

Chapter 52: [Hazardous Materials and Waste Transportation](#)

Quick Start Summary

Product ID: [627](#) | Revision ID: 2402 | Date published: 28 May 2021 | Date effective: 28 May 2021

URL: <https://www-group.slac.stanford.edu/esh/eshmanual/references/hazmattransportQuickstart.pdf>

1 Who needs to know about these requirements

The requirements of Hazardous Materials and Waste Transportation apply to all workers who transport, or cause to be transported, any material regulated by the Department of Transportation (DOT) and the International Civil Aviation Organization (ICAO), including *hazardous material*, *radiological material*, *hazardous waste*, *radioactive waste*, and *mixed waste*, and user facilities, Shipping and Receiving, Radiation Protection Field Operations and Radioactive Waste Management, Chemical and Waste Management, and the DOT program manager.

2 Why

Transportation of hazardous material and waste is strictly regulated. Following the requirements of this chapter will allow flexibility in operations while maintaining compliance with regulations.

3 What do I need to know

- All determinations of which regulations apply must be made by an appropriately trained and authorized subject matter expert.
- All off-site shipments of hazardous materials and wastes must be performed by one of the following groups in accordance with their areas of authority and responsibility: hazardous materials, Shipping and Receiving; hazardous wastes, Waste Management; radioactive materials, Radiation Protection Field Operations; and radioactive and mixed wastes, Radiation Protection Radioactive Waste Management.
- Exceptions for the transport of *materials of trade (MOT)* must be by appropriately trained and authorized personnel.

4 When

These requirements take effect 28 May 2021.

5 Where do I find more information

[SLAC Environment, Safety, and Health Manual](#) (SLAC-I-720-0A29Z-001)

- [Chapter 52, “Hazardous Materials and Waste Transportation”](#)

Or contact the [program manager](#).

Chapter 52

Hazardous Materials and Waste Transportation

Product ID: [499](#) | Revision ID: [2401](#) | Date published: 28 May 2021 | Date effective: 28 May 2021

URL: <https://www-group.slac.stanford.edu/esh/eshmanual/pdfs/ESHch52.pdf>

1 Purpose

The purpose of this program is to ensure the safe transport of hazardous materials and waste by meeting the requirements of the United States Department of Transportation (DOT), Department of Energy (DOE), and Environmental Protection Agency (EPA), and the International Civil Aviation Organization (ICAO). It covers the roles, responsibilities, and authorization for the following activities as they pertain to *hazardous material*, *radiological material*, *hazardous waste*, *radioactive waste*, and *mixed waste* shipment and transportation:

- Offering hazardous material and hazardous waste to vendors and third-party carriers for transport *in commerce*
- Transporting hazardous material and waste within and off of the SLAC property, not in commerce
- Classifying and identifying hazardous material and waste to be transported from SLAC
- Packaging of hazardous material and waste for *transport*
- Marking, labeling, and communicating the risks of hazardous material/waste shipments
- Preparing and signing shipping documents and waste manifests

This program applies to all workers who offer for transportation, or cause to be transported, any DOT- or ICAO-regulated material, and the special functions provided within user facilities, Shipping and Receiving, Radiation Protection Field Operations and Radioactive Waste Management, Chemical and Waste Management, and the DOT program manager.

Note SLAC does not provide DOT shipping guidance to institutions or individuals for materials or equipment being shipped to SLAC by non-SLAC personnel. They are responsible for determining and meeting all the legal and regulatory requirements that apply; however, shipments must meet SLAC requirements once on-site.

For general information on the procurement, storage, handling, and use of hazardous materials, see [Chapter 40, “Chemical Lifecycle Management”](#). For hazard communication and mitigation related to hazardous materials, see [Chapter 53, “Chemical Safety”](#). For chemical use in laboratories, see [Chapter 58, “Laboratory Safety”](#). For work with biohazardous materials, see [Chapter 34, “Biosafety”](#). For spills involving hazardous materials, see [Chapter 16, “Spills”](#). For general radiological materials safety information, see [Chapter 9, “Radiological Safety”](#). For information related to the generation, handling, and storage of hazardous wastes, see [Chapter 17, “Hazardous Waste”](#).

2 Roles and Responsibilities

Functional roles and their general responsibilities under this program are listed below. More detailed responsibilities and when they apply are provided in the procedures and requirements.

The roles may be performed by one or more individuals and one individual may fill more than one role. Responsibilities may be delegated.

2.1 Worker

- Submits requests through proper channels for preparation for off-site transport (use the [SLAC eShipper](#) for hazardous materials and radioactive materials, contact Waste Management for hazardous waste, or contact Radioactive Waste Management for radioactive and mixed waste.)

Note Only a properly trained hazmat employee of one of the groups listed in sections 2.6 through 2.8 may prepare and approve hazardous materials and wastes and related shipping papers for transportation in commerce off of SLAC property.

- Ensures non-commerce transport of samples, equipment, and hazardous materials meet the requirements of [Hazardous Materials and Waste Transportation: Non-commercial Hazardous Materials Transport Procedure](#)
- Ensures transport of hazardous materials within contiguous SLAC property is in accordance with DOT, DOE, and SLAC requirements as described in [Hazardous Materials and Waste Transportation: On-site Transportation Requirements](#)

2.2 Chemical Receiver

- Ensures all received hazardous materials packages are in good condition and not leaking or damaged
- Verifies that the correct materials, in the correct quantities, are received at the correct location as listed on the shipping documentation before signing for and accepting the materials
- If needed, arranges for the safe and secure short-term storage of the shipment before being taken to the long-term storage area
- Must be designated and identified by the ESH coordinator and DOT program manager in order to receive *highly toxic material*. Additional security measures must be in place and verified by the DOT program manager as being consistent with the *Hazardous Materials Transportation Security Plan*. Security measures include receipt of such materials by designated chemical receivers trained in the requirements of the security plan, with material being immediately secured upon receipt by placing it in a secure, limited access, or locked storage area.

2.3 Directorate DOT Point-of-Contact

- Must be designated by his or her directorate
- Must be a SLAC employee: either an ESH coordinator or equally qualified staff person
- Checks that proposed non-commerce transport of samples, equipment, and hazardous materials meet the regulatory definition and the requirements of [Hazardous Materials and Waste Transportation: Non-commercial Hazardous Materials Transport Procedure](#)

- Ensures that inventories are updated and adequate storage provided for materials being transported or received, and notifies Radiation Protection of any non-radioactive nuclear materials received
- Is a SLAC point-of-contact for non-radioactive hazardous material

2.4 User Facility Management

- Implements shipping and receiving procedures in conformance with this program for samples meeting the definition of *hazardous materials* or shipped in hazardous material (for example, dry ice or liquid nitrogen)

Note *Samples contained in liquid nitrogen (in dewars) prepared and offered by any SLAC employee or user for shipment must be coordinated and approved by the directorate ESH coordinator*

- Delegates and trains a SLAC employee as the DOT point-of-contact if the facility generates a large number of hazardous materials shipments or will require the non-commerce transport of samples, equipment, or hazardous materials.

2.5 SLAC eShipper Verifier

- Verifies [SLAC eShipper](#) forms for correct DOT/IATA shipping information
- Works with [SLAC eShipper](#) submitter to ensure correct information before approving

2.6 Shipping and Receiving

- Implements shipping and receiving procedures in conformance with DOT, DOE, and SLAC requirements
- Prepares, ships, and receives hazardous materials at the SLAC B081 receiving dock
- Acts as SLAC eShipper verifier for requests of non-radioactive hazardous materials shipments
- Maintains records in conformance with DOT, DOE, and SLAC requirements
- Conducts DOT security assessments for their function in accordance with the *Hazardous Materials Transportation Security Plan*

2.7 Radiation Protection Department

2.7.1 Field Operations Group

- Acts as DOT point-of-contact for radioactive materials
- Stores, prepares, transports on-site, and ships radioactive materials in conformance with DOT, DOE, and SLAC requirements, as appropriate
- Acts as SLAC eShipper verifier for requests for radioactive hazardous materials shipments
- Acts as point-of-contact for regulatory agencies regarding radioactive materials shipping compliance
- Conducts DOT security assessments for their function in accordance with the *Hazardous Materials Transportation Security Plan*

- Maintains records in conformance with DOT, DOE, and SLAC requirements, as appropriate

Note All radioactive material must be pre-approved and received by the Radiation Protection Department and processed in accordance with RP program requirements.

2.7.2 Radioactive Waste Management Group

- Stores, prepares, transports on-site, and ships radioactive wastes and mixed wastes in conformance with DOT, EPA, DOE, and SLAC requirements, as appropriate
- Is the only group authorized to ship radioactive and mixed waste off-site; develops and implements shipping and receiving procedures for the radioactive and mixed wastes in conformance with DOT, DOE, and SLAC requirements
- Conducts DOT security assessments for their function in accordance with the *Hazardous Materials Transportation Security Plan*
- Acts as point-of-contact for regulatory agencies regarding radioactive and mixed waste shipping compliance
- Maintains records in conformance with DOT, DOE, EPA, and SLAC requirements, as appropriate

2.8 Chemical and Waste Management Department

2.8.1 Chemical Management Group

- Conducts DOT security assessments for their function in accordance with the *Hazardous Materials Transportation Security Plan*
- Acts as point-of-contact for regulatory agencies regarding hazardous materials shipping compliance
- Maintains records in conformance with DOT, DOE, EPA, and SLAC requirements, as appropriate
- Acts as SLAC eShipper verifier for requests for non-radioactive hazardous materials shipments
- Conducts hazardous materials delivery audits for direct chemical deliveries

2.8.2 Waste Management Group

- Stores, prepares, transports on-site, and ships non-radioactive hazardous wastes in conformance with DOT, EPA, DOE, and SLAC requirements, as appropriate
- Is only group authorized to ship hazardous waste off-site
- Ensures annual registration with the federal DOT and submits payment of fees in accordance with [49 CFR 107 Subpart G](#)¹
- Conducts DOT security assessments for their function in accordance with the *Hazardous Materials Transportation Security Plan*
- Acts as point-of-contact for regulatory agencies regarding hazardous waste shipping compliance

¹ Offerors and transporters of certain quantities and types of hazardous materials, including hazardous wastes, are required to file an annual registration statement with the United States Department of Transportation and to pay a fee (see [49 CFR 107.601-620](#)). See [PHMSA – Registration](#) for more information.

