SUBJECT AREA CONTENT

Management System: Hazardous Material Transportation Safety

Subject Area: Movement by Vehicle of Hazardous and Radiological Materials On-site

Effective Date: Jun 15, 2016 (Rev 5.1)
Periodic Review Due: Jun 15, 2019
Subject Matter Expert: Michael Clancy Jr
Management System Executive: Jason Remien
Management System Steward: Gail Mattson

Introduction

This subject area covers the step-by-step process that BNL staff and non-BNL staff must follow to package and move by vehicle hazardous and radiological materials (hazmat) between BNL facilities on-site. For the purpose of this subject area a vehicle includes any type of machine that is powered by an engine or motor. This subject area is designed to ensure that all hazmat required to be moved by vehicle on-site will be properly packaged, labeled, and handled to ensure the safety of the staff, and in compliance with appropriate regulations as defined in the Hazardous Material Transportation Manual Program Description.

The Packaging and Transportation Group (P&TG) from the Environmental Protection Division (EPD), the Waste Management Group (WMG) from EPD, and the Distribution Group from the Property and Procurement Management Division perform movement by vehicle of hazmat under their approved operational procedures. These three groups are considered the shipping organizations at Brookhaven. All of their SOPs that govern movement of hazardous and radioactive material on site have been reviewed by the Transportation Safety Officer for compliance with the BNL HMTM.

Refer to the Transfer (i.e., Movement by Vehicle) of Hazardous Material On-site Flowchart or the Transfer (i.e., Movement by Vehicle) of Radioactive Material On-site Flowchart for an overview of the procedures described in this subject area. See the Hazardous Material Transportation Safety Management System Description for an overview of the Transportation Safety Program.

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https://sbms.bnl.gov/sbmsearch/SubjArea/PrintAll.cfm?SAId=46&DisplayButton=No&Ex... 6/16/2016
1. Packaging and Movement of Materials of Trade (MOT) On-site

- Transfer and package MOT in compliance with Laboratory and regulatory requirements.

2. Packaging and Movement by Vehicle of Hazardous Material On-site (Non-MOT)

- Transfer and package material in compliance with Laboratory and regulatory requirements.
- Determine if material is excluded as MOT.
- Determine if chemical container is bar coded with CMS label.

3. Packaging and Movement by Vehicle of Radioactive Material On-site

- Transfer and package material in compliance with Laboratory and regulatory requirements.
- Determine if material meets the DOE definition of radiological material.

Definitions

Exhibits

Transfer (i.e., Movement by Vehicle) of Hazardous Material On-site Flowchart
Transfer (i.e., Movement by Vehicle) of Radioactive Material On-site Flowchart

Forms

BNL On-site Transfer/Safety Assessment Form (TSAF)

Training Requirements and Reporting Obligations

This subject area contains the following training requirement (see the BNL Training and Qualifications website):


MANDATORY TRAINING

Any person that moves hazardous material, including MOT, on-site must take the above stated Computer-Based Training. Retraining must occur every three years.

Consult Chapter 10 Personnel Qualification and Training of the Hazardous Material Transportation Manual Program Description for licensing requirements for on-site operations of vehicles.
This subject area does not contain reporting obligations.

External/Internal Requirements

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<thead>
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<th>Requirement Number</th>
<th>Requirement Title</th>
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<tbody>
<tr>
<td>10 CFR 71</td>
<td>Packaging and Transportation of Radioactive Material</td>
</tr>
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<td>49 CFR 107</td>
<td>Transportation/Hazardous Materials Program Procedures</td>
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<td>49 CFR 179</td>
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<td>49 CFR 390</td>
<td>Transportation/Federal Motor Carrier Safety Regulations; General</td>
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<tr>
<td>49 CFR 391</td>
<td>Transportation/Qualifications of Drivers</td>
</tr>
<tr>
<td>49 CFR 392</td>
<td>Transportation/Driving of Commercial Motor Vehicles</td>
</tr>
<tr>
<td>49 CFR 393</td>
<td>Transportation/Parts and Accessories Necessary for Safe Operation</td>
</tr>
<tr>
<td>49 CFR 395</td>
<td>Transportation/Hours of Service of Drivers</td>
</tr>
</tbody>
</table>
Managers shall manage work to control risks and hazards, ensure customer satisfaction, and provide a benefit to BNL.

Managers shall analyze work for hazards, authorize work to proceed, and ensure that work is performed within established controls.

All staff and users shall identify, evaluate, and control hazards in order to ensure that work is conducted safely and in a manner that protects the environment and the public.

Managers shall ensure that work is planned to prevent pollution, minimize waste, and conserve resources, and that work is conducted in a cost-effective manner that eliminates or minimizes environmental impact.

