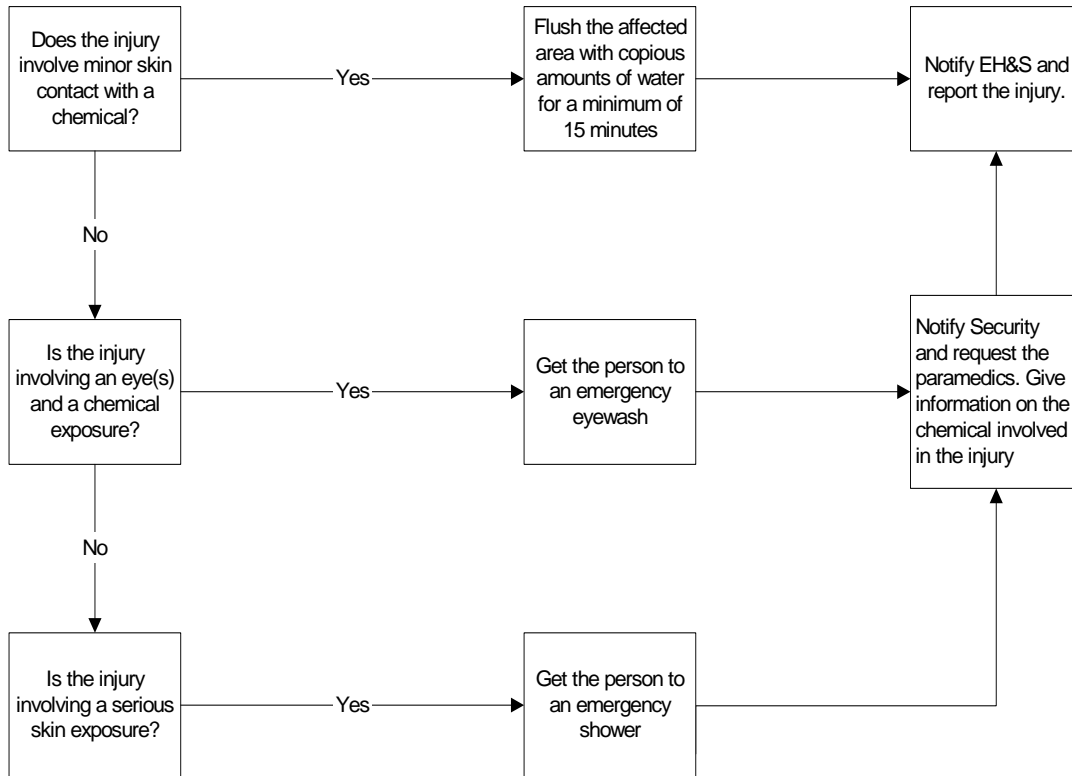
INCIDENT RESPONSE

For emergencies involving fire, explosion or health threatening incidents, the following apply:

- Call Security at extension 5000 for emergency assistance;
- Alert people in the area of the incident;
- Evacuate the area (If Necessary); and
- Provide information to emergency personnel.

