

  Environment, Health & Safety	SOP #:	EHS-0003	
	Revision #:	1.8	
	Implementation Date:	04/06/04	
Page #:	1 of 1	Last Reviewed/Update Date:	04/21/16
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Hazardous Waste Removal and Disposal

1. Purpose / Background

This document describes the procedures used by the Massachusetts Institute of Technology (MIT) to dispose of chemical waste, including procedures used in determining how the costs of this service are met. These procedures are intended to support MIT's Environmental Health & Safety (EHS) Policy and comprise a portion of the MIT Environment, Health, and Safety Management System (EHS-MS).

The primary goal of MIT's chemical waste removal and disposal procedure is to ensure that the collection and disposal of waste chemicals throughout the Institute is conducted in a safe manner and in full compliance with governing regulations, specifically the Resource Conservation and Recovery Act (RCRA) (40 CFR 260-265) and the Massachusetts hazardous waste regulations (310 CMR 30), as well as MIT's Environment Health and Safety Management System practices.

2. Scope

This Standard Operating Procedure (SOP) addresses the procedures the EHS Office will follow to ensure that hazardous waste is properly collected, transported from campus, and that responsibilities for waste shipments are clearly communicated.

The EHS Office has responsibility for managing requests for hazardous waste collection from DLCs, managing central hazardous waste storage areas, removing waste from the Campus safely, and maintaining accurate records of all shipments.

Procedures for managing universal waste are addressed in the SOP Waste – Universal and Electronic (EHS-0034).

3. Requirements

- 3.1. Only EHS Office staff and EHS Office designees with RCRA training per 40 CFR 265.16 and 262.34 (as captured in EHS course 502c, RCRA Managing Hazardous Waste-Advanced) may sign manifests.

4. Program Description

4.1 Request for Hazardous Waste Collection

4.1.1. Before submitting a request for waste pickup, DLCs should first make an attempt to donate unused virgin material that is in safe condition (i.e., the container is intact, and the chemical's useful life has not expired or the chemical does not show signs of deterioration) to an accepting, authorized MIT user.

4.1.2 Any generator shall submit a request for hazardous waste collection when:

- A satellite accumulation area (SAA) container becomes full or is no longer needed;
- Before an SAA container reaches its three-day storage limit;

  Environment, Health & Safety	SOP #:	EHS-0003	
	Revision #:	1.8	
	Implementation Date:	04/06/04	
Page #:	2 of 2	Last Reviewed/Update Date:	04/21/16
SOP Owner:	Eric Hammond	Approval:	EHS: Lou DiBerardinis, EMP: Pam Greenley

- Items in the less-than-90 day area are nearing their 90 day storage limit;
- Any one of the less-than-90-day storage areas becomes full;
- A lab clean-out, move, or closure occurs; or
- There are spill clean-up materials requiring pick-up.

4.1.3 The most direct route for generators to request hazardous waste collection is by completing the online hazardous waste collection request form available at: <http://ehs.mit.edu/site/waste>. Alternatively, requests may be received through environment@mit.edu, one of the Environmental Management Programs (EMP) staff, or through the EHS Office main number at 617-452-3477 (2-EHSS).

4.1.4 Requests that are received through environment@mit.edu, made directly to the Environmental Management Program staff, or phoned in are entered into the online collection form.

4.1.5 The online collection request is forwarded to the EHS Office's database.

4.1.6 The database generates an email message that is sent to the hazardous waste program administrators at the EHS Office and to MIT's hazardous waste contractor.

4.1.7 Collection data are recorded, and a collection date is scheduled.

4.1.8 **Non-routine requests:** EMP may determine/deem/identify a request as non-routine (e.g., gas cylinder disposal, laboratory cleanout). The hazardous waste program administrator and hazardous waste contractor will investigate requests that are deemed non-routine requests. This is done to ensure that the waste can be safely handled, packaged and transported and that the receiving facilities are authorized to accept and treat the waste. Hazardous waste management costs may be associated with these non-routine requests which are covered by the DLC. Please refer to Appendix A – Hazardous Waste Costs Covered by the DLC, for more information.