All staff and users shall ensure that they are trained and qualified to carry out their assigned responsibilities, and inform their supervisor if they are assigned to perform work for which they are not properly trained or qualified.
All staff and guests shall promptly report accidents, injuries, ES&H deficiencies, emergencies, and off-normal events in accordance with procedures.

Managers shall establish, implement, and track appropriate actions to correct weaknesses in performance and areas for improvement.

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https://sbms.bnl.gov/sbmsearch/subjarea/46/46_SA.cfm
PROCEDURE: PACKAGING AND MOVEMENT OF MATERIALS OF TRADE (MOT) ON-SITE

Management System: Hazardous Material Transportation Safety

Subject Area: Movement by Vehicle of Hazardous and Radiological Materials On-site

1. Packaging and Movement of Materials of Trade (MOT) On-site

Effective Date: Jun 15, 2016
Subject Matter Expert: Michael Clancy Jr
Management System Executive: Jason Remien

Applicability

This information applies to BNL staff and non-BNL staff who package and move by vehicle Materials of Trade (MOT) between BNL facilities on-site. For the purpose of this Subject Area a vehicle includes any type of machine that is powered by an engine or motor.

Required Procedure

Certain hazardous materials, when used in direct support of Brookhaven's business, may be transferred from one location to another by a staff member as "Materials of Trade," i.e., hazardous chemicals or other hazardous material which will be consumed by the staff member's work. The regulations for transferring MOT are much less restrictive and are based on a quantity limit for specific Department of Transportation hazard classes. The BNL Materials of Trade (MOT) Table exhibit provides the quantity limits for MOT commonly used at BNL that can be transferred. For those materials that are not in the BNL MOT exhibit, consult a Transportation Safety Department/Division Point of Contact (POC) or the Transportation Safety Officer (TSO) to determine if it can be managed as MOT. The following materials are not MOT: explosives, spontaneous combustible, poisonous by inhalation, radioactive, or a hazardous waste.

Following these procedures ensures that the Laboratory is in compliance with the requirements in 49 CFR 173.6, Materials of Trade.

BNL staff and non-BNL staff transferring MOT follow the steps below.

<table>
<thead>
<tr>
<th>Step 1</th>
<th>Determine if your material is a Material of Trade</th>
</tr>
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<tbody>
<tr>
<td></td>
<td>• Review the BNL Materials of Trade (MOT) Table.</td>
</tr>
</tbody>
</table>
Step 2

When packaging MOT, ensure that the following conditions are met:

- Incompatible chemicals are not contained in the same outer packaging (See the exhibit on Incompatible Chemicals in the Hazardous Waste Management Subject Area).
- Packaging is leak-tight, securely closed, secured against movement in the vehicle, and protected against damage.
- Packaging is as good as manufacturer's original packaging, or designed for the specific material.
  
  **Note:** For example, gasoline must be in a metal or plastic container that conforms to OSHA requirements. Containers should have approval marked.
- Outer packaging or receptacles are marked with the common name of the hazardous material.
- A BNL vehicle is used whenever possible to transfer MOT associated with work at BNL. The driver of a BNL vehicle must follow the Government Vehicles Subject Area.
- To use a private vehicle to move MOT, the Department Chair/Division Manager must be notified prior to use.
- The Department/Division ES&H Coordinator or designee must communicate to the driver the following requirements:
  - The driver has a valid state driver's license;
  - The vehicle must be in good mechanical condition and have a valid state safety inspection;
  - The vehicle must be insured with at least the required minimum liability insurance required by the state where the vehicle is registered;
  - The driver must obey all state and local traffic rules and regulations;
  - The driver must possess basic hazard information on the commodity being transported (e.g., Material Safety Data Sheet).
  - The driver must be have general knowledge of the MOTs regulations including:
    - Quantity limitations, packaging requirements, and marking and labeling requirements.
    - See MOT Fact Sheet

**Note:** Contact a Transportation Safety Subject Matter Expert for assistance in packaging your material.

**Note:** If a spill occurs during the transport of MOT, call 911 or 2222 and follow the Spill Response Subject Area.
Determine if the chemical container is bar coded with a Chemical Management System (CMS) label. If the chemical container has a CMS bar code label and you are transferring it to another building or storage area onsite, complete and forward a Chemical Management System Chemical Transfer Sheet to the CMS Team, Building 120, to notify them of the new location. Do not remove the CMS bar code label when transferring the chemical container to a new on-site location.

**Note**: When involving contracted services (i.e., riggers), to move material, the requester has the responsibility to comply with CMS requirements.