INJURIES INVOLVING A CHEMICAL

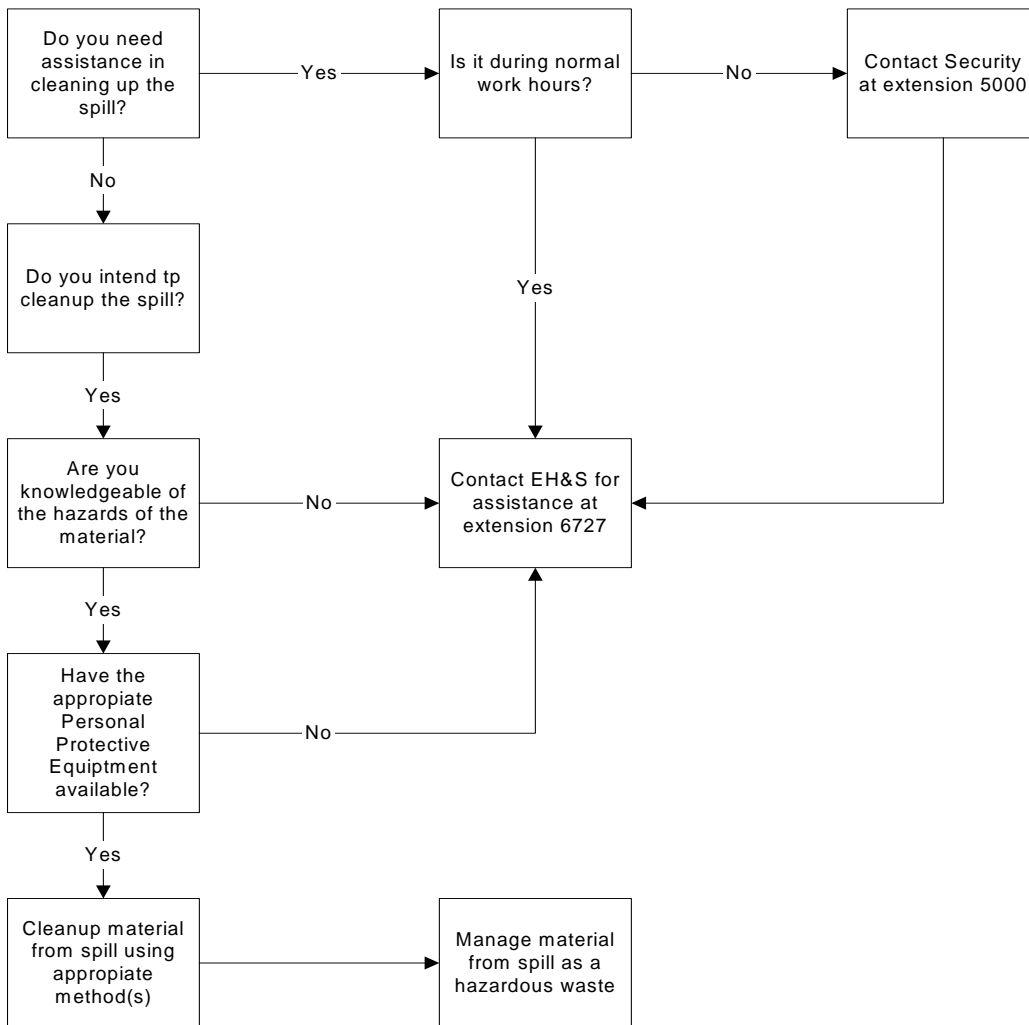
For injuries involving a chemical use the following flowchart to determine a course of action.