4.1.9 **Cylinders.** DLCs may arrange for the pickup of cylinders. DLCs must provide a journal voucher (JV) account number and note this number on the red tag.

4.2. Hazardous Waste Removal

4.2.1. The EHS Office will classify the request for hazardous waste collection as either routine or non-routine.

4.2.2. Once the request is evaluated, the EHS Office contacts the hazardous waste contractor, who performs the waste pickups from the various locations and conducts the lab packs in accordance with applicable regulations.

4.2.3. The Radiation Protection Program manages radioactive waste.

4.2.4. The Biosafety Program manages biological waste.

  Environment, Health & Safety	SOP #:	EHS-0003	
	Revision #:	1.8	
	Implementation Date:	04/06/04	
Page #:	3 of 3	Last Reviewed/Update Date:	04/21/16
SOP Owner:	Eric Hammond	Approval:	EHS: Lou DiBerardinis, EMP: Pam Greenley

4.3. Hazardous Waste Disposal

- 4.3.1 MIT's hazardous waste transporter typically prepares for the shipment according to scheduled pickups. The Department of Transportation (DOT) shipping name and Environmental Protection Agency (EPA) waste codes, volumes, units, where the waste originated, and any special comments are noted. Information is stored in a database. Job slips, shipping papers, and packing slips are prepared. EMP has final authority on scheduling.
- 4.3.2 Routine waste removal/pickups typically occurs twice monthly at a minimum. Hazardous waste is transported from the central storage building. Other main 90-day storage areas are serviced on an as-needed basis.
- 4.3.3 For routine shipments, manifests are signed by designated EHS staff and distributed after the hazardous waste contractor hauls the waste from campus.
- 4.3.4 Prior to signing, the EHS Office will review the manifest for completeness and accuracy.
- 4.3.5 **Manifest distribution:** the distribution of the universal/uniform waste manifest will be as follows:
- MIT retains one copy;
 - If the hazardous waste shipment goes directly to a Massachusetts hazardous waste facility, then MIT does not have to submit a copy to MassDEP. If the shipment goes directly to an out-of-state hazardous waste facility, MIT must submit a fully executed photocopy of Copy 3 to MassDEP within 45 days of receiving it from the designated facility.
 - MIT receives one copy from the destination facility. If MIT does not receive this copy within 45 days, then MIT sends an exception letter to the DEP, with copies issued to the Department of Environmental Protection in which the Treatment, Storage and Disposal Facility (TSDF) is located, as well as the TSDF. A copy of the exception letter is also retained for the MIT EHS Office file.
- 4.3.6 The hazardous waste contractor forwards signed manifests to the hazardous waste program administrators in the EHS Office. The EHS Office records dates, the manifest number, shipper and receipt of the returned copy for tracking purposes. The EHS Office administrator then scans the returned TSDF copy and files both the original and returned manifests along with associated shipment paperwork in the EHS Office.
- 4.3.7 Manifests are required to be kept on site for 3 years. MIT maintains older copies in archive in accordance with the Records Retention, EHS Office SOP (EHS-0021).

4.4. Corrective Action

- 4.4.1 The hazardous waste contractor conducts quality assurance/quality control measures on manifests for waste shipments after leaving the campus. Before waste is removed from campus, the EHS Office has four opportunities to review manifests for errors. The opportunities occur when:
- EMP's contractor receives information from MIT;
 - EMP goes over to the 90-day storage areas to sign manifest; and

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  Environment, Health & Safety	SOP #:	EHS-0003	
	Revision #:	1.8	
	Implementation Date:	04/06/04	
Page #:	4 of 4	Last Reviewed/Update Date:	04/21/16
SOP Owner:	Eric Hammond	Approval:	EHS: Lou DiBerardinis, EMP: Pam Greenley

- EMP's contractor checks manifests one last time before leaving.

- 4.4.2 **Misclassification of waste:** If waste is misclassified, either the transporter or the EHS Office will make the necessary corrections.
- 4.4.3 **Waste rejection:** If waste is rejected at the receiving facility, then it is returned to MIT. The EHS Office will inform the PI or the administrative officer of any rejected waste; the EHS Office typically assumes the cost of reshipping the waste.
- 4.4.4 **Manifests:** If EMP's contractor detects an error at the time of shipment (before manifests are distributed), corrections will be made to the manifest and initialed. If an error is detected after manifests are distributed, then the EMP's contractor will send MIT a letter noting the correction. MIT EHS signs the letter and returns it to the contractor.