**Guidelines**

The driver should read and possess a copy of the DOT brochure *What Are Materials of Trade, and What Regulations Apply?*

**References**

- Chemical Management System Chemical Transfer Sheet
- Government Vehicles Subject Area
- Hazardous Waste Management Subject Area
- MOT Fact Sheet
- Spill Response Subject Area
- Transportation of Hazardous and Radiological Materials Off-site Subject Area

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https://sbms.bnl.gov/sbmsearch/subjarea/46/46_pro1.cfm
PROCEDURE: PACKAGING AND MOVEMENT BY VEHICLE OF HAZARDOUS MATERIAL ON-SITE (NON-MOT)

Management System: Hazardous Material Transportation Safety

Subject Area: Movement by Vehicle of Hazardous and Radiological Materials On-site

2. Packaging and Movement by Vehicle of Hazardous Material On-site (Non-MOT)

Applicability

This information applies to BNL staff and non-BNL staff who package and move by vehicle hazardous material (non-Materials of Trade [MOT]) between BNL facilities on-site. For the purpose of this subject area, a vehicle includes any type of machine that is powered by an engine or motor. This section applies to material that is not radioactive, but has a hazardous trait that may cause harm to a staff member or impact the environment.

The Packaging and Transportation Group (P&TG) from the Environmental Protection Division (EPD), the Waste Management Group (WMG) from EPD, and the Distribution Group from the Property and Procurement Management Division perform movement by vehicle of hazmat under their approved operational procedures.

Required Procedure

<table>
<thead>
<tr>
<th>Step</th>
<th>Description</th>
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</table>
| Step 1 | Consult the Transportation Safety Subject Matter Expert (SME) (if needed) to package and move by vehicle hazardous material using one of the following methods when the material is being transferred by a motorized vehicle.  
  - Compliance with DOT regulations (go to Transportation of Hazardous and Radiological Material Off-site Subject Area), or  
  - Compliance with the BNL Hazardous Material Transportation Manual (HMTM) Program Description.  
  Note: Following this subject area ensures compliance with the HMTM Program Description. |
| Step 2 | What hazards are associated with this material? |
Explosive (reactive), Compressed gas, Flammable, Spontaneously combustible, Water reactive, Oxidizer, Organic peroxide, Poison, Toxic, Infectious, Corrosive, Environmental Concern (i.e., PCBs).

**Step 3** Determine if the material is excluded as MOT (see the section Packaging and Transferring Materials of Trade [MOT] On-site). If the material is MOT, follow the requirements of that section.

**Step 4** Determine if the material to be transferred has already been evaluated using the BNL On-site Transfer/Safety Assessment Form (TSAF).

**Step 5** If the material has been previously evaluated and there are no significant changes (within the bounds evaluated), package and move the material as described on the TSAF. A copy of the TSAF must accompany the material. Go to step 11.

**Step 6** If material has not been previously evaluated, complete the TSAF. For guidance regarding the completion of this form, read Chapter 5 of the HMTM Program Description and notify a Transportation Safety SME.

**Step 7** Submit the completed TSAF to the BNL Transportation Safety Officer (TSO) for approval.

**Step 8** The TSO will return the approved TSAF to the requester. The TSAF will prescrib controls (i.e., packaging, labeling, drivers license) to be followed during the movement. If the TSAF was issued for multiple movements it will be valid and usable for two years, provided nothing has changed with the material being moved.

**Step 9** Determine if the chemical container is bar coded with a CMS label. If the chemical container has a CMS bar code label and you are transporting it to another building or storage area onsite, complete and forward a Chemical Management System Chemical Transfer Sheet to the CMS Team, Building 120, to notify them of the new location. Do not remove the CMS bar code label when transferring the chemical container to a new on-site location.

**Step 10** When packaging hazardous materials, make sure that the following conditions are met:

- Incompatible chemicals are not contained in the same outer packaging (see the exhibit on Incompatible Chemicals in the Hazardous Waste Management Subject Area).
- Packaging, original manufacturer's preferred, is leak-tight, securely closed, secured against movement (blocked and braced), and protected against damage. The approved TSAF will provide details on packaging and securement.
- Warning-Glass containers and other breakable containers must be placed in an outer packaging with cushioning to prevent it from breakage during movement.
- The package must be placed in the vehicle and secured (i.e., blocked and braced) so it will not shift during the movement.
- Outer packaging or receptacles are marked with the common name of the hazardous material.

**Note:** Contact a Transportation Safety SME for assistance with packaging if necessary.
Step 11
Move the material according to the requirements of the approved TSAF.
A copy of the TSAF must be carried by the driver of the vehicle during the loading and movement of the hazmat.

Note: If there are any injuries/spills of this material during transfer, call 911 or 2222 and follow the Spill Response Subject Area.