- Maintains records in conformance with DOT, DOE, EPA, and SLAC requirements, as appropriate
- Acts as SLAC eShipper verifier for requests for non-radioactive hazardous materials shipments

2.9 DOT Program Manager

- Reviews this chapter annually for compliance with regulatory references listed in Section 6.1, “External Requirements”
- Coordinates periodic updates of referenced procedures
- Ensures each stakeholder group identifies all personnel who are involved in the shipment or receipt of hazardous materials or who perform any hazmat employee function and performs audits to measure the level of compliance in the field, including the responsibility for properly training workers in the function-specific areas of their jobs and maintaining documentation
- Ensures each stakeholder group verifies subcontractors are in compliance with DOT regulations through contracting agreements and/or signed letters of compliance
- Maintains an inventory of and verifies that all DOT-regulated portable tanks, tank trucks, and tube trailers owned by SLAC are maintained and inspected in accordance with [49 CFR 178](#) or equivalent if not used in commerce. Ensures that any subcontractor working full-time on-site that has rolling stock requiring periodic certification and permits furnishes a one-year calendar that contains all due dates for permits, and then inspects this as part of the vendor audit process.
- Reviews and updates the *Hazardous Materials Transportation Security Plan* and ensures affected groups perform security audits and training in conformance with the plan
- Provides regulatory updates as needed
- Documents significant successes, problems, or corrective actions in packaging in the lessons learned format and submits to the SLAC lessons learned program manager for further communication
- Verifies and coordinates registration with Chemtrec for use as the emergency contact number on shipping papers
- Ensures all hazardous material delivery locations and designated hazardous material receivers are identified throughout SLAC facilities using the CMS except for radioactive material approved and received by the Radiation Protection Department.
- Ensures stakeholder groups are maintaining records in accordance with DOT hazardous materials regulations ([49 CFR 171–180](#)) and ICAO, as appropriate. Record keeping may include packaging certification, training records, copies of shipping papers and manifests, procedures for preparing samples for shipment in liquid nitrogen dewars or dry ice, and communication or agreements with regulatory agencies, including special permits for non-DOT specified packaging.

3 Procedures, Processes, and Requirements

These documents describe the detailed requirements for this program and how to implement them:

- [Hazardous Materials and Waste Transportation: On-site Transportation Requirements](#) (SLAC-I-730-0A09S-037). Describes requirements for transporting hazardous materials and waste on-site

- [Hazardous Materials and Waste Transportation: Non-commercial Hazardous Materials Transport Procedure](#) (SLAC-I-730-0A09C-006). Describes process for transporting hazardous materials meeting DOT material of trade (MOT) exception to and from SLAC
- [Hazardous Materials and Waste Transportation: In Commerce Transport Procedure](#) (SLAC-I-730-0A09C-007). Describes process for shipping hazardous materials and waste from SLAC in commerce

These are the forms and tools for this program:

- [Chemical Management System](#). System used for ordering and tracking chemicals and storing safety data sheets
- [SLAC eShipper](#). System for documenting DOT/IATA shipments

These are other program documents and resources:

- *Hazardous Materials Transportation Security Plan* (SLAC-I-750-0A86M-001) (contact program manager)

4 Training

4.1 Worker

As a *hazmat employer*, SLAC is responsible for identifying and training *hazmat employees*. Each hazmat employee must be trained and tested, and the employer must keep a record of training to include certification of training and testing, date of training, a description of the training material, and the name and address of the person providing the training.

Each hazmat employee must be initially trained, and retrained at least every three years, in four areas:

1. General awareness training designed to provide familiarity with requirements and to enable the employee to recognize and identify hazardous materials
2. Function-specific training concerning requirements that are specifically applicable to the functions the employee performs
3. Safety training concerning emergency response information, measures to protect the employee from the hazards posed by materials, and methods and procedures for avoiding accidents
4. Security training that provides an awareness of the security risks associated with hazardous materials transportation and methods to enhance hazardous materials transportation security and in-depth security training for hazmat employees who handle or perform regulated functions related to the transportation of the materials listed in [49 CFR 172.800\(b\)](#) or who are responsible for implementing the security plan, on the specific portions of the plan for which they are responsible.

Hazmat employees, who prepare or offer dangerous good shipments via air carrier must be trained in accordance with current IATA Dangerous Goods Regulations ([IATA DRG](#)). This training is required every two years.

Initial training must be conducted within 90 days of an employee assuming hazmat employee duties. Hazmat employees may perform their job functions within that time under the direction of a trained hazmat employee.

- ESH Course 103, Hazard Communication ([ESH Course 103](#))

Personnel who use potentially hazardous chemicals (including cryogenics), and those who may be exposed to potentially hazardous chemicals under a foreseeable workplace emergency situation.

This includes personnel who do not work directly with chemicals but are required to be in areas where chemicals are used and need to understand the warning signs that may be present.

Area managers and supervisors whose personnel may be exposed to hazardous materials and are required to implement the HazCom program in their work area.
- ESH Course 123, Hazard Materials Transportation General Awareness and Safety Training ([ESH Course 123](#))

Personnel who conduct transportation-related activities for non-radioactive hazardous materials or waste on-site, in quantities that would trigger Department of Transportation (DOT) requirements. Activities include

 - Loading non-radioactive hazardous materials or waste for transport in commerce or on-site (e.g. hoisting and rigging, forklift drivers)
 - Preparing non-radioactive hazardous materials or waste for transportation on-site
 - Operating a vehicle used to transport non-radioactive hazardous materials or waste on-site
- ESH Course 180, Basic Haz Mat Transportation Training ([ESH Course 180](#))

DOT Hazmat employees who may be required to make hazardous material shipment determinations
- ESH Course 181, Basic Haz Waste Transportation Training ([ESH Course 181](#))

DOT Hazmat employees who may have to make hazardous waste shipment determinations and who work in the

 - Waste Management Group
 - Radioactive Waste Management Group
- ESH Course 182, Basic Rad Mat Transportation Training ([ESH Course 182](#))

DOT Hazmat employees who may be required to make radioactive material shipment determinations
- ESH Course 183, Advanced Haz Mat Shipper Training ([ESH Course 183](#))

eShipper verifiers and employees required to certify that hazardous material shipments are in compliance with the requirements of 49 CFR
- ESH Course 185, DOT Haz Mat Security Awareness Training ([ESH Course 185](#))

All employees performing DOT-related hazardous materials handling activities that are not making hazardous material shipment determinations.

This includes employees that directly affect hazardous materials transportation safety and may be involved in the loading, on-site transport, or unloading of

 - Hazardous material
 - Hazardous waste
 - Radioactive material or waste
 - Mixed waste

These individuals may include forklift drivers, hoisting and rigging personnel, and material handlers.

- ESH Course 297, IATA ([ESH Course 297](#))
DOT Hazmat employees who may be required to make dangerous goods shipments by air. Attendees should choose courses that focus on their shipping responsibilities (i.e. Hazardous Materials). E-shipper verifiers are required to take advanced course work.
- ESH Course 179, SLAC HazMat Transportation Security Plan Training ([ESH Course 179](#))
SLAC personnel with DOT HazMat responsibilities that prepare for shipment (including loading, unloading or incidental storage) or transport one or more of the hazardous materials listed in 49 CFR 172.800 (b) including
 - Any quantity of a material poisonous by inhalation (49 CFR 171.8);
 - Type B, liquid or solid, temperature controlled organic peroxide;
 - A large bulk quantity of Division 6.1 (poison or toxic material) or Class 8 materials (corrosive) meeting the requirements for Packing Group I.

Note *A large quantity is considered to be anything equal or greater than 300kg (6614 pounds) solid or 3000 liters (792 gallons) liquid.*

5 Definitions

hazmat employee. Person who is employed by a *hazmat employer* and who in the course of employment directly affects hazardous materials transportation safety. This term includes any employee who 1) loads, unloads, or handles hazardous materials; 2) manufactures, tests, reconditions, or repairs, modifies, marks, or otherwise represents containers, drums, or packages as qualified for use in the transportation of hazardous materials; 3) prepares hazardous materials for transportation; 4) is responsible for safety of transporting hazardous materials; or 5) operates a vehicle used to transport hazardous materials.

hazmat employer. An employer who uses one or more of its employees in connection with transporting hazardous materials *in commerce*, or causes hazardous materials to be transported or shipped in commerce

dangerous goods. See *hazardous materials*

helium₃. A rare, non-radioactive isotope of helium used for use in nuclear fusion research.

in commerce. Trade or transportation in the jurisdiction of the United States within a single state; between a place in a state and a place outside of the state; that affects trade or transportation between a place in a state and place outside of the state; or on a United States-registered aircraft; involves transfer of funds or monetary exchange

International Air Transportation Association (IATA). An international trade organization of member carriers that regulates the shipment of dangerous goods via air carrier through the development and implementation of the IATA Dangerous Goods Regulations ([IATA DRG](#)). The DGR incorporates the United Nations International Civil Aviation Organization's Hazardous Materials Technical Instructions, which the DOT recognizes and authorizes for use for air shipments. All air shipments of IATA-regulated dangerous goods carried by IATA members must be prepared and transported in accordance with the IATA DGR.