5. Roles & Responsibilities

- 5.1. The Managing Director for Environment, Health, and Safety Programs, in consultation with the Institute Council on Environmental Health and Safety, approves the protocols for chemical waste disposal within MIT. The basis for such procedures shall be the recommendations of the Environmental Health and Safety (EHS) Office.
- 5.2. The EMP is responsible for implementing and coordinating MIT's chemical waste disposal efforts. EMP reviews and recommends revisions to these protocols and procedures as appropriate. EMP also submits reports to DEP including Biennial Reports and Letters of Exception.
- 5.3. In the event a TSDF files a discrepancy report for waste received from MIT, the EMP is responsible for investigating the cause of the discrepancy, contacting the DLC to obtain any additional required information, and for ensuring the waste is re-manifested to accurately reflect the waste characteristics.
- 5.4. DLCs that generate chemical waste are responsible for adhering to hazardous waste management procedures as outlined in the EHS Course 501c, "Managing Hazardous Waste". Researchers, staff, and students who work with chemicals in any manner are required to be familiar with and follow these procedures.
- 5.5. DLCs shall follow the guidelines in the SOP "Deactivating and Decommissioning Equipment" (EHS-0049) in determining the disposition of equipment offered for recycling or disposal.
- 5.5.1. Any DLC that is disposing of capacitors, transformers, or equipment that contains transformers and/or capacitors shall ascertain whether the materials contain polychlorinated biphenyls (PCBs).
- 5.5.2. If the date of the equipment manufacture cannot be ascertained, then DLCs must assume the equipment contains PCBs. Dielectric, heat transfer, and hydraulic fluids from equipment manufactured prior to 1979 must be assumed to contain PCBs, unless the DLC has documentation to demonstrate otherwise.
- 5.5.3. If the equipment is known to be manufactured after July 2, 1979, it can be assumed to be non-PCB.

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  Environment, Health & Safety	SOP #:	EHS-0003	
	Revision #:	1.8	
	Implementation Date:	04/06/04	
Page #:	5 of 5	Last Reviewed/Update Date:	04/21/16
SOP Owner:	Eric Hammond	Approval:	EHS: Lou DiBerardinis, EMP: Pam Greenley

5.5.4. If the equipment has been tested and has been found to contain less than 50 parts per million (ppm), a “no PCB” label may be affixed to the equipment.

5.6. The EMP is responsible for coordinating field screening of waste that is offered for disposal, including oils, dielectric fluids, heat transfer fluids, hydraulic and other fluids which may contain PCBs.

5.7. MIT’s hazardous waste contractor is responsible for verifying the disposition of capacitors, transformers, and other electrical equipment and their associated dielectric, heat transfer, and hydraulic fluids to ensure materials containing PCBs are properly manifested and disposed.

6. Training

Anyone involved in the generation of hazardous waste or who supervises those who do so must complete, on an annual basis, hazardous waste training that addresses applicable hazardous waste regulations. The EHS Office offers a training class, Managing Hazardous Waste, course number 501c (501w is the online version). A class schedule may be obtained through the EHS Office (x2-3477) or online at <http://ehs.mit.edu/site/training>. Researchers and other staff in the DLCs are encouraged to use the website as part of conducting a Training Needs, particularly as it applies to chemical waste management in this procedure.

EHS Office staff involved in administering the hazardous waste program must complete 8-hour RCRA training (EHS course 502c) at least annually.

7. Monitoring Requirements

7.1. Federal and State hazardous waste regulations require that all hazardous waste accumulation areas be inspected on a weekly basis; that large quantity generators report on hazardous waste shipments; and that all generators notify DEP when the destination facility does not notify the generator of the final disposition of hazardous waste in a timely manner (within 45 days).