Note: The most expedient route should be utilized for hazardous material transfers, with no unnecessary stopovers.

Note: Only Laboratory/government vehicles may be used for non-MOT.

References

Chemical Management System Chemical Transfer Sheet

Hazardous Material Transportation Manual Program Description

Spill Response Subject Area

Transportation of Hazardous and Radiological Material Off-site Subject Area

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PROCEDURE: PACKAGING AND MOVEMENT BY VEHICLE OF RADIOACTIVE MATERIAL ON-SITE

Management System: Hazardous Material Transportation Safety

Subject Area: Movement by Vehicle of Hazardous and Radiological Materials On-site

3. Packaging and Movement by Vehicle of Radioactive Material On-site

Effective Date: Jun 15, 2016
Subject Matter Expert: Michael Clancy Jr
Management System Executive: Jason Remien

Applicability

This information applies to BNL staff and non-BNL staff who package and transfer radioactive material between BNL facilities on-site in a Laboratory vehicle. For the purpose of this Subject Area a vehicle includes any type of machine that is powered by an engine or motor.

The Packaging and Transportation Group (P&TG) from the Environmental Protection Division (EPD), the Waste Management Group (WMG) from EPD, and the Distribution Group from the Property and Procurement Management Division perform movement by vehicle of hazmat under their approved operational procedures.

SPECIAL NOTE: 10 CFR 830.200 - Subpart B, Safety Basis Requirements, requires all on-site transportation activities meeting the definition of a Hazard Category 3 (HC-3) non-reactor nuclear facility or above to have a DOE-approved Documented Safety Analysis (DSA) and Technical Safety Requirements (TSR) in place before transfers. If your material is greater than an HC-3 quantity, you may not move your material using this subject area and you must contact the Transportation Safety Officer (TSO). Materials moved as part of Accelerator Operations as defined by DOE Order 420.2C "Safety of Accelerator Facilities" are not subject to the Nuclear Facility rules.

Required Procedure

This subject area is designed to ensure that all radioactive material that is required to be moved by vehicle on-site will be properly packaged, labeled, and handled to ensure the safety of the staff and in compliance with appropriate regulations.

BNL staff and non-BNL staff transferring radioactive material follow the steps below.

Step 1
Consult the Transportation Safety Department/Division Point of Contact (POC) and Facility Support Representative to package and move by vehicle radioactive material using one of the following methods when the material is being transferred by a motorized vehicle.
- Compliance with DOT regulations (go to the Transportation of Hazardous and Radioactive Materials Off-site Subject Area) or
- Compliance with the BNL Hazardous Material Transportation Manual (HMTM) Program Description

**Note:** Following this subject area ensures compliance with the HMTM Program Description.

**Note:** You have the option to call the Packaging and Transportation Group from EPD to package and transfer the radioactive material for you.

**Note:** If the material is accountable nuclear and/or fissile, contact the Radiological Control Division's (RCD) Nuclear Materials Management (NMM) Section. **Do not proceed further.**

### Step 2
With the assistance of a Facility Support Representative or Technician, determine if the material meets the DOE definition of radiological material that must be controlled, and/or marked/labeled in accordance with the BNL Radiological Control Manual. Radioactive material includes activated material, contaminated material, sources, sealed sources, and radioactive waste. The material can be solid, liquid, or gas.

### Step 3
If the material does not meet the DOE definition (see step 2), the material is not radioactive for the purpose of this subject area; work with the FS Rep to move the material.

### Step 4
If the material meets the definition of radioactive material, follow the remaining steps of this subject area.

### Step 5
Radioactive material may be transferred under the supervision of a Facility Support Representative or Technician, using the established Facility Support Services' procedures (e.g., Radiological Work Permit, Release of Materials from Controlled Radiological Areas, Work Planning and Control for Experiments and Operations Subject Area) provided all the following criteria are met:

- Dose rate is <100 mrem/hr at 30 cm;
- Activity does not exceed 10 times the limits established in Appendix E of 10 CFR 835 in any form;
- No smearable contamination on the outside of the package greater than the release criteria;
- The material is not accountable nuclear and/or fissile contaminated material.

If the material exceeds any of the above criteria, it must go through a Safety Assessment and be documented on the BNL On-site Transfer/Safety Assessment Form (TSAF).

### Step 6
All radioactive material must be packaged for movement. The TSO can approve material for unpackaged movement based on the risk of the spread of contamination. Handheld industrial hygiene and radiation detection instruments used to perform field surveys with check sources permanently attached to the exterior or installed within the unit may be moved unpackaged.