International Civil Aviation Organization (ICAO). An international organization of member states whose purpose is to secure international co-operation and highest possible degree of uniformity in regulations and standards, procedures and organization regarding civil aviation matters. This organization publishes the Technical Instructions for the Safe Transport of Dangerous Goods by Air ([ICAO Document 9284](#)). These standards are integrated in the IATA DGR.

material of trade (MOT). A hazardous material, other than a hazardous waste, that is carried on a motor vehicle: 1) for the purpose of protecting the health and safety of the motor vehicle operator or passengers (for example, a fire extinguisher); 2) for the purpose of supporting the operation or maintenance of a motor vehicle (including its auxiliary equipment) (for example, an extra quart of oil); or 3) by a private motor carrier in direct support of a principal business that is other than transportation by motor vehicle.

material, deuterated. Any material containing deuterium in any form (D₂, D₂O)

material, hazardous. A substance or material that the Department of Transportation (DOT) or other regulatory body has determined is capable of posing an unreasonable risk to health, safety, and property when transported in commerce and has been designated as hazardous. Hazardous materials must meet the defining criteria for hazardous classes and divisions per [49 CFR 173](#).

material, highly toxic. This includes all materials classified as DOT explosives, inhalation hazards, organic peroxides, dangerous when wet, and toxins regulated by Center for Disease Control and Prevention ([42 CFR 73](#)) or United States Department of Agriculture ([9 CFR 121](#))

material, radioactive. Any material with known or detectable radioactivity. For purposes of transportation, this may include 1) material that has become radioactive due to SLAC operations; 2) sealed radioactive sources; 3) radioactive research samples; 4) naturally occurring radioactive material (NORM).

on-site. Refers to all property within the contiguous fenced area accessed through the Sand Hill Road and the Alpine Road gates. SLAC's property is completely within DOE-leased, Stanford-owned private property and does not have any public roads.

packing group. Means a grouping according to the degree of danger presented by hazardous materials. Packing Group I indicates great danger; Packing Group II, medium danger; Packing Group III, minor danger. Packing groups are assigned to specified hazard classes and quantities in [49 CFR 172.101](#), HazMat Table.

transport. The movement of property and loading, unloading, or storage incidental to that movement

waste, hazardous. Hazardous material for which the owner/generator has determined there is no further use for the material and has authorized disposal of the material

waste, mixed. Waste that has both hazardous and radioactive components

waste, radioactive. Radioactive material for which the owner/generator has determined there is no further use for the material and has authorized disposal of the material

6 References

6.1 External Requirements

The following are the external requirements that apply to this program:

- Title 49, *Code of Federal Regulations*, “Transportation”, Subtitle B, “Other Regulations Relating to Transportation”, Chapter 1, “Pipeline and Hazardous Materials Safety Administration, Department of Transportation”
 - Subchapter A, “Hazardous Materials and Oil Transportation”, Part 107, “Hazardous Materials Program Procedures”, Subpart B, “Special Permits”, Section 105, “Application for Special Permit” ([49 CFR 107.105](#))
 - Subchapter C, “Hazardous Materials Regulations”, Parts 171, “General Information, Regulations, and Definitions”, through 180, “Continuing Qualification and Maintenance of Packagings” ([49 CFR 171–180](#)) (DOT requirements)
- Department of Energy Order 460.1D, “Packaging and Transportation Safety” ([DOE O 460.1D](#))
- Department of Energy Order 460.2A, “Departmental Materials Transportation and Packaging Management” ([DOE O 460.2A](#))
- Department of Energy Manual 460.2-1A, “Radioactive Material Transportation Practices Manual” ([DOE M 460.2-1A](#))
- International Civil Aviation Organization (ICAO). International Civil Aviation Organization Technical Instructions for the Safe Transport of Dangerous Goods by Air ([ICAO Document 9284](#))
- International Air Transportation Association (IATA). Dangerous Goods Regulations ([IATA DRG](#))

The following are external guidance documents that apply to this program; their use is not mandatory:

- Department of Energy Guide 460.1-1, “Implementation Guide for Use with DOE O 460.1A, Packaging and Transportation Safety” ([DOE G 460.1-1](#))
- Department of Energy Guide 460.2-1, “Implementation Guide for Use with DOE O 460.2, Departmental Materials Transportation and Packaging Management” ([DOE G 460.2-1](#))

6.2 Related Documents

[SLAC Environment, Safety, and Health Manual](#) (SLAC-I-720-0A29Z-001)

- [Chapter 9, “Radiological Safety”](#)
- [Chapter 16, “Spills”](#)
- [Chapter 17, “Hazardous Waste”](#)
- [Chapter 34, “Biosafety”](#)
- [Chapter 40, “Chemical Lifecycle Management”](#)
- [Chapter 53, “Chemical Safety”](#)
- [Chapter 58, “Laboratory Safety”](#)

Other SLAC Documents

- [Radioactive Waste Manual](#) (SLAC-I-760-2A08Z-001)
- [Shipping and Receiving of Radioactive Materials Procedure](#) (SLAC-I-760-0A30C-002, FO 010)

Other Documents

- Title 9, *Code of Federal Regulations*, “Animals and Animal Products”, Chapter 1, “Animal and Plant Health Inspection Service, Department of Agriculture”, Part 121, “Possession, Use, and Transfer of Select Agents and Toxins” ([9 CFR 121](#))
- Title 42, *Code of Federal Regulations*, “Public Health”, Chapter 1, “Public Health Service, Department of Health And Human Services”, Subchapter F, “Quarantine, Inspection, Licensing”, Part 73, “Select Agents and Toxins” ([42 CFR 73](#))
- Title 49, *Code of Federal Regulations*, “Transportation”, Subtitle B, “Other Regulations Relating to Transportation”, Chapter 1, “Pipeline and Hazardous Materials Safety Administration, Department of Transportation”, Subchapter A, “Hazardous Materials and Oil Transportation”, Part 107, “Hazardous Materials Program Procedures”, Subpart G, “Registration of Persons Who Offer or Transport Hazardous Materials” ([49 CFR 107 Subpart G](#))
- Department of Transportation. [PHMSA – Registration](#)

Chapter 52: [Hazardous Materials and Waste Transportation](#)

On-site Transportation Requirements

Product ID: [628](#) | Revision ID: 2403 | Date published: 28 May 2021 | Date effective: 28 May 2021

URL: <https://www-group.slac.stanford.edu/esh/eshmanual/references/hazmattransportReqOnsite.pdf>

1 Purpose

The purpose of these requirements is to ensure the safe on-site transportation of *hazardous materials* and *hazardous waste* in compliance with the Department of Energy Order 460.1D, “Packing and Transportation Safety” ([DOE O 460.1D](#)). This order mandates that on-site transfers of hazardous materials be performed in accordance with either Title 49, *Code of Federal Regulations*, “Transportation”, Parts 171, “General Information, Regulations, and Definitions”, through 180, “Continuing Qualification and Maintenance of Packagings” ([49 CFR 171-180](#)) (DOT requirements) or a site-specific transportation safety document (TSD) that describes the methodology for achieving equivalent safety.

These requirements cover any *on-site* transportation of hazardous materials, substances, or wastes, in addition to those materials that if transported *in commerce* or on a public road would be subject to the DOT requirements. For the purposes of this document, *on-site* refers to all property within the contiguous fenced area accessed through the Sand Hill Road and the Alpine Road gates. SLAC’s property is completely within DOE-leased, Stanford-owned private property and does not have any public roads.

These requirements apply to all workers engaged in on-site transportation.

2 Requirements

2.1 General

All transport, whether by hand or by vehicle, from one room to the next, between floors of one building, or between buildings, must be performed in a manner that minimizes risk to the health and safety of employees, the public, and the environment. The requirements below are the minimum necessary to ensure this but do not restrict the implementation of safer practices or additional controls when necessary.

SLAC prohibits the transport of hazardous materials in personal vehicles, except for chemicals in consumer packaging and quantities or those addressed in [Hazardous Materials and Waste Transportation: Non-commercial Hazardous Materials Transport Procedure](#):

- Properly identified, marked, and labeled
- Segregated according to compatibility
- Secured to prevent sliding or shifting during transport

When packaging materials are used for hazardous materials transport on roads within SLAC contiguous property, they must be equivalent to the general packaging requirements of DOT hazardous materials

regulations for material compatibility and safety. Packages must also be marked with the name of the material¹ and secured from movement or shifting.

Workers are directed to use only equipment they are authorized and trained to use and only as intended. In addition to these requirements, workers are encouraged to contact their Environment, Safety, and Health (ESH) coordinators.

Table 1 General Controls for Transporting Hazardous Materials and Waste

Person	Requirement
On-site transporter	<ol style="list-style-type: none">1. Must be familiar with these requirements and safe transport practices2. Must have proper equipment and training to facilitate safe transport3. Must be familiar with emergency response procedures in the event of a spill or release

2.2 Hazardous Materials and Research Samples

Whenever possible, materials should be kept in their original containers with labels intact. If material has been transferred to a secondary container it must be labeled with a secondary label. If the material is a synthesized material or sample it needs to be labeled with a chemical name (not a symbol) and hazard. No matter the type of material or container, there needs to be enough information available to link the material to its *safety data sheet* ([SDS](#)) (if a product) and identify the appropriate [Emergency Response Guidebook \(ERG\)](#) guide in the event of a spill or release. The following requirements must be considered when planning to transport hazardous materials and research samples.