SPILL PROCEDURES

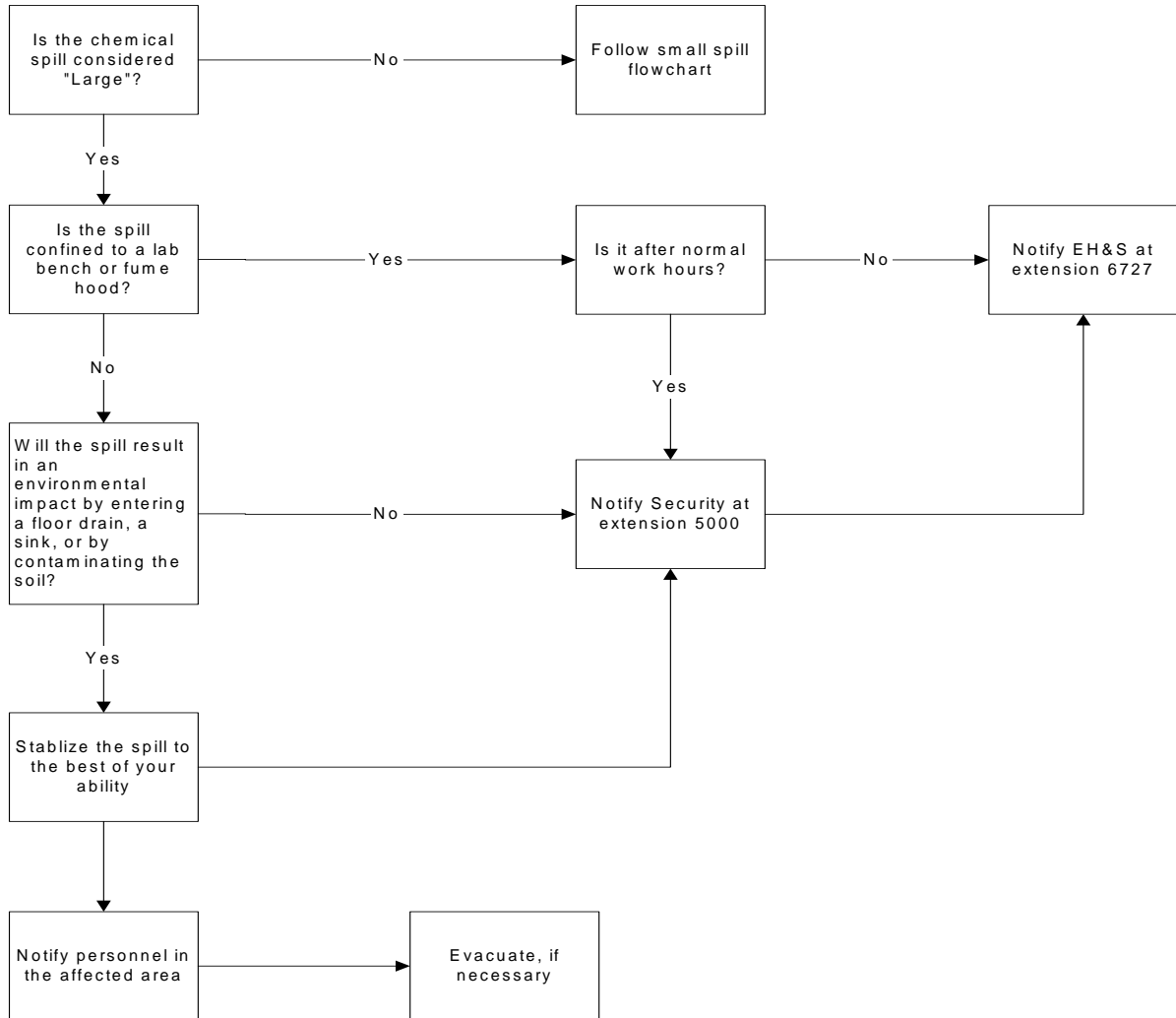
Small Spill

The following flowchart illustrates the steps to take in the event of a small spill. If there is any uncertainty whether the spill is manageable, contact EH&S or Security immediately.



Large Spill

In the event that a spill is large, not contained, or has a potential environmental impact, Security and/or EH&S must be notified immediately. In addition, personnel will do the following:



CHAPTER SEVEN

HAZARDOUS WASTE GENERATOR TRAINING

The EH&S 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 EH&S office for individual or group training.

HAZARD AWARENESS

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

Corrosive (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

Toxic (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,
 - Attached with a fully complete hazardous waste tag.
4. Hazardous wastes may be accumulated for a period of up to 9 months.

ACCIDENT RESPONSE

This component 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,
 - Alert people in the area,
 - Evacuate the area, and

- Remain in 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,
 - If it is a serious skin or eye exposure, use an emergency shower or eyewash and notify Security at extension 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 EH&S Office for assistance.
4. Call Security, at extension 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.

APPENDIX A 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
Alcohol	Clear colorless liquid	Alcohol <24%	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

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
Ethidium Bromide Gels		<0.1%	Solid: Trash
Ferric Citrate	Dark red to brown powder	Any Concentration	Solid: Trash
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
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
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

APPENDIX B HAZARDOUS WASTE TAG

00001

CALTECH PASADENA, CA. HAZARDOUS WASTE IDENTIFICATION TAG

**Complete and Attach to Container
When Waste Is First Generated**

Date Waste Is First Generated _____
Department _____
PI _____
Contact Person _____
Lab Location _____
Phone Number _____

Substance Identification Do Not Abbreviate / No Chemical Formulas

Component (List All Compounds)	Quantity

Physical State (check one)

Gas Liquid Solid

Hazard Class (check one)

Asbestos Flammable Corrosive
 Reactive Poison Oxidizer
 Other (specify) _____

I certify that this substance is
accurately described and contained
for safe handling

X _____
Authorized Signature

Date _____

California Institute of Technology
Safety Office
Extension 6727