When packaging radioactive materials, make sure that the following conditions are met:
- Incompatible materials are not contained in the same outer packaging (see the exhibit [Examples of Incompatible Chemicals](#) in the Hazardous Waste Management Subject Area);
- Packaging must be designed to contain the material to prevent the spread of contamination or leakage, and must be securely closed.
- **Warning**: Glass containers and other breakable containers must be placed in an outer packaging with cushioning to prevent it from breakage during movement;
- The package or material must be placed in the vehicle and secured (i.e., blocked and braced) so it will not shift during the movement. This includes unpackaged material and handheld radiation detection instruments with check sources permanently attached to the exterior of the unit. The source must be inspected for damage before and after movement.
- Packaging material in the manufacturer's original packaging or in as good as manufacturer's original packaging;
  - Sources and sealed sources require packaging for movement by vehicle.
- No smearable contamination on the outside of the package;
- Affix a properly filled out Radioactive Label/Tag;
- All packaging and transfers should be done while trying to keep the dose to the workers and/or public As Low as Reasonably Achievable (ALARA);
- The approved TSAF will have specific requirements for packaging and blocking and bracing based on the risk of the material.

**Note:** In some cases, due to the configuration and type of material, no additional packaging may be necessary. The material itself may serve as the package (e.g., certain magnets, piping materials). The TSO will approve material eligible for unpackaged movement.

**Note:** Contact a Transportation Safety SME for assistance with packaging if necessary.

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| Step 7 | If material has been previously evaluated and there are no significant changes (within the bounds evaluated) in the approved BNL On-site Transfer/Safety Assessment Form (TSAF), the material would then qualify as a repetitive transfer. |
| Step 8 | If material has not been previously evaluated, complete the TSAF. For guidance regarding the completion of this form, read Chapter 5 of the HMTM Program Description and notify a Transportation Safety SME. |
| Step 9 | Submit the completed TSAF to the BNL Transportation Safety Officer (TSO) for approval. |
| Step 10 | The TSO will return the approved TSAF to the requester. The TSAF will prescribe controls (i.e., packaging, labeling, drivers license) to be followed during the movement. If the TSAF was issued for multiple movements it will be valid and usable for two years, provided nothing has changed with the material being moved |
| Step 11 | A copy of the TSAF must accompany each movement.  
**Note:** If there are any injuries/spills of this material during transfer, then call 911 or 2222 and follow the [Spill Response](#) Subject Area.  
**Note:** The most expedient route should be used for radioactive material transfers, with no unnecessary stopovers. |
References

DOE-STD-1027-92 Hazard Categorization and Accident Analysis Techniques for Compliance with DOE Order 5480.23, Nuclear Safety Analysis Reports

Hazardous Material Transportation Manual Program Description

Hazardous Waste Management Subject Area

Radiological Control Manual Program Description

Release of Materials from Controlled Radiological Areas

Spill Response Subject Area

Transportation of Hazardous and Radioactive Materials Off-site Subject Area

Work Planning and Control for Experiments and Operations Subject Area

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EXHIBIT: TRANSFER (I.E., MOVEMENT BY VEHICLE) OF HAZARDOUS MATERIAL ON-SITE FLOWCHART

Management System: Hazardous Material Transportation Safety

Subject Area: Movement by Vehicle of Hazardous and Radiological Materials On-site

Transfer (i.e., Movement by Vehicle) of Hazardous Material On-site Flowchart

Effective Date: Jun 15, 2016

Transfer (i.e., Movement by Vehicle) of Hazardous Material On-site Flowchart is provided as a PDF.

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Questions/Comments  Disclaimer

https://sbms.bnl.gov/SBMSearch/subjarea/46/46_Exh1.cfm
Transfer of Hazardous Material On-site

Determine the need to ship hazardous material on-site.

Does the material meet MOT?

Has the material been previously evaluated and approved?

No

Fill out the BNL On-site Transfer/Safety Assessment Form.

Yes

Ensure compatibility.

Properly package material, leak-tight, secured, labeled.

Complete CMS Chemical Transfer Sheet.

Transfer material.

Complete CMS Chemical Transfer Sheet.

Check Compatibility Table.

No

Yes

Has the material been previously evaluated and approved?
EXHIBIT: TRANSFER (I.E., MOVEMENT BY VEHICLE) OF RADIOACTIVE MATERIAL ON-SITE FLOWCHART

Management System: Hazardous Material Transportation Safety

Subject Area: Movement by Vehicle of Hazardous and Radiological Materials On-site

Transfer (i.e., Movement by Vehicle) of Radioactive Material On-site Flowchart
Effective Date: Jun 15, 2016

Transfer (i.e., Movement by Vehicle) of Radioactive Material On-site Flowchart is provided as a PDF.