Table 2 Controls for Transporting Hazardous Materials and Research Samples

Person	Requirement
On-site transporter	<p>PPE and Security</p> <ul style="list-style-type: none">▪ Wears appropriate PPE for the hazard (see the SDS)▪ Maintains possession and control of material at all times▪ To the degree possible, transports the material directly to its final destination with no intermediate stops <p>Containers</p> <ul style="list-style-type: none">▪ Confirms the integrity of the primary container (for example, it is securely closed and in good condition)▪ If the material has been repackaged using a secondary container confirms it is compatible with the material it is intended to contain (see the SDS) (for example, uses approved metal containers for solvents and plastic containers for acids and bases); avoids using glass if possible

1 There must be enough information on the package to allow the use of the Department of Transportation [Emergency Response Guidebook \(ERG\)](#). This includes the generic chemical name of the material, the UN/NA number or, if neither of those is adequate, the appropriate three-digit guide number from the ERG must be written on the package.

Person	Requirement
	<ul style="list-style-type: none"> ▪ Uses a DOT- or OSHA-approved safety can for rated volume of five gallons or less to transport gasoline to field locations. Keeps it in the open bed of a truck. Does not transport in the trunk or compartment of a passenger vehicle. <p>Drums</p> <ul style="list-style-type: none"> ▪ Uses drums that are in good condition and free of major rust and dents ▪ Ensures that drums are not leaking or overfilled, or exceed weight capacity before transporting them ▪ Ensures that drum bungs or rings are tight ▪ Uses a drum dolly to place large or heavy drums on pallets ▪ Secures all drums to the pallet with appropriate strapping material <p>Pallets</p> <ul style="list-style-type: none"> ▪ Carefully inspects pallets before they are loaded ▪ Does not use pallets with cracked or broken slats ▪ Does not exceed rated capacity <p>Equipment</p> <ul style="list-style-type: none"> ▪ When the material is within equipment that must be moved, drains it before transporting; otherwise provides containment and spill clean-up material <p>Labels</p> <ul style="list-style-type: none"> ▪ Confirms that the container labels are intact and the information is accurate ▪ If a hazardous material has been repackaged, ensures the new container is labeled with the required information (see above) <p>Packaging and Compatibility</p> <ul style="list-style-type: none"> ▪ When packaging small containers of hazardous materials for transport, uses carrying cases, racks, or trays to keep the containers upright and to minimize shifting during transport, or uses original DOT-approved containers that they came in ▪ Does not place incompatible materials in the same tray or carrying case ▪ Protects and cushions glass containers to minimize the risk of breakage ▪ Transports only compatible materials within the same outer packaging; incompatible materials need to be segregated in a manner that precludes mixing if there is a spill or release ▪ Ensures that any cushioning or absorbent material used for packaging is also compatible with the hazardous material <p>Loading</p> <ul style="list-style-type: none"> ▪ Secures containers to prevent sliding or shifting of contents or the packages during transport; uses means such as bins, boxes, cinch straps, bungee cords to keep containers upright ▪ Inspect equipment and strapping material to ensure its integrity and that rated capacity is not exceeded ▪ If the containers shift during transport, stops immediately and re-secures the containers <p>Routes</p> <ul style="list-style-type: none"> ▪ Evaluates the route and prepares for the worse-case scenario (this is especially important if transporting highly toxic materials or large quantities of liquids). Are there storm drains, traffic, pedestrian traffic, or areas under construction? In some cases it

Person	Requirement
	<p>may be appropriate to contact SLAC Site Security to help control traffic while transporting high risk materials.</p> <ul style="list-style-type: none"> ▪ Informs receiving party that material will be moved and to prepare for receipt and storage <p><i>Note: the receiving party may need to update its area inventory; even one industrial-sized cylinder may trigger inventory requirements in an area that otherwise would not fall under this requirement.</i></p> <p>Modes of Transport</p> <ul style="list-style-type: none"> ▪ Never uses mopeds or bicycles to transport hazardous materials ▪ Employees and users must only use SLAC-owned or GSA vehicles; subcontractors must follow their own company policy and the terms of their contract with SLAC ▪ Never drives faster than is safe for the driving conditions and load being handled and uses caution when rounding corners and driving over speed bumps and is especially cautious when crossing busy intersections ▪ When transporting chemicals by foot: <ul style="list-style-type: none"> ▪ All flammable and hazardous liquids (at normal temperature and pressure) and all powdered or granular hazardous solids in glass containers should be transferred through corridors and between buildings, using chemical carriers or secondary containers. ▪ Bottle carriers should be used for flammable liquids and corrosive chemicals in glass bottles of two liters or more capacity, or plastic bags for smaller quantities. ▪ Great care should be exercised even when transporting containers within workspaces.

2.3 Compressed Gas Cylinders, Propane, and Dewars

Note Requirements addressing the design, operation, maintenance, and decommissioning of all pressure systems and their components are in [Chapter 14, “Pressure Systems”](#).

Table 3 Controls for Transporting Gas Cylinders, Propane, and Dewars

Person	Requirement
On-site transporter	<p>The following apply in addition to all of the requirements in Table 2:</p> <p>Compressed Gas Cylinders</p> <ul style="list-style-type: none"> ▪ Before loading, removes the regulator, closes valves, and installs a suitable protective valve cover (exception is if cylinder is firmly secured on a special carrier intended for this purpose) ▪ Does not use ropes, chains, or slings to lift or suspend cylinders unless provisions have been made on the cylinder for appropriate lifting attachments such as lugs. For cylinders not designed for lifting attachments, suitable cradles, sling boards, platforms, or pallets may be used. Attachments must never be welded to a cylinder. Cylinders must not be hoisted or transported by means of magnets or choker slings. ▪ Lifts cylinders by the body (not the valve cover) in order to avoid dropping the cylinder

Person	Requirement
	<ul style="list-style-type: none"> ▪ Never drags, slides, or rolls a cylinder; rolls large cylinders by tilting and rolling on their bottom edges ▪ Transports large cylinders, secured in a vertical position, using a suitable hand truck, forklift, or cylinder pallet system ▪ Properly secures cylinders and dewars to the vehicle by such means as appropriate cylinder cart basket or straps ▪ Transports cylinders in an open truck or the cargo area of a closed bodied vehicle; does not transport in the passenger area of a vehicle ▪ Removes cylinders from closed-bodied vehicles as soon as possible to minimize the possibility of relief valve discharge, especially in warm weather <p>Dewars</p> <p>In addition to the above</p> <ul style="list-style-type: none"> ▪ Use handcarts to move cryogenic liquid containers (dewars) to and from the vehicle. Dewars cannot be rolled on their edge like cylinders, and must be moved by use of a four-wheeled hand truck designed for containers with a capacity greater than 20 gallons (76 liters). Hand trucks must be kept in good condition to avoid tipping or losing control of heavy dewars and possibly leading to injury and severe freezing of tissue. ▪ Dewars must be allowed to vent.

2.4 Radioactive Materials

SLAC defines radioactive materials in [Criteria Defining and Monitoring for Radioactive Material](#). The movement of all radioactive materials within SLAC requires a prior radiological survey by Radiation Protection Field Operations (RPFO) workers. All material transported must have a radioactive material label attached to the material. RPFO also provides guidance on packaging for safe transportation when necessary. Additional information on contamination controls are found in the [Radiological Control Manual](#) and [Chapter 9, “Radiological Safety”](#).

Table 4 Controls for Transporting All Radioactive Materials

Person	Requirement
On-site transporter	<p>The following apply in addition to all of the requirements in Table 2:</p> <ul style="list-style-type: none"> ▪ Is GERT-qualified and wears personal dosimeters; must be RWTII if moving contaminated material ▪ Reviews labels regarding dose rates and contamination levels to ensure they are within the limits specified in the Radiological Control Manual ▪ Ensures materials with radioactive contamination are double bagged/equivalent, and if heavy or has possible puncture points, uses a durable outer covering ▪ Ensures destination is properly identified and posted by RP (for example, a radiologically controlled or radiation area) to receive material (and may need to be indoors) ▪ Notifies the destination’s area manager or building manager if the receipt of the material may impact other work or workers in the area

2.5 Hazardous, Mixed, and Radioactive Waste

On-site transportation of DOT-regulated wastes requires the most comprehensive documentation, oversight, and control due to regulatory requirements from agencies such as the Environmental Protection Agency and Nuclear Regulatory Commission. Declaration forms are used to classify the waste, document its generation, and track its progress through disposal. Both Waste Management and Radiation Protection Radioactive Waste Management (RPRWM) provide container specifications, packaging guidelines, and segregation and load-bracing requirements as needed. All waste packages are marked and labeled as needed with SLAC internal numbers, hazardous waste labels (including constituents), other required notices (for example, asbestos), and radiation survey information.

It is strongly encouraged to limit the transport from of hazardous waste on-site to Waste Management whenever possible. The requirements for transporting hazardous waste on-site are listed below. Additional information on moving radioactive waste on-site, which includes mixed waste, is located in Chapter 4 of the [Radioactive Waste Manual](#).