7.2. DLCs are responsible for weekly visual inspections of their own satellite accumulation areas (SAAs).

7.3. The EHS Office shall inspect all less-than-90-day storage areas weekly, record the results of the weekly inspections, and ensure that hazardous wastes are stored properly. When necessary, the EHS Office may field screen certain wastes to confirm their characterization.

7.4. DLCs are responsible to inspect satellite accumulation areas at least weekly and arrange for waste pickups once the storage and/or time limits are met. Inspections shall include monitoring waste accumulation to ensure that incompatible wastes are not stored together, containers are closed, containers are intact, the area is properly designated, and waste identification tags (i.e., “red tags”) are fully labeled.

7.5. The EHS Office screens waste oil for the presence of chlorinated materials. Where screening indicates chlorinated compounds, the oil is analyzed for PCBs.

  Environment, Health & Safety	SOP #:	EHS-0003	
	Revision #:	1.8	
	Implementation Date:	04/06/04	
Page #:	6 of 6	Last Reviewed/Update Date:	04/21/16
SOP Owner:	Eric Hammond	Approval:	EHS: Lou DiBerardinis, EMP: Pam Greenley

7.6. Biennial Reporting: In accordance with Federal and State regulations, the EHS Office shall submit a Biennial Report to DEP on March 1 of every even-numbered year. The contents of the Biennial Report are outlined in 310 CMR 30.332, “Biennial Reporting”.

7.7. Exception Reports: If within 45 days of the date of transport the EHS Office does not receive notification from the destination facility of the final disposition of the hazardous waste, the EHS Office shall submit a letter of exception to the DEP and the hazardous waste management authority in the state where the destination facility is located. The exception letter shall include a legible copy of the manifest in question, and a cover letter signed by the hazardous waste program administrator in the EHS Office describing the steps taken to locate the hazardous waste and the results of those efforts.

8. Record Management

Federal regulations require that hazardous waste manifests, biennial reports and exception reports be maintained on site for 3 years. The EHS Office maintains hazardous waste records on a permanent basis. Refer to the SOP “Records Retention, EHS Office” (EHS-0021) for additional guidance.

9. References / Related EHS Guides:

9.1. Standards

- 40 CFR 260 Hazardous Waste Management System: General
- 40 CFR 261 Identification and Listing of Hazardous Waste
- 40 CFR 262 Standards Applicable to Generators of Hazardous Waste
- 40 CFR 265 Interim Status Standards for Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities
- 49 CFR 171 Subchapter C, Hazardous Materials Regulations through 185
- 310 CMR 30 Massachusetts Hazardous Waste Regulations

9.2. Other SOP/ SOGs

- Abandoned Hazardous Waste Management (EHS-0018)
- Drain Disposal/Wastewater Practices (EHS-0005)
- Hazardous Waste Management (EHS-0032)
- Laboratory Moves: Preparation and Decontamination (EHS-0026)
- Laboratory Start-up (EHS-0014)
- Lab Waste Streams - Fact Sheet (EHS-0047)
- Records Retention, EHS Office (EHS-0021)
- Spill Response Procedures (EHS-0004)
- Waste – Universal & Electronic (EHS-0034)
- Peroxide-forming Chemicals (EHS-0042)
- Appendix A – Hazardous Waste Costs Covered by the DLC

  Environment, Health & Safety	SOP #:	EHS-0003	
	Revision #:	1.8	
	Implementation Date:	04/06/04	
Page #:	7 of 7	Last Reviewed/Update Date:	04/21/16
SOP Owner:	Eric Hammond	Approval:	EHS: Lou DiBerardinis, EMP: Pam Greenley

10. Definitions

- 10.1. Corrosive** – waste that is listed in 310 CMR 30.131-136 marked “C”, or any waste that exhibits any of the following characteristics:
- 10.1.1. It is aqueous and has a pH less than 2 or greater than 12.5.
 - 10.1.2. It is a liquid and corrodes steel (Type SAE 1020) at a rate greater than 6.35mm per year at a test temperature of 55° C (or 0.250 inches per year at a test temperature of approximately 130° F).
- 10.2. DOT** – United States Department of Transportation. DOT regulates the shipment of hazardous materials, including waste. DOT regulations for shipping hazardous materials and waste appear in 49 CFR 171-185.
- 10.3. EMP** – Environmental Management Program, a group within the EHS Office that provides hazardous waste collection services.
- 10.4. Generator** is any person, by site, whose act or process produces hazardous waste, or whose act first causes a waste to become subject to regulation. Both individual labs and MIT as a whole are considered generators.
- 10.5. Hazardous Waste** – waste that meets one or more of the following characteristics: a) corrosive; b) ignitable; c) reactive; d) toxic; or, e) appears on any of the lists contained in 310 CMR 30.130 - 30.136; or is listed as such by the federal and/or state agencies.
- 10.6. Incompatible Waste** – waste that should not be mixed with other waste or materials under uncontrolled conditions because the commingling might produce heat, pressure, fire, explosion, violent reaction, toxic dusts, mists, vapors, or gases, or flammable vapors or gases.
- 10.7. Ignitable** - waste that is listed under 310 CMR 30.131-136 marked “I”, or any waste that exhibits any of the following characteristics:
- 10.7.1. It is a liquid and has a flashpoint of less than 140° F (60° C), excluding an aqueous solution of ethyl alcohol which contains less than 24% alcohol by volume.
 - 10.7.2. It is not a liquid and is capable under standard temperature and pressure of catching fire through friction, absorption of moisture or spontaneous chemical changes and, when ignited, burns so vigorously and persistently that it creates a hazard.
 - 10.7.3. It is a compressed gas and is ignitable.
 - 10.7.4. It is an oxidizer.

  Environment, Health & Safety	SOP #:	EHS-0003	
	Revision #:	1.8	
	Implementation Date:	04/06/04	
Page #:	8 of 8	Last Reviewed/Update Date:	04/21/16
SOP Owner:	Eric Hammond	Approval:	EHS: Lou DiBerardinis, EMP: Pam Greenley

10.8. Manifest – the form used as a shipping document to identify the quantity, composition, and the origin, routing, and destination of hazardous waste from the site of generation to the point of disposal, treatment, storage, or use.

10.9. Reactive – waste that is listed under 310 CMR 30.131-.136 marked “R”, or waste that exhibits any of the following characteristics:

10.9.1. It is normally unstable and readily undergoes violent changes without detonating.

10.9.2. It reacts violently with water.

10.9.3. It forms potentially explosive mixtures with water.

10.9.4. When mixed with water, it generates toxic gases, vapors or fumes in a quantity sufficient to present danger to public health, safety, or welfare, or to the environment.

10.9.5. It is a cyanide or sulfide bearing waste which, when exposed to a pH of between 2 and 12.5, can generate toxic gases, vapors or fumes in a quantity sufficient to present a danger to public health, safety, or welfare, or to the environment.

10.9.6. It is capable of detonation or explosive reaction if it is subjected to a strong initiating source or if heated under confinement.

10.9.7. It is readily capable of detonation or explosive decomposition or reaction at a standard temperature and pressure.

10.9.8. It is a forbidden explosive, a Class A explosive or a Class B explosive as defined by DOT regulations.

10.10. Satellite Accumulation Area – an area in a lab or facility that is at or near the hazardous waste generation point and is designated for the collection of hazardous waste. The purpose of an SAA is to allow a convenient location for waste to be collected until it can be practicably moved to a central storage location.

10.11. Shipping Paper – means an invoice, bill of lading, or other shipping document serving a similar purpose; other than a hazardous waste manifest used to document the conveyance of materials between different locations.

10.12. Toxic – a waste that is listed in 310 CMR 30.131-.136 marked “T”. If no designation (I, C, or R) follows a listing of a hazardous waste, such waste has been listed solely because it is toxic. If a waste contains any of the chemicals listed in 310 CMR 30.125A, it is considered toxic if the concentrations are known and are above the regulated limit. If a waste contains any chemical listed in 310 CMR 30.125B, it is presumed to be toxic regardless of the concentration.

Appendix A

Hazardous Waste Costs Covered by DLC – September 2010

The costs for the following types of services are expected to be covered by the Department, Lab or Center (DLC), not the Environment, Health & Safety Office (EHS). Assistance can be provided by the EHS Hazardous Waste Team. Contact environment@mit.edu for more information.