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Questions/Comments  Disclaimer

Determine the need to transfer radioactive material on-site.

Does the material's activity concentration and total activity exceed the values specified in paragraph 173.436 or paragraph 173.433 for mixtures?

Is the dose rate >100 mrem/hr? Does the activity exceed the dispersible limits established in Exhibit E of 10 CFR 835? Is there smearable contamination? Is the material fissile or accountable nuclear?

Has the material been previously evaluated and approved?

Contact the Facility Support Representative or technician who will follow the BNL Radiological Control Manual.

Ensure compatibility.

Properly package material, leak-tight, secured against movement in the vehicle, labeled.

Transfer material using a laboratory/government vehicle.

Fill out the BNL On-Site Transfer/Safety Assessment Form.

See the exhibit on Incompatible Chemicals.
FORM: BNL ON-SITE TRANSFER/SAFETY ASSESSMENT FORM (TSAF)

Management System: Hazardous Material Transportation Safety

Subject Area: Movement by Vehicle of Hazardous and Radiological Materials On-site

BNL On-site Transfer/Safety Assessment Form (TSAF)
Effective Date: Jun 15, 2016

The BNL On-site Transfer/Safety Assessment Form (TSAF) is provided as a Word file.

The only official copy of this file is the one on-line in SBMS.

Before using a printed copy, verify that it is the most current version by checking the effective date.

Questions/Comments  Disclaimer

https://sbms.bnl.gov/SBMSearch/subjarea/46/46_Exh2.cfm
BNL On-site Transfer/Safety Assessment Form (TSAF)

Requested By: 
Department/Division: 
Principal Investigator: 

Date of Transfer: From Building/Area: 
Time of Transfer: Building or Area: 

Safety Assessment (Chapter 5 of the HMTM provides detailed guidance).

1. Material Characteristics/Classification

a) Name (e.g., Commercial, CAS):

b) Quantity:

c) Type of Container:

d) Radioactive: Yes ☐ No ☐

e) Isotopes of Concern and Estimated Level of Activity:

If the material is classified as radioactive, Facility Support must provide a radiological survey before transferring it, and attach completed survey.

f) Does the material contain fissionable isotopes? Yes ☐ No ☐

If No, you may proceed to question (g) without the involvement of BNL Criticality Safety Officer.

If Yes, the BNL Criticality Safety Officer (CSO) must be contacted to ensure the receiving facility fissionable material inventory limits have not been exceeded and to evaluate the need for criticality safety measures and controls in accordance with the Criticality Safety section of the Nuclear/Criticality Safety Subject Area.

A memo from the CSO to the BNL Transportation Safety Officer shall be prepared to document the evaluation.

g) Is the material hazardous, as defined in 49 CFR 172.101, Chapter 6 or Chapter 7 of the HMTM? Yes ☐ No ☐

If yes, then you are required to continue this safety assessment analysis unless the material meets one of the following criteria:

- The transfer is covered by Subject Areas and has previously been evaluated for transfer by the Isotopes and Special Materials Group, Shipping and Receiving, Waste Management Group, or the Transportation Safety Officer (TSO).
- The transfer is routine and has been previously evaluated for transfer.
- Material is defined as a Material of Trade or is a Small Quantity Exempted.
h) Is the material a Material of Trade (MOT)? Yes □ No □

i) Is the material an excepted quantity as defined by 49 CFR (e.g., limited quantity, small quantity)? Yes □ No □

j) Is this material being moved entirely within an Accelerator Operations Area as defined by DOE Order 420.2C Safety of Accelerator Facilities? Yes □ No □

If Yes, proceed to question (l)

k) Does the material meet the definition of radioactive material in quantities greater than the DOE-STD-1027-92 thresholds, LA-12981-MS, US-940, Revision 1, Table of DOE-STD-1027-92 Hazard Category 3 Threshold Quantities for the ICRP-30 List of 757 Radionuclides for Hazard Category 3 Non-Reactor Nuclear Facility quantity? (See Table A.1. Thresholds for Radionuclides). Yes □ No □

Document the Sum of Fractions calculation as follows:

Table 1

<table>
<thead>
<tr>
<th>Nuclide</th>
<th>Activity</th>
<th>TQ</th>
<th>TQ Source</th>
<th>Activity/TQ</th>
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</tr>
</tbody>
</table>

Summation:

The Threshold Quantity values must be based on DOE STD-1027-92, LA-12981-MS, US-940, or otherwise be approved by DOE.