Table 5 Controls for Transporting Hazardous, Mixed, and Radioactive Waste

Person	Requirement
On-site transporter	<p>The following apply in addition to all of the requirements in Table 2:</p> <p>Hazardous Waste</p> <ul style="list-style-type: none"> ▪ Obtains clearance from Field Services Department workers to move hazardous waste to a new location ▪ Makes sure containers for hazardous waste are labeled with SLAC hazardous waste labels (see Chapter 17, “Hazardous Waste”), which contain the following additional information: <ul style="list-style-type: none"> ▪ Date that the first drop of hazardous waste was placed in the container ▪ The words HAZARDOUS WASTE ▪ Name of the hazardous waste ▪ Hazard class ▪ Name and extension of the person responsible for the contents of the container <p>Mixed and Radioactive Waste</p> <ul style="list-style-type: none"> ▪ Obtains clearance from RP to move mixed or radioactive waste to a new location ▪ Be GERT-qualified and wear personal dosimeters; must be RWTII if moving contaminated material ▪ Notifies receiving facility of intended transport ▪ Reviews labels regarding dose rates and contamination levels to ensure they are within the limits specified in the Radiological Control Manual ▪ Makes sure containers or items are marked and tagged with radiological surveys, EPA, DTSC, or other required notices

3 Forms

The following forms and systems are required by these requirements:

- [Hazardous Waste Pick-Up and Empty Container Request Form](#) (SLAC-I-800-0A08R-001). Form used to request from Waste Management delivery and pickup of waste containers

4 Recordkeeping

The following recordkeeping requirements apply for these requirements:

- There are no recordkeeping requirements for general staff and users. All records are kept by the responsible groups and program managers.

5 References

[SLAC Environment, Safety, and Health Manual](#) (SLAC-I-720-0A29Z-001)

- [Chapter 52, “Hazardous Materials and Waste Transportation”](#)
 - [Hazardous Materials and Waste Transportation: Non-commercial Hazardous Materials Transport Procedure](#) (SLAC-I-730-0A09C-006)
 - [Hazardous Materials and Waste Transportation: In Commerce Transport Procedure](#) (SLAC-I-730-0A09C-007)
- [Chapter 9, “Radiological Safety”](#)
- [Chapter 14, “Pressure Systems”](#)
- [Chapter 17, “Hazardous Waste”](#)
- [Chapter 34, “Biosafety”](#)
- [Chapter 40, “Chemical Lifecycle Management”](#)
- [Chapter 53, “Chemical Safety”](#)
- [Chapter 58, “Laboratory Safety”](#)

Other SLAC Documents

- [Chemical Management Services \(CMS\)](#)
- [Radiological Control Manual](#) (SLAC-I-720-0A05Z-001), Chapter 4, Part 2, “Release and Transportation of Radioactive Material”, and Part 3, “Radioactive Source Controls”
- [Radioactive Waste Manual](#) (SLAC-I-760-2A08Z-001), Chapter 4, “Moving Radioactive Waste On-Site”
- [Shipping and Receiving of Radioactive Materials Procedure](#) (SLAC-I-760-0A30C-002, FO 010)
- [Criteria Defining and Monitoring for Radioactive Material](#) (SLAC-I-760-2A30C-006, FO 018)
- [Nanomaterial Safety Plan](#) (SLAC-I-730-0A09M-008)

Other Documents

- Title 49, *Code of Federal Regulations*, “Transportation”, Chapter 1, “Pipeline and Hazardous Materials Safety Administration, Department of Transportation”, Subchapter C, “Hazardous Materials Regulations”, Parts 171, “General Information, Regulations, and Definitions”, through 180, “Continuing Qualification and Maintenance of Packagings” ([49 CFR 171-180](#)) (DOT requirements)
- Department of Energy Order 460.1D, “Packing and Transportation Safety” ([DOE O 460.1D](#))
- Department of Energy Handbook 1139, “Chemical Management” ([DOE-HDBK-1139](#))
- Department of Transportation. [Emergency Response Guidebook \(ERG\)](#)

Chapter 52: [Hazardous Materials and Waste Transportation](#)

Non-commercial Hazardous Materials Transport Procedure

Product ID: [629](#) | Revision ID: 2404 | Date published: 28 May 2021 | Date effective: 28 May 2021

URL: <https://www-group.slac.stanford.edu/esh/eshmanual/references/hazmattransportProcedNonCommerce.pdf>

1 Purpose

The purpose of this procedure is to ensure the safe and efficient transport between collaborators and users at Stanford University (and other nearby universities, research facilities, and institutions) and SLAC of research materials and samples and hazardous materials that qualify for the Department of Transportation (DOT) *material of trade (MOT)* exception.

This procedure covers only non-commercial transport on public roads of DOT hazardous materials meeting MOT requirements. (The MOT exception does not apply to transport of hazardous materials by air or waterway.) Materials subject to this procedure are limited to samples (synthesized or purchased) transported by those conducting the research and to MOT materials as defined by the DOT ([49 CFR 173.6](#)), in the quantities listed in Table 1. This procedure does not cover transport of hazardous, radioactive, or mixed waste (see [Hazardous Materials and Waste Transportation: In Commerce Transport Procedure](#)) or transport on-site (see [Hazardous Materials and Waste Transportation: On-site Transportation Requirements](#)).

This procedure applies to users, staff scientists, collaborators, post docs, students, and SLAC employees. It is not intended to apply to subcontractors. MOT originating from Stanford University should follow Stanford University procedures. MOT originating from SLAC should follow SLAC procedures.

2 Procedures

2.1 Prerequisites

2.1.1 Hazard Classes and Quantities

The MOT exception provided by the DOT applies only to transport, as part of a business, of hazardous materials in the hazard classes and quantities below. It does not apply to hazardous material that is self-reactive, poisonous by inhalation, or a hazardous waste. The total for any load must not exceed 200 kilograms (440 pounds).

Table 1 Material of Trade Quantity Limits

Hazard Class or Division	Packing Group	Maximum Amount of Material in Each Individual Package
2.1 Flammable compressed gases 2.2 Non-flammable, non-toxic gases	Not applicable	Each cylinder may not weigh more than 100 kg (220 lbs) gross
3 Flammable and combustible liquid 4.1 Flammable solid 5.1 Oxidizer 5.2 Organic peroxide 6.1 Poisons 8 Corrosive 9 Class 9 ORM-D	PG I	Solids: 0.5 kg (1lb) Liquids: 0.5 L (1pint)
3 Flammable and combustible liquid 4.1 Flammable solid 5.1 Oxidizer 5.2 Organic peroxide 6.1 Poisons 8 Corrosive 9 Class 9 ORM-D	PG II and III, or ORM-D	Solids: 30 kg (66 lbs) Liquids: 30 L (8 gal)
4.3 Dangerous when wet	Only PG II and III materials are allowed	30 ml (1ounce)
6.2 Infectious or biological substance (non-medical waste) excludes Category A infectious substances	Not applicable	One or more inner packaging, each no more than 0.5 kg(1.1 lb) or 0.5 L (17 ounces), totaling no more than 4 kg (8.8 lbs)or 4L (1 gal); or A single inner packaging containing not more that 16 kg (35.2 lbs) or 16 L (4.2 gal) in a single outer packaging
Diluted mixtures of Class 9 materials (not exceeding 2% concentration)	Not applicable	May be transported in a tank having a capacity of up to 1500 L (400 gal)

2.1.2 Directorate Implementation

This procedure is written to allow flexibility in meeting the different research needs of users and staff. As such, each division’s ESH coordinator will need to develop specific processes and procedures to meet the criteria below, including

- Identifying a DOT point-of-contact (POC) or gatekeeper to ensure controls are in place and used
- Ensuring persons transporting MOT are aware that they are doing so
- Ensuring work planning and control documentation and processes address MOT transport

Program audits will include asking for demonstration of the controls. Incidents will trigger a review of the process.

2.1.2.1 Incoming Materials

Incoming materials must be approved by the ESH coordinator and/or DOT program manager. Controls must be in place to ensure that an accurate chemical inventory is maintained in the receiving storage areas and that a *safety data sheet (SDS)*, if applicable, is on file. Appropriate storage for the material must be available before material is brought on-site.

2.1.2.2 Outgoing Materials

Outgoing materials must be approved by the ESH coordinator and/or DOT program manager. The material to be transported must meet the definition of MOT and transport must meet the applicable regulations ([49 CFR 173.6](#)). This includes those transporting the material having a general knowledge of MOT regulations, quantity limitations, and packaging, marking, and labeling requirements. Directorate-specific procedures should also encourage courtesy calls to receiving institutions so that they can expect and prepare for receiving hazardous materials.

2.1.2.3 Collaborations

Collaborations between Institutions within Driving Distance

Joint agreements should be encouraged between support staff of both institutions. Special attention should be given to the safe transport through local community streets.

National / International Collaborations

Since the MOT exception does not apply to transport of hazardous materials by air or waterway, directorate-specific procedures should encourage the following preferred solutions (starting with 1):

1. Encourage chemicals to be purchased at the institution at which they are used to allow their own screening and control systems to operate.
2. Encourage direct shipments by suppliers to outside institution.
3. Encourage shipment through commercial courier service.
4. Encourage having material packaged by trained DOT staff.
5. The transporting person must be knowledgeable of MOT requirements and document his or her knowledge and awareness of potential risks.

Note *Transporting non-hazardous samples packed in insulated packaging containing refrigerated liquid materials (liquid nitrogen) or solid dry ice (carbon dioxide) must follow International Air Transport Association (IATA) and carrier requirements. (See [Hazardous Materials and Waste Transportation: In Commerce Transport Procedure](#).)*

2.2 Procedures

The following procedures must be followed in order to use the MOT exception.

2.2.1 Incoming

Step	Person	Action
1.	Researcher	Initiates the process by identifying materials that will need to be transported to SLAC. This can be part of the experiment review process or by contacting the SLAC POC / collaborator and documenting permission through the work planning and control (WPC) process.
2.	SLAC POC / collaborator	Requests input by directorate safety staff / ESH coordinator and/or ESH staff
3.	DOT POC	Reviews request and determines if material to be transferred qualifies as MOT. If yes, sends directorate guidance document to SLAC researcher and SLAC POC / collaborator on how to package and transport safely. ¹
4.	DOT POC	If request does not meet the MOT requirements, notifies the researcher that the material must be shipped via a registered hazmat transporter through Shipping and Receiving if the preferred non-commercial shipment solutions (Section 2.1.2.1) do not meet his or her needs
5.	Researcher	Upon arrival, checks in material with SLAC POC / collaborator for approved storage, inventory, and SDS updates
6.	SLAC POC / collaborator	Notifies ESH coordinator of arrival
7.	DOT POC	Ensures that inventory and SDS database is updated and adequate storage has been provided; notifies Radiation Protection for nuclear materials ²

2.2.2 Outgoing

Step	Person	Action
1.	Researcher	Initiates the process by identifying to the SLAC POC / collaborator materials that will need to be transported to home institution
2.	SLAC POC / collaborator	Requests review by DOT POC and/or ESH staff
3.	DOT POC	Reviews request and determines if material to be transferred qualifies as MOT. If yes, sends directorate guidance document to researcher on how to package and transport safely
4.	DOT POC	If request does not meet MOT requirements, notifies the requester that the material must be shipped via a hazmat transporter through Shipping and Receiving

1 If shipment is from another institution it is their responsibility to determine appropriate and safe shipment. SLAC is limited to giving our acceptance criteria for receipt.

2 Deuterium, deuterium-containing compounds, and lithium 6 (Li₆)

Step	Person	Action
5.	DOT POC	Ensures that inventory updated, notifies Radiation Protection for nuclear materials ³
6.	Researcher	Transports material following guidance and informs POC at destination of material transfer

2.2.3 Material of Trade Requirements

A hazardous materials shipment must meet all of the following conditions to qualify as MOT:

- Must meet the maximum quantity limits in Table 1 for packages for hazard classes and divisions.
- With the exception of tanks containing diluted mixtures of Class 9 materials, no more than a combined gross weight of 200 kilograms (440 pounds) of MOT may be transported on any one vehicle.
- Packaging must be equal or stronger than original packaging.
- Packaging must be leak-tight for liquids and gases and sift-proof for solids.
- Packages must be securely closed, secured against movement, and protected against damage.
- Packaging must be marked with a common name or proper shipping name, including the letters RQ if it contains a reportable quantity of a hazardous substance.
- Transporter must be informed of the presence of hazardous materials and have general knowledge of MOT regulations.

In addition, SLAC requires:

- For breakable containers, a rigid outer packaging (cardboard, plastic, or metal box or pail) must be used and each inner receptacle must be packaged with absorbent or cushioning material to prevent breakage and to maintain each inner receptacle in an upright condition. For liquids, there must be sufficient absorbent material to contain all liquid contained within the packaging.
- Outer packaging is not required for non-breakable receptacles such as metal or plastic cans and bottles that are secured against movement in cages, bins, boxes, or compartments.
- Each inner receptacle in a package must have a positive closure mechanism. Appropriate positive closure mechanisms include a screw-top lid or tight friction fit cap or lid designed as a closure for that specific container. Simple test tubes with a Parafilm or aluminum foil closure do not meet this requirement.
- The inner receptacle must be contained in a sealed plastic bag (zip-lock or twisted and tied/taped closed) or other closed secondary container. If materials of different chemical identity are packaged in the same outer container, the materials must be chemically compatible.
- All inner receptacles as well as the outer packaging must be marked with the common name of the material (or the DOT proper shipping name) and its primary hazard.⁴ Chemical formulas, abbreviations, or acronyms are not an acceptable form of chemical identity for this marking

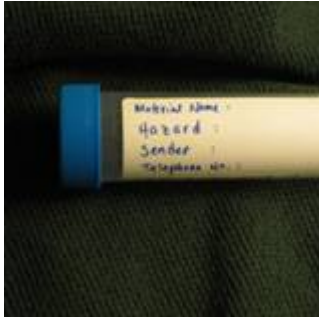
3 Deuterium, deuterium-containing compounds, and lithium 6 (Li₆)

4 Enough information must be on the package to allow the use of the [Emergency Response Guidebook \(ERG\)](#). The use of the UN/NA number is encouraged as well as the three-digit guide number that references appropriate response in the case of a spill or release.

requirement. If the material is an engineered nanomaterial, then include the following words on the label:⁵

NANOSCALE – THIS MATERIAL’S TOXICITY, REACTIVITY, AND OTHER HAZARDS MAY BE GREATER THAN ITS MACRO-SIZED FORMS

Inner Receptacle with
Positive Closure and Label



Zip-lock Bag to Contain
Leaks/Spills



Outer Packaging



Figure 1 Examples of Proper Packaging (photographs from Lawrence Berkeley National Laboratory)

- If it is necessary to transport gasoline to a field location, it must be contained in a DOT- or OSHA-approved plastic or metal safety can with a rated volume of five gallons or less. In addition, gasoline containers must be transported in the open bed of a truck. They cannot be transported in the trunk of a passenger vehicle.
- Compressed gas cylinders must be DOT-approved and tested and transported upright and secured. Cylinders cannot be transported in the same area as passengers.

Note Toxic gases (Hazard Class 2.3) cannot be transported under the MOT exception.

- It is recommended that when transporting propane cylinders, no more than 90 pounds of propane capacity (not including weight of cylinder) be carried and the cylinder have a quick disconnect or plug installed in the service valve outlet. To minimize the possibility of relief valve discharge, propane cylinders must not be left in a vehicle, especially during warm weather.
- The material must be transported directly to its final destination with no intermediate stops.

If a shipment qualifies as MOT:

- No shipping papers are required.
- No additional emergency response information is required.
- No placarding is required.
- No formal training or retention of training records is required.

Note An MOT may be transported in a motor vehicle with other hazardous materials without affecting its eligibility for the MOT exception.

⁵ Additional information can be found in the [Nanomaterial Safety Plan](#) (SLAC-I-730-0A09M-008).

If a shipment does not meet the MOT exception requirements then it must be handled as a regulated hazardous material and be prepared by trained personnel as described in [Hazardous Materials and Waste Transportation: In Commerce Transport Procedure](#).

2.2.3.1 Hazard Communication

All passengers in the motor vehicle must be informed of the presence of any hazardous material within the vehicle and informed of the transportation requirements and limitations of this section.

If a substance is produced for use by another person, then a safety data sheet ([SDS](#)) must be developed and provided to the end user.

2.2.3.2 Transport Requirements

Hazardous materials must not be transported in the passenger compartment of the vehicle. They must be kept in the trunk of a passenger vehicle or the bed of a truck (this means that hatchback vehicles with no trunks must not be used for transporting hazardous materials). Transport of hazardous materials using bicycles or mopeds or on the Marguerite shuttle bus system or other modes of public transit is strictly prohibited.

3 Forms

The following forms and systems are required by this procedure:

- None; documentation should be done within existing WPC processes or directorate/user lab specified forms.

4 Recordkeeping

The following recordkeeping requirements apply for this procedure:

- None; recordkeeping should be integrated into existing processes. Records should be kept until material is delivered to its destination.

5 References

[SLAC Environment, Safety, and Health Manual](#) (SLAC-I-720-0A29Z-001)

- [Chapter 52, “Hazardous Materials and Waste Transportation”](#)
 - [Hazardous Materials and Waste Transportation: On-site Transportation Requirements](#) (SLAC-I-730-0A09S-037)
 - [Hazardous Materials and Waste Transportation: In Commerce Transport Procedure](#) (SLAC-I-730-0A09C-007)
- [Chapter 34, “Biosafety”](#)
- [Chapter 40, “Chemical Lifecycle Management”](#)

- [Chapter 53, “Chemical Safety”](#)
- [Chapter 58, “Laboratory Safety”](#)

Other SLAC Documents

- [Chemical Management Services \(CMS\)](#)
- [Nanomaterial Safety Plan](#) (SLAC-I-730-0A09M-008)

Other Documents

- Title 49, *Code of Federal Regulations*, “Transportation”, Subtitle B, “Other Regulations Relating to Transportation”, Chapter 1, “Pipeline and Hazardous Materials Safety Administration, Department of Transportation”, Subchapter C, “Hazardous Materials Regulations”, Part 173, “Shippers: General Requirements for Shipments and Packagings”, Section 173.6, “Materials of Trade Exception” ([49 CFR 173.6](#))
- Department of Transportation. [Emergency Response Guidebook \(ERG\)](#)

Chapter 52: [Hazardous Materials and Waste Transportation](#)

In Commerce Transport Procedure

Product ID: [630](#) | Revision ID: 2405 | Date published: 28 May 2021 | Date effective: 28 May 2021

URL: <https://www-group.slac.stanford.edu/esh/eshmanual/referencess/hazmattransportProcedCommerce.pdf>

1 Purpose

The purpose of this procedure is to ensure the safe shipment *in commerce* of hazardous materials and waste in a manner that conforms to regulatory requirements and best practices. This procedure covers all off-site shipments of regulated *hazardous material*, *radiological material*, *hazardous waste*, *radioactive waste*, and *mixed waste* in commerce originating at the SLAC National Accelerator Laboratory (SLAC). It applies to all workers requesting shipment in commerce and groups responsible for preparing, packaging, scheduling, and approving shipments, including Shipping and Receiving, Chemical and Waste Management, Radiation Protection Field Operations and Radioactive Waste Management.

2 Procedures

2.1 Regulatory Background

Federal requirements to ensure the safe transport of hazardous materials in commerce are promulgated by the Department of Transportation's (DOT) Pipeline and Hazardous Material Safety Agency (PHMSA). The requirements are codified in the Title 49, *Code of Federal Regulations*, Parts 171 through 180 ([49 CFR 171–180](#)).

Internationally, requirements for the air transport of hazardous materials are established through a series of technical instructions ([ICAO Document 9284](#)) published by the International Civil Air Organization (ICAO), which are then re-written as regulations by the International Air Transport Association (IATA) and published and updated annually as the IATA Dangerous Goods Regulations ([IATA DRG](#)). The DOT recognizes the ICAO technical instructions by reference and accepts any shipments of hazardous material that are packaged, documented, and offered in accordance with the [IATA DRG](#) as compliant.

2.2 Organizational Responsibilities

In addition to the actual shipment and receipt of hazardous material, the DOT also regulates employers of hazmat employees. A *hazmat employee* is anyone who prepares, handles, or offers hazardous material packages and related documentation into commerce, or arranges for the shipment of hazardous waste. As a *hazmat employer*, SLAC is required to train and retain a record of current training for each hazmat employee whose job function impacts the shipment or receipt of hazardous materials in commerce the elements found in 49 CFR Parts 172 and 173. If offering dangerous goods via air carrier, the training in function-specific areas must be in accordance with IATA DGR 1.5.

Packaging materials used for hazardous materials shipments off SLAC property must meet DOT and/or IATA general packaging requirements, and the material’s special provisions and specific packing instruction(s). Work groups performing this service at SLAC are listed in Table 1.

Table 1 Organizational Responsibilities

Person	Responsibility
Shipping and Receiving	<ul style="list-style-type: none"> ▪ Confirms packaging, prepares and ships all hazardous materials ▪ Acts as SLAC eShipper verifier for requests of non-radioactive hazardous materials shipments ▪ Approves commercial transport firms (except for materials purchased through CMS) ▪ Confirms packaging, prepares and ships all return hazardous materials
Radiation Protection Field Operations (RPFO)	<ul style="list-style-type: none"> ▪ Packages and prepares all radioactive material before sending to Shipping and Receiving for shipment ▪ Acts as SLAC eShipper verifier for requests for radioactive hazardous materials shipments
Chemical and Waste Management (CWM)	<ul style="list-style-type: none"> ▪ Acts as SLAC eShipper verifier for requests for non-radioactive hazardous materials shipments ▪ Packages and prepares all hazardous waste for shipment ▪ Approves all hazardous waste haulers
Radiation Protection Radioactive Waste Management (RPRWM)	<ul style="list-style-type: none"> ▪ Packages and prepares all mixed and radioactive waste for shipment ▪ Approves all mixed and radioactive waste haulers

2.3 Hazardous Material Shipments in Commerce

Transport of chemicals in commerce from an off-site location to SLAC will be accomplished only through the [Chemical Management Services \(CMS\)](#) acquisition process.¹ Transportation of hazardous materials in commerce from SLAC to off-site locations will be managed and arranged by properly trained Shipping and Receiving personnel, using the appropriate shipping containers, labels, and other necessary equipment. To initiate this process SLAC employees and users must use the [SLAC eShipper](#) form for hazardous materials. Subcontractors must follow their own procedures.

Step	Person	Requirement
1.	Requester	Uses SLAC eShipper form for hazardous materials shipments
2.	SLAC eShipper verifier	Verifies the information meets DOT requirements
3.	Shipping and Receiving	Picks up, packages, prepares shipping papers, schedules transport with reputable transporters

¹ Any exceptions must be made on a case-by-case basis. Contact the DOT program manager and Shipping and Receiving manager for details.

2.4 Radioactive Material Shipments in Commerce

Transport of radioactive materials in commerce from and to an off-site location will be accomplished following the [Shipping and Receiving of Radioactive Materials](#) procedure. Transportation of radioactive materials in commerce from SLAC to off-site locations will be managed and arranged by properly trained Radiation Protection Department personnel, using the appropriate shipping containers, labels, and other necessary equipment. To initiate this process SLAC employees and users contact the Radiation Protection Field Operations.

Step	Person	Requirement
1.	Requester	Informs RPFO that there is a radioactive material to be shipped
2.	RPFO	Verifies the information and completes eShipper
3.	RPFO	Packages material and prepares shipping papers as needed
4.	Shipping and Receiving	Schedules transport with reputable transporters

2.5 Hazardous Waste Shipments in Commerce

Transportation of hazardous waste from SLAC to off-site locations will be managed and arranged by properly trained Field Services Waste Management personnel, using the appropriate shipping containers, labels, and other necessary equipment. All off-site transportation of hazardous wastes will be performed by properly licensed third-party subcontractors arranged and coordinated by Waste Management. No other off-site transportation is allowed.

Step	Person	Requirement
1.	Requester	Submits a Hazardous Waste Pick-Up and Empty Container Request Form to initiate pickup
2.	Waste Management	Consolidates packages, prepares shipping papers, and schedules shipment with approved waste hauler

2.6 Mixed and Radioactive Waste Shipments in Commerce

Transportation of mixed and radioactive waste from SLAC to off-site locations will be managed and arranged by properly trained Radiation Protection Radioactive Waste Management personnel, using the appropriate shipping containers, labels and other necessary equipment as prescribed in the [Radioactive Waste Manual](#).

Step	Person	Action
------	--------	--------

1.	Requester	Notifies RPFO (ext. 4299) that waste is ready to transferred to an radioactive material low-level mixed-waste storage area
2.	RPRWM	Consolidates packages, prepares shipping papers, and schedules shipment with an approved waste hauler

3 Forms

The following forms and systems are required by these requirements:

- [SLAC eShipper](#). System for documenting DOT/IATA shipments
 - [User Guide for the New SLAC eShipper Page](#)
- [Hazardous Waste Pick-Up and Empty Container Request Form](#) (SLAC-I-800-0A08R-001). Form used to request from Waste Management delivery and pickup of waste containers
- [Mixed Waste Generation Request Form](#) (in Radioactive Waste Manual [SLAC-I-760-2A08Z-001])
 - [Mixed Waste Generation Checklist](#) (in Radioactive Waste Manual [SLAC-I-760-2A08Z-001])
 - [Radioactive Waste Management: Potential Mixed Waste Items](#)
- [Radioactive Material Declaration Form](#) (in Radioactive Waste Manual [SLAC-I-760-2A08Z-001])

4 Recordkeeping

The following recordkeeping requirements apply for these requirements:

- There are no recordkeeping requirements for general staff and users. All records are kept by the responsible groups and program managers.

5 References

[SLAC Environment, Safety, and Health Manual](#) (SLAC-I-720-0A29Z-001)

- [Chapter 52, “Hazardous Materials and Waste Transportation”](#)
 - [Hazardous Materials and Waste Transportation: On-site Transportation Requirements](#) (SLAC-I-730-0A09S-037)
 - [Hazardous Materials and Waste Transportation: Non-commercial Hazardous Materials Transport Procedure](#) (SLAC-I-730-0A09C-006)
- [Chapter 17, “Hazardous Waste”](#)
- [Chapter 34, “Biosafety”](#)
- [Chapter 40, “Chemical Lifecycle Management”](#)
- [Chapter 53, “Chemical Safety”](#)
- [Chapter 58, “Laboratory Safety”](#)

Other SLAC Documents

- [Chemical Management Services \(CMS\)](#)
- [Radioactive Waste Manual](#) (SLAC-I-760-2A08Z-001)
- [Shipping and Receiving of Radioactive Materials](#) (SLAC-I-760-0A30C-002)
- [Nanomaterial Safety Plan](#) (SLAC-I-730-0A09M-008)

Other Documents

- Title 49, *Code of Federal Regulations*, “Transportation”, Subtitle B, “Other Regulations Relating to Transportation”, Chapter 1, “Pipeline and Hazardous Materials Safety Administration, Department of Transportation”, Subchapter C, “Hazardous Materials Regulations”, Parts 171, “General Information, Regulations, and Definitions”, through 180, “Continuing Qualification and Maintenance of Packagings” ([49 CFR 171–180](#)) (DOT requirements)
- Department of Transportation. [PHMSA – Registration](#)
- International Civil Aviation Organization (ICAO). Technical Instructions for the Safe Transport of Dangerous Goods by Air ([ICAO Document 9284](#))
- International Air Transportation Association (IATA). Dangerous Goods Regulations ([IATA DRG](#))

851>Cal/OSHA Implementation Plan: Hazardous Materials and Waste Transportation

This form is for documenting changes to a program and the program's supporting resources (ESH Manual chapter or similar program description, training courses, databases, and so on) resulting from the adoption of the model Revolutionary Working Group (RWG) contract (see below) and the associated DOE variance from 10 CFR 851, "Worker Safety and Health Program". The purpose is to ensure consistent, concise descriptions of the resulting changes. The form is to be completed by the program manager and sent to the DOE as a cover sheet with the revised documents. The general process is as follows:

1. Program manager completes form
2. Changes to program resources made and reviewed following normal revision processes
3. DOE sent draft form and revisions
4. Changes to program resources published
5. DOE sent final form and revisions

1 Introduction

The RWG model contract and 10 CFR 851 variance are intended to simplify and improve the implementation of worker safety and health requirements by tailoring the laws, regulations, and standards that apply while achieving a level of protection equivalent to the requirements of 10 CFR 851. This mostly entails replacing federal Occupational Safety and Health Administration (OSHA) regulations (29 CFR 1910 and 1926) with Cal/OSHA regulations (8 CCR) as external requirements to be complied with but may also involve other laws and regulations and either different versions of industry standards than those cited in 10 CFR 851 or entirely different standards. (One purpose of this form is to capture the specific changes in external requirements for each program.) (For more information on this effort, see the variance application in [851>Cal/OSHA](#) resources.)

2 Plan

Field Number	Field Name	Field
1.	Program name	Hazardous Materials and Waste Transportation
2.	Program manager	Pilastro, Yolanda L.
3.	LBNL counterpart	Peterson, Andrew (SME list) (LBNL Phonebook)
4.	Program documents	<p><i>The following is a list of existing program documents, to be reviewed by the program manager to determine which will need to be revised to reflect 851>Cal/OSHA changes.</i></p> <ul style="list-style-type: none">▪ ESH Manual Chapter 52: Hazardous Materials and Waste Transportation▪ Hazardous Materials and Waste Transportation: Quick Start Summary▪ Hazardous Materials and Waste Transportation: On-site Transportation Requirements▪ Hazardous Materials and Waste Transportation: Non-commercial Hazardous Materials Transport Procedure▪ Hazardous Materials and Waste Transportation: In Commerce Transport Procedure

Field Number	Field Name	Field
5.	Training courses	<p><i>The following is a list of existing training courses, to be reviewed by the program manager to determine which will need to be revised to reflect 851>Cal/OSHA changes.</i></p> <p><i>Course materials are available for review.</i></p> <ul style="list-style-type: none"> ▪ ESH Course 123, Hazard Materials Transportation General Awareness and Safety Training (ESH Course 123) ▪ ESH Course 179, SLAC HazMat Transportation Security Plan Training (ESH Course 179) ▪ ESH Course 180, Basic Haz Mat Transportation Training (ESH Course 180) ▪ ESH Course 182, Basic Rad Mat Transportation Training (ESH Course 182) ▪ ESH Course 297, IATA (ESH Course 297)
6.	Other program resources	<p><i>The following is a list of existing program resources, to be reviewed by the program manager to determine which will need to be revised to reflect 851>Cal/OSHA changes.</i></p> <ul style="list-style-type: none"> ▪ Chemical Management Services (CMS) ▪ Hazard Communication and MSDS References ▪ Hazardous Materials Storage Maps (SharePoint) ▪ Hazardous Materials Transportation Security Plan (SLAC-I-750-0A86M-001)
7.	Current external requirements	<p><i>The following is a list of current external requirements for this program, as identified in the program documents above.</i></p> <ul style="list-style-type: none"> ▪ Title 49, Code of Federal Regulations, "Transportation", Subtitle B, "Other Regulations Relating to Transportation", Chapter 1, "Pipeline and Hazardous Materials Safety Administration, Department of Transportation", Subchapter A, "Hazardous Materials and Oil Transportation", Part 107, "Hazardous Materials Program Procedures", Subpart B, "Special Permits", Section 105, "Application for Special Permit" (49 CFR 107.105) ▪ Title 49, Code of Federal Regulations, "Transportation", Subtitle B, "Other Regulations Relating to Transportation", Chapter 1, "Pipeline and Hazardous Materials Safety Administration, Department of Transportation", Subchapter C, "Hazardous Materials Regulations", Parts 171, "General Information, Regulations, and Definitions", through 180, "Continuing Qualification and Maintenance of Packagings" (49 CFR 171-180) ▪ Department of Energy Order 460.1C, "Packing and Transportation Safety" (DOE O 460.1C) <p><i>The following is a list of current external reference/guidance documents.</i></p> <ul style="list-style-type: none"> ▪ Title 9, Code of Federal Regulations, "Animals and Animal Products", Chapter 1, "Animal and Plant Health Inspection Service, Department of Agriculture", Subchapter E, "Viruses, Serums, Toxins, and Analogous Products, Organisms and Vectors", Part 121, "Possession, Use, and Transfer of Select Agents and Toxins" (9 CFR 121) ▪ Title 42, Code of Federal Regulations, "Public Health", Chapter 1, "Public Health Service, Department Of Health and Human Services", Subchapter A, "General Provisions", Part 73, "Select Agents and Toxins" (42 CFR 73) ▪ Title 49, Code of Federal Regulations, "Transportation", Subtitle B, "Other Regulations Relating to Transportation", Chapter 1, "Pipeline and Hazardous Materials Safety Administration, Department of Transportation", Subchapter A, "Hazardous Materials and Oil Transportation", Part 107, "Hazardous Materials Program Procedures", Subpart G, "Registration of Persons Who Offer or Transport Hazardous Materials" (49 CFR 107 Subpart G) ▪ Department of Energy Guide 460.1-1, "Implementation Guide for Use with DOE O 460.1A,

Field Number	Field Name	Field
		<p>Packaging and Transportation Safety” (DOE G 460.1-1)</p> <ul style="list-style-type: none"> ▪ Department of Energy Order 460.2A, “Departmental Materials Transportation and Packaging Management” (DOE O 460.2A) ▪ Department of Energy Manual 460.2-1A, “Radioactive Material Transportation Practices Manual” (DOE M 460.2-1A) ▪ Department of Energy Guide 460.2-1, “Implementation Guide for Use with DOE O 460.2, Departmental Materials Transportation and Packaging Management” (DOE G 460.2-1) ▪ Department of Transportation. Emergency Response Guidebook (ERG) ▪ Department of Transportation. PHMSA – Registration ▪ International Civil Aviation Organization (ICAO). International Civil Aviation Organization Technical Instructions for the Safe Transport of Dangerous Goods by Air (ICAO Document 9284) ▪ International Air Transportation Association (IATA). Dangerous Goods Regulations (IATA DRG) ▪ Radioactive Waste Manual (SLAC-I-760-02A08Z-001) ▪ Criteria for Defining and Monitoring for Radioactive Material Procedure (SLAC-I-760-0A30C-006, FO 018) ▪ Shipping and Receiving of Radioactive Materials Procedure (SLAC-I-760-0A30C-002, FO 010) ▪ SLAC eShipper ▪ User Guide for the New SLAC eShipper Page ▪ Business Services Procedure Part III – Shipping Procedures ▪ SLAC Lightsource User Access Guidelines and Agreement ▪ Radioactive Material Declaration Form (in Radioactive Waste Manual [SLAC-I-760-2A08Z-001]) ▪ Hazardous Waste Determination Form (in Radioactive Waste Manual [SLAC-I-760-2A08Z-001]) ▪ Mixed Waste Generation Checklist (in Radioactive Waste Manual [SLAC-I-760-2A08Z-001]) ▪ Mixed Waste Generation Request Form (in Radioactive Waste Manual [SLAC-I-760-2A08Z-001]) ▪ Radioactive Waste Management: Potential Mixed Waste Items
8.	Proposed external requirements	<p><i>List all the external requirements that will apply to this program. To determine, start by looking up existing external requirements in 851>Cal/OSHA resources (variance, gap analysis, and contract) and finding replacements (for example a specific section in 29 CFR 1910 to a specific section in 8 CCR or a current version of an industry standard). Where Cal/OSHA requirements are less stringent than those of 10 CFR 851, check with Jeremy Sawyer on which to use. Enter “no changes” if none.</i></p> <ul style="list-style-type: none"> ▪ No changes
9.	Proposed substantive changes	<p><i>Describe (list) the substantive changes to be made in the program, based on the new external requirements. Enter “no changes” if none.</i></p> <p>No changes</p>

Field Number	Field Name	Field
10.	Additional proposed substantive changes	<p><i>Describe (list) the substantive changes to be made in the program, in addition to those based on the new external requirements. For example, those due to stakeholder input, other reviews and audits, operating experience. Enter “no changes” if none.</i></p> <ul style="list-style-type: none"> ▪ Chemical receivers must be designated by the division ESH coordinator and the DOT program manager ▪ Shipments of samples in liquid nitrogen must be coordinated with the ESH coordinator ▪ ESH coordinators are to develop processes and procedures to meet DOT requirements ▪ ESH coordinators and the DOT program manager are to approve incoming and outgoing shipments of materials of trade ▪ Responsibility for maintaining the Hazardous Materials Transportation Security Plan has been transferred from the SLAC site security manager to the DOT program manager ▪ Requirements have been updated to reflect current chemical management services/system practices
11.	Affected program documents	<p><i>List program documents affected by the changes above. Enter “no changes” if none.</i></p> <ul style="list-style-type: none"> ▪ Hazardous Materials and Waste Transportation: Non-commercial Hazardous Materials Transport Procedure ▪ Hazardous Materials and Waste Transportation: In Commerce Transport Procedure
12.	Affected training courses	<p><i>List training courses affected by the changes above. Enter “no changes” if none.</i></p> <ul style="list-style-type: none"> ▪ No changes
13.	Other affected program resources	<p><i>List other program resources affected by the changes above. Enter “no changes” if none.</i></p> <ul style="list-style-type: none"> ▪ No changes
14.	Comments/Questions/Issues	<p><i>Add any comments or questions regarding applicable requirements or changes.</i> [Add text]</p>
15.	Status	<input checked="" type="checkbox"/> Initial draft (proposed changes) <input checked="" type="checkbox"/> Draft (for DOE review) <input checked="" type="checkbox"/> Final (published changes)
16.	Date completed	9/18/20 (rev 9/23/2020) 11/25/2020 5/28/2021