Type of Service	DLC Cost	Way to Minimize Cost
Cylinder Disposal	Specific costs will depend on the size and type of cylinder for disposal. EHS will work w/ the DLC to provide a quote of the costs associated with their specific request prior to removing the cylinders. Disposal costs can range from \$100-\$3000(+) depending on the request & volume.	Order reusable lecture bottle gasses when possible; order compressed gasses from vendors that will take back their cylinders and order only what you need.
Unknown Chemical Waste Testing	Each characteristics test will cost the lab roughly \$50. These tests are conducted in the lab by our onsite vendor to determine the basic hazards for safe handling and processing the material.	Ensure all chemical and waste collection containers are clearly labeled with full chemical name, date and initials; verify chemical information with researchers leaving the lab or Institute prior to their departure.
Highly Hazardous Chemical Disposal	Explosives, temperature, shock sensitive and peroxide forming chemicals generally require additional measures to ensure their safety for transportation and disposal. For example, a police or fire department detail to oversee a remote opening to stabilize the material for shipment may be required. These requests may range from \$500-\$1500(+) depending on the material & volume.	Maintain an active inventory; order only what you need and identify the owner of the material on the container w/ the date of expiration. Determine if a less hazardous chemical can be used for the process as an alternative.
Analytical Testing	Testing needed to identify contents of equipment or material slated to leave campus for disposal can range from \$150-\$5000 depending on the required level of analysis. Typically this pertains to items thought to contain PCBs and heavy metals.	Know the contents and age of your equipment prior to requesting disposal.
Lab Cleanouts	A cleanout may be needed due to a lab move, decontamination request, new PI coming to campus or a researcher leaving campus with a lot of legacy chemicals to remove at one time. Due to the high volume of chemicals at this one time, a fee associated with the labor, materials, transportation and disposal is placed on the lab to manage. These requests can range from \$1500-\$10,000(+) depending on volume and types of chemicals identified.	Keep an active inventory. Reach out to colleagues in other MIT labs to see if they can use your unwanted chemicals.
Lab Decontaminations	If a DLC has the need for an environmental service provider to fully decontaminate their space (lab, cold or warm rooms, dark rooms, equipment room) the Hazardous Waste Team will work with the lab to ensure competitive rates are received for the service and that the	Determine what chemicals are used in the space, as the decontamination may be able to be completed by the lab occupants. Practice good housekeeping during the course of your research and wipe down workspaces routinely with

Type of Service	DLC Cost	Way to Minimize Cost
	work is completed to their satisfaction. This service may be the result of an Emergency Response, contamination of equipment and workspace due to a specific chemical or process, or a new PI entering a previously used lab. Recent requests have ranged from \$500-\$10,000.	materials such as dilute bleach solutions and Simple Green.
Project* Related Items	Analytical testing, decontamination, removal of abandoned wastes and disposal of project related wastes; such as, waste water, contaminated soil and equipment, oil with PCBs, etc. will be billed to the Project.	Ensure the departing PI is held responsible for costs associated with their residual chemical wastes or decontamination.

**The term Project refers to Facilities capital projects and renovations that have Institutional funds allocated to complete a particular scope of work. In the event waste is generated due to a renovation or capital project EHS is available to facilitate the waste management and compliance needs but funds should be allocated through the project.*

While EHS maintains a budget to cover costs for routine hazardous wastes generated as a result of research, education and facilities activities, the items listed above are not covered by the EHS Office, rather by the Department, Lab or Center (DLC) or Project generating the waste or entity requesting the service. EHS will work with the DLC to secure competitive quotes from environmental service providers and will oversee the operation to ensure full compliance and satisfaction with the work requested. For specific information regarding lab moves and associated costs, please refer to the EHS SOP on lab moves: [Laboratory Moves, Preparation and Decontamination – EHS SOP# 0026](#). To avoid these costs, EHS stresses that it is in the lab's best interest to maintain an active inventory of their chemicals, ordering only what is needed and removing expired chemicals before they become more hazardous. Remember, once you've determined that you no longer need a particular chemical or the expiration date has been reached, the chemical becomes a waste.