If No, proceed to question (l)

If Yes, Is the radioactive material either in special form or packaged in a Type B container and for either case accompanied by certification and approval documentation per DOE-STD-1027-92 Chg 1? Yes □ No □

If No, STOP SAM PROCESS! ON-SITE TRANSFER SHALL BE MADE IN ACCORD WITH BNL FACILITY HAZARD CATEGORIZATION and NUCLEAR/CRITICALITY SAFETY SUBJECT AREAS AND MAY NEED A DOE APPROVED BNL ON-SITE TRANSPORTATION DOCUMENTED SAFETY ANALYSIS.

If Yes, Provide the TSO with all backup certification, test, and approval documentation for the source, radioactive material, and or package to determine if material is not subject to 10 CFR 830.200 - Subpart B, Safety Basis Requirements. If Yes, the BNL Nuclear Safety Officer (NSO) must review all documentation and approve the SAM.

DO NOT CONTINUE WITH SAM PROCESS UNTIL SOURCE OR PACKAGE DOCUMENTATION IS ACCEPTABLE BY TSO and NSO.

l) What is the materials classification: Hazard Class: UN #:
2. Material Hazard Assessment

What hazard does your material pose? (See Chapter 6 of the HMTM for guidance).

Low (PG III)  
Medium (PG II) 
High (PG I)  
Low No Packing Group  
Low Excepted Radioactive 
Medium LSA/SCO 
High Type A

3. Material Hazard Level

What hazard would your material pose to personnel, equipment, and environment should containment be lost during transfer?

Low  
Medium  
High

4. Package Types

What type of package is your material in?

DOT Low  
DOT-E Medium  
Non-DOT High  

If your package is Non-DOT, it must be evaluated in accordance with Chapter 5 of the HMTM, and you must acquire approval from the TSO before transferring your material in this package.

5. Transfer Assessment

What type of transfer is this?

Routine Low  
Exclusive Use Medium  
Non-routine High  

If more than one hazardous material is being transferred on the transport vehicle, check compatibility of lading with packaging materials and compatibility during transport of multiple hazardous materials.

What hazard does transferring your material pose? (See Chapters 5, 6, and 7 of the HMTM).

Low  
Medium  
High

6. Transportation System Assessment and Evaluation

Using the information gathered in steps 1 through 5, determine the minimum requirements that your transportation system must have to transfer your material. Examples of using the information gathered in step 1 through 5 can be found in Section 5 of the HMTM.
Determining the Risk Level of Hazard and Selecting the Transportation System

Each step in the SAM process, beginning with material classification, is assigned a point value based on the factors the SME has determined. These risk point values are as follows:

<table>
<thead>
<tr>
<th>SAM Form Section</th>
<th>Question</th>
<th>Answer</th>
<th>Risk Point Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.0(d) Material Classification</td>
<td>Is the material radioactive?</td>
<td>Yes:</td>
<td>2 points</td>
</tr>
<tr>
<td></td>
<td></td>
<td>No:</td>
<td>0 points</td>
</tr>
<tr>
<td>1.0(f) Material Classification</td>
<td>Does the material contain fissile materials?</td>
<td>Yes:</td>
<td>2 points</td>
</tr>
<tr>
<td></td>
<td></td>
<td>No:</td>
<td>0 points</td>
</tr>
<tr>
<td>1.0(g) Material Classification</td>
<td>Is the material hazardous as defined by 49 CFR?</td>
<td>Yes:</td>
<td>2 points</td>
</tr>
<tr>
<td></td>
<td></td>
<td>No:</td>
<td>0 points</td>
</tr>
<tr>
<td>1.0(h) Material Classification</td>
<td>Is the material defined as an MOT?</td>
<td>Yes:</td>
<td>0 points</td>
</tr>
<tr>
<td></td>
<td></td>
<td>No:</td>
<td>2 points</td>
</tr>
<tr>
<td>1.0(i) Material Classification</td>
<td>Is the material defined as an excepted quantity?</td>
<td>Yes:</td>
<td>0 points</td>
</tr>
<tr>
<td></td>
<td></td>
<td>No:</td>
<td>2 points</td>
</tr>
<tr>
<td>1.0(j) Material Classification</td>
<td>Does the material meet the definition of radioactive materials greater than the DOE STD-1027-92 thresholds for Category 3 Nuclear quantities?</td>
<td>Yes:</td>
<td>STOP. Your material is not allowed to be transferred under this process</td>
</tr>
<tr>
<td></td>
<td></td>
<td>No:</td>
<td>0 points</td>
</tr>
</tbody>
</table>

1.0 Material Classification Risk Points

| 2.0 Material Hazard Assessment (Non-radioactive) | What hazard does your material pose?                                      | None       | 0 points |
|                                               |                                                                          | Low (PG III) | 1 point |
|                                               |                                                                          | Medium (PG II) | 2 points |
|                                               |                                                                          | High (PG I)   | 3 points |

2.0 Material Hazard Assessment (Radioactive) What hazard does your material pose?

| 2.0 Material Hazard Assessment (Radioactive) | Low (Excepted Material) | 1 point |
|                                           | Medium (LSA/SCO)        | 2 points |
|                                           | High (Type A)           | 3 points |

2.0 Material Hazard Assessment Risk Points

| 3.0 Material Hazard Level | What hazard would your material pose should containment be lost? | Low       | 1 point |
|                          |                                                                  | Medium    | 2 points |
|                          |                                                                  | High      | 3 points |

3.0 Material Hazard Level Risk Points

| 4.0 Package Type | What type of package is your material in? | DOT certified or approved | 1 point |
|                 |                                          | DOT-E (equivalent)         | 2 points |
|                 |                                          | Non-DOT                    | 3 points |

4.0 Package Type Risk Points

| 5.0a Transfer Assessment | What type of transfer is this? | Routine | 1 point |
|                         |                                | Exclusive Use               | 2 points |
|                         |                                | Non-Routine                 | 3 points |

5.0a Transfer Assessment Risk Points

| 5.0b Transfer Assessment | What overall hazard does transferring your material pose? | Low       | 1 point |
|                         |                                                            | Medium    | 2 points |
|                         |                                                            | High      | 3 points |

5.0b Transfer Assessment Risk Points

1.0 through 5.0 Risk Point Total

Table 1 Point Value System
Add up the Risk Points determined in Table 1 and compare the Risk Point Total to Table 2 values below. The Risk Point Total and Transportation System Assessment Hazard Level determine the performance requirements for material transfer unless otherwise directed by the TSO or the TSO designee.

<table>
<thead>
<tr>
<th>Transportation System Assessment Hazard Level</th>
<th>Risk Point Total Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low</td>
<td>&lt; 11</td>
</tr>
<tr>
<td>Medium</td>
<td>12-21</td>
</tr>
<tr>
<td>High</td>
<td>22-28</td>
</tr>
</tbody>
</table>

Table 2 Transportation System Assessment

Based on the Transportation System Assessment Hazard Level selected from Table 2, go to Section 5.4 of the HMTM for the performance requirements appropriate for the material transfer.

Your material transfer has been rated as  

low ☐  medium ☐  high ☐

Therefore, your transportation system must meet the requirements for that level stated in MTM Chapter 5 Section 5.4 unless otherwise determined by the TSO or the TSO designee.

7. Transportation System Documentation

This document must accompany the transfer and be located in the glove box or the driver's side door pocket.

8. Packaging and Transfer Details

Identify performance requirements for this transfer (e.g., the specific type of package, labeling requirements, hazard communication requirements, transport routes).

If the material is in “special form” or in a Type B container, and/or the “Summation Value” in Table 1 in Section J is equal to or greater than 0.1 the form must be reviewed and approved by the BNL Nuclear Safety Officer. The Transportation Safety Officer will forward the document to the NSO when applicable:

Forward to NSO     Yes ☐ No ☐

Nuclear Safety Officer Approval     Date

Transportation Safety Officer or SME Approval     Date

NOTE: The approval is only valid for 2 years from the signed date provided that there are no changes to the material or packaging. If any condition is changed or deviations have to be made from Section 8, resubmit the SAM for approval.
## DEFINITIONS

### Definition: Movement by Vehicle of Hazardous and Radiological Materials On-site

<table>
<thead>
<tr>
<th>Term</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>hazardous material</td>
<td>A substance that has been determined to pose an unreasonable risk to health, safety, and property when transported in commerce. A hazardous material includes hazardous waste and hazardous substances.</td>
</tr>
<tr>
<td>high hazard</td>
<td>Material that, if containment is lost, has been determined to pose an extreme danger or health hazard to the emergency response personnel (e.g., regulatory limits could be exceeded), and significant damage to the environment or equipment will result.</td>
</tr>
<tr>
<td>low hazard</td>
<td>Material that, if containment is lost (e.g., the package breaks), has been determined to pose little danger or health hazard to emergency response personnel, and little or no damage to the environment or equipment will result.</td>
</tr>
<tr>
<td>Materials of Trade (MOT)</td>
<td>Certain hazardous materials, when used in direct support of Brookhaven's business, may be transported from one location to another by a staff member for his or her own use as Materials of Trade, i.e., hazardous chemicals or other hazardous material that will be consumed by a staff member's work. The regulations for transporting MOT are much less restrictive and are based on a quantity limit for specific Department of Transportation hazard classes. The BNL Materials of Trade (MOT) exhibit provides the quantity limits for MOