

HAZARDOUS MATERIALS PACKAGING AND TRANSPORTATION SAFETY

1.0 Objective

The objective of this performance assessment is to evaluate the effectiveness of the laboratory's packaging and transportation safety program as implemented in the facility. The assessment encompasses packaging and transportation of hazardous and radioactive materials and wastes. The Facility Representative or Environmental, Safety, and Health Support Specialist examines policies, procedures and programs implemented in the facility. To evaluate the effectiveness of implementation, the Facility Representative or Environmental, Safety, and Health Support Specialist may observe loading or unloading of materials into or out of packages, loading or unloading of packages onto or from vehicles, or transportation of hazardous materials shipments. The Facility Representative or Environmental, Safety, and Health Support Specialist may also interview personnel, review records, or perform walkdowns.

2.0 Definitions

Concern - A determination of a programmatic breakdown or widespread problem supported by one or more findings or observations.

Finding - An individual item which does not meet requirements.

Functional Area - A discrete group of related safety and support programs.

Lines of Inquiry - Questions that guide the assessor in planning and conducting the performance assessment.

Observation - A condition or practice that does not provide or promote effective protection of the health and safety of the public or DOE's workers or the environment.

Performance Assessment - An evaluation of a program or functional area to verify laboratory line management effectiveness in ensuring the health and safety of the public and of DOE's workers and in ensuring protection of the environment.

Performance Attributes - Key elements, functions, or activities to be assessed in a particular functional area.

3.0 References

3.1 DOE O 231.1, *Environment, Safety and Health Reporting*

- 3.2 DOE O 460.2, *Departmental Materials Transportation and Packaging Management*
- 3.3 DOE 5820.2A, *Radioactive Waste Management*
- 3.4 10 CFR 71, *Packaging and Transportation of Radioactive Material*
- 3.5 49 CFR Parts 100-199, *Hazardous Materials Regulations*
- 3.6 DOE/EH-0256T, Revision 1, *U.S. Department of Energy Radiological Control Manual, Rev. 1*

4.0 Performance Assessment Activities

The assessor reviews selected program documents, including policies, procedures, program plans, and safety analysis reports for packaging before beginning the assessment. Appendix A provides a suggested list of documents that the assessor may review during preparations for the assessment.

During the assessment, the assessor evaluates selected performance attributes by developing and applying lines of inquiry for each performance attribute. In evaluating the lines of inquiry to determine if the facility is meeting the performance attributes, the assessor completes a range of activities such as document reviews, interviews with facility and support staff, observations of packaging and transportation activities and facility walkdowns. Appendix B provides a listing of suggested performance attributes and lines of inquiry. In conducting this assessment, the assessor may also draw upon surveillance guides prepared for the packaging and transportation safety functional area. The following guides are available:

- PTS 13.1 Radioactive and Hazardous Materials Transportation
- PTS 13.2 Packaging and Preparation for Shipment

During the assessment, the assessor will focus on how effectively the packaging and transportation safety program is being implemented at a particular facility. In performing this assessment, balance must be maintained between reviews of site-wide programs, facility-specific procedures and actual implementation. The following questions provide a general framework that should be used in planning, conducting, and documenting the assessment:

- Does the site-wide packaging and transportation safety program ensure that hazardous and radioactive materials are packaged safely for transportation onsite and offsite?
- Is the packaging and transportation safety program effectively implemented at the facility so that hazardous and radioactive materials are safely packaged for shipment?
- Are transportation activities at the facility conducted safely and in accordance with the packaging and transportation safety program so that all movements of hazardous and radioactive materials pose the minimum risk to DOE and laboratory employees and the public?

APPENDIX A

POTENTIAL DOCUMENTS FOR REVIEW

Site-wide packaging and transportation safety program document
Site-wide transportation manual
Facility-specific procedures for packaging and shipment of hazardous and radioactive materials
Site-wide emergency plan
Facility-specific emergency plan
Packaging and transportation safety training materials
Annual transportation report
Site occurrence reports involving transportation of hazardous or radioactive materials

APPENDIX B

PERFORMANCE ATTRIBUTES AND LINES OF INQUIRY

PERFORMANCE ATTRIBUTE: I. The laboratory has implemented a program with formal procedures, including systematic instructions and pertinent training, for ensuring that packaging safety requirements are met.

LINES OF INQUIRY:

1. Does the laboratory maintain written procedures that specify the approved packaging, labeling, and verification of the packaging used to transport hazardous materials?
2. Does the laboratory provide documented training (and re-qualification training) on handling, packaging, labeling, and verification of the packaging used to transport hazardous materials?
3. Do the laboratory's personnel follow the written procedures?
4. Does the laboratory conduct regular inspections to ensure that these procedures are followed?
5. Are the inspections completed using procedures that contain checklists to ensure that the packaging, marking and labeling requirements are met?
6. Are these checklists periodically reviewed to ensure their compliance with the latest regulations?
7. Does the laboratory identify, track, resolve, and trend packaging deficiencies?
8. Do the laboratory's procedures ensure that the following are verified before each use of a package for transporting radioactive or fissile materials?
 - a. The package has not been significantly damaged.
 - b. Moderators and non-fissile neutron absorbers as specified in the package certification are present in the quantities and form described in the certification documents.
 - c. The closure of the package and its sealing gaskets are free from defects.
 - d. Any valve through which primary coolant can flow is protected from tampering.
 - e. The internal gauge pressure of the package will not exceed the maximum normal operating pressure during transports.
 - f. Contamination of primary coolant for the package will not exceed specific levels.
9. Is the package appropriately labelled and does it display the transport index in accordance with 49 CFR 171 and 172?

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PERFORMANCE ATTRIBUTE: II. The laboratory has a quality assurance program with formal procedures to ensure that the requirements of 10 CFR 71.105 for packaging safety are met.

LINES OF INQUIRY:

1. Are the requisite standards of quality met in the fabrication, assembly, and testing of each package?
2. Does the laboratory maintain the requisite standards of quality for in-use packages?
3. Has the laboratory clearly established specific responsibilities of designated units (including the vendor, the fabricator, and the laboratory) for assuring specified quality at all stages of construction?
4. Does the laboratory designate codes, standards, and specifications for materials, equipment, methods of fabrication, testing, and performance specifications?
5. Has the quality control of materials, equipment, and services been ensured?
6. Are quality assurance records maintained in an auditable file during the service life of the container and for one year after the last shipment using the packaging?
7. Are there established acceptance criteria in terms of measurable characteristics?
8. Is there a program of routine maintenance inspection and, where necessary, retesting to ensure that all reusable containers used by the laboratory continue to meet the applicable design standards?
9. Does the laboratory provide or ensure the required training, testing, and certification of manufacturing and inspection personnel involved in special processes?
10. Is there a program that certifies the equipment and procedures used in the performance of special processes?

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PERFORMANCE ATTRIBUTE: III. The laboratory conducts a preliminary determination to ensure packaging safety requirements are met before the first use of each package.

LINES OF INQUIRY:

1. Before the first use of any packaging for the shipment of more than Type A quantity of radioactive material or fissile materials, is the packaging inspected to ensure that there are no cracks, pinholes, uncontrolled voids, or other defects that could significantly reduce the effectiveness of the package?
2. Before the first use of any packaging for the shipment of more than Type A quantity of radioactive material or fissile materials, where the maximum normal operating pressure will exceed 5 pounds per square inch gauge, is the containment vessel tested to ensure that it will not leak at an integral pressure 50 percent higher than the maximum normal operating pressure?
3. Is the packaging marked conspicuously and durably with its model number or as required by specification or certification requirements?
4. Before the model number is affixed, was an inspection performed to determine that the packaging had been fabricated in accordance with the approved design?

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PERFORMANCE ATTRIBUTE: IV. The laboratory maintains shipping records for a minimum of 2 years for shipments of packages containing fissile material or greater than Type A quantities of radioactive material.

LINES OF INQUIRY:

1. Do shipping records include: certificate of compliance information, package serial number, volume and type of coolant, type and quantity of material in each package, total volume in the shipment, date of shipment, name and address of the transferee, and the address of the delivery location?
2. Is irradiated fissile material identified by model, irradiation decay history, and any unusual condition related to radiation safety?
3. Are special controls provided for Fissile Class III shipments?
4. Are results from the initial inspection of the packaging before its first use maintained?
5. Are results of inspections of the packaging before the shipment is made maintained?

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PERFORMANCE ATTRIBUTE: V. The laboratory maintains technical backup support documentation for certified, exempt, and specification packaging to ensure packaging safety requirements are met.

LINES OF INQUIRY:

1. Does the laboratory prepare a document defining the safety basis for each new specification or certified packaging designed, developed, and fabricated for offsite shipment of fissile and other radioactive materials in quantities exceeding Type A or hazardous materials?
2. Is there a complete physical and technical description for each specific package used?
3. Does each package have a unique safety analysis report for packaging, including considerations for meeting the requirements for packaging and transport safety, nuclear criticality safety, and radiological safety?
4. Does information for Type B packaging substantiate that the packaging will maintain its integrity under the Type B hypothetical accident conditions?
5. Does the technical backup support documentation include design and development information with pertinent data, analytical methods, test criteria, and test results?
6. Does the documentation contain test data, graphs, drawings, pictures, and technical references?

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PERFORMANCE ATTRIBUTE: VI. The laboratory has prepared a safety analysis report for packaging (SARP) for all Type B and fissile material packaging designs that must be certified by DOE.

LINES OF INQUIRY:

1. Does the SARP include a detailed description of the design basis engineering assumptions applicable to the package?
2. Does the SARP identify established codes and standards proposed for use in package design, fabrication, assembly, testing, maintenance, and use?
3. Does the SARP include a description of the proposed packaging in sufficient detail to identify the packaging accurately, and provide the basis for evaluating the packaging?
4. Are detailed instructions for operations and maintenance of the packaging included in the SARP?
5. In the absence of specified codes and standards, does the SARP describe the basis and rationale used to formulate the packaging quality assurance program?
6. Does the SARP include a description of the quality assurance program for the design, fabrication, assembly, testing, maintenance, repair, modification, and use of the proposed packaging?
7. Does the SARP identify any specific provisions of the quality assurance program which are applicable, including a description of the leak test procedure?

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PERFORMANCE ATTRIBUTE: VII. The laboratory maintains documentation to demonstrate that each package meets the testing requirements of DOE O 460.2.

LINES OF INQUIRY:

1. Has the laboratory verified and documented that the specific packaging requirements are met for vendor supplied packages?
2. Is there a documented test plan for each package detailing the testing requirements, testing results, and the acceptance criteria completed?
3. For each package type, have the appropriate tests been included as required by DOE O 460.2?
4. For each package type, do the test results satisfactorily meet the acceptance criteria of DOE O 460.2?

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PERFORMANCE ATTRIBUTE: VIII. The laboratory maintains evidence of the approval of packaging for use in transporting radioactive or fissile materials.

LINES OF INQUIRY:

1. Does the laboratory have a Certificate of Compliance from DOE for each package?
2. Does the laboratory have evidence that packages have been certified by the Nuclear Regulatory Commission in accordance with 10 CFR 71?
3. Does the laboratory have other documentation substantiating approval for use of packaging?

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PERFORMANCE ATTRIBUTE: IX. The laboratory has implemented a program with formal procedures that ensures transportation safety requirements are met.

LINES OF INQUIRY:

1. Does the shipper maintain written procedures that specify the approved transportation requirements for hazardous materials?
2. Does the shipper provide documented training (and re-qualification training) in the regulations governing transportation safety?
3. Does the shipper conduct regular inspections using established procedures to ensure that policies and procedures comply with transportation requirements and are implemented effectively?
4. Do the shipper's personnel follow written procedures for the transportation of hazardous materials?
5. Are the motor carrier drivers that transport irradiated reactor fuel qualified and trained in the Federal Highway Administration regulations in 49 CFR Parts and Titles as specified in DOE 1540.4?
6. Are the motor carrier drivers that transport hazardous materials qualified and trained in the hazardous materials requirements as specified in 49 CFR 177.816?
7. Do procedures for transporting hazardous materials include checklists that are used to ensure that transportation requirements are met before departure?
8. Are these procedures periodically reviewed to ensure compliance with the latest regulations?
9. Are vehicles properly placarded to identify the hazards carried on the vehicle?
10. Does the laboratory identify, track, resolve, and trend transportation problems?
11. Does the shipper have an emergency response procedure?

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PERFORMANCE ATTRIBUTE: X. The laboratory has a program that ensures the vehicle is appropriate for safely transporting the load.

LINES OF INQUIRY:

1. Is the vehicle selected appropriate for the weight, concentration, and center of gravity of the load?
2. Are vehicles transporting hazardous materials placarded appropriately for the materials being transported?
3. Before a shipment is loaded upon a transport vehicle, does the shipper visually survey the equipment externally to determine its general operating condition, its capability to transport the shipment, and the existence of appropriate restraint devices in good condition?
4. Does the shipper ensure the estimated gross weight of the shipment does not exceed the authorized carrying capacity of the conveyance?
5. Does the shipper routinely give the carrier prior notification of overweight or over-dimensional shipments?
6. Does the carrier ensure that highway weight and clearance restrictions are met?

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PERFORMANCE ATTRIBUTE: XI. The laboratory has a program that ensures that vehicle is safely loaded and unloaded.

LINES OF INQUIRY:

1. Are reasonable precautions such as wheel chocking taken to prevent motion of the vehicle during the loading or unloading process?
2. Is the loading device used to load or unload a shipment appropriate for the dimensions and weight of the package?
3. Are loading devices that could potentially damage any packages of a shipment being used?
4. Are appropriate precautions taken to minimize the potential for damaging packages that may contain hazardous materials?
5. Are dock boards or bridge plates properly secured before they are driven over?

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PERFORMANCE ATTRIBUTE: XII. The laboratory has a program to ensure that the load is properly secured to the transporting vehicle.

LINES OF INQUIRY:

1. Do heavy containers not shipped on specially designed vehicles have skids, load spreaders, blocking, bracing, or securement devices to maintain load distribution within the area load-rating of the vehicle, or to less than 500 pounds per square foot, whichever is less?
2. Is the shipment positioned on the vehicle so that the weight is equally distributed over the width and length of the vehicle?
3. Is the shipment secured in accordance with the acceptable practices of DOE O 460.2?
4. Is the load inspected thoroughly by the shipper and carrier before release of the shipment?
5. Does the shipper require the carrier to check the tiedowns periodically during transit, and tighten them as necessary?

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PERFORMANCE ATTRIBUTE: XIII. The laboratory maintains notification procedures for notifying recipients and shippers regarding expected arrival dates and nonreceipt of radioactive materials.

LINES OF INQUIRY:

1. Before each shipment of fissile materials, or shipments of more than Type A quantity or radioactive material, does the shipper notify the consignee of the dates of the shipment and of the expected arrival?
2. Does the shipper notify each consignee of any special loading or unloading instructions before the first shipment?
3. If the shipment has not been received within 4 days of the estimated arrival date, does the consignee immediately notify the shipper?
4. Are lost, strayed, or stolen shipments that are not recovered or accounted for reported to the field organization transportation officer as an unusual occurrence?
5. For all radioactive material shipments (Type A, Type B, low specific activity) is a return receipt requested?
6. Does the shipper follow-up on the shipment status if the return receipt is not received within 1 month?

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PERFORMANCE ATTRIBUTE: XIV. The shipping papers provide an adequate description of the contents of the hazardous material shipment and other applicable information.

LINES OF INQUIRY:

1. Do the shipping papers include: the name of the shipper, the number of pages, an emergency response telephone number, the shipping name of the hazardous material, a description of the physical and chemical form of the material, the hazard class, the hazard material identification number, the total quantity by weight or volume, the activity (in terms of curies, millicuries, or microcuries), the label applied to the package, and the transport index, if applicable?
2. Is there an annotation to indicate that the exclusive use of a vehicle was requested and was furnished by the carrier, if applicable?
3. When applicable, is there an annotation to indicate that a signature is required?

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PERFORMANCE ATTRIBUTES AND LINES OF INQUIRY

PERFORMANCE ATTRIBUTE: XV. The laboratory has implemented a program to ensure that the transport requirements for low specific activity (LSA) radioactive materials are met.

LINES OF INQUIRY:

1. Are packaged shipments of LSA material consigned as exclusive use in a DOT Specification 7A Type A package, if applicable?
2. Are materials packaged in strong, tight packages so that there will be no leakage of radioactive material under conditions normally incident to transport?
3. Are packages verified to not have any significant removable surface contamination?
4. Do external radiation levels comply with 49 CFR 173.441?
5. Is the exterior of each package marked "Radioactive-LSA"?
6. Are specific instructions, for maintenance of exclusive use shipment controls, provided by the shipper to the carrier?
7. Is transportation by air prohibited?
8. Are unpackaged (bulk) shipments of LSA materials transported only in exclusive-use closed-transport vehicles and in compliance with 49 CFR 173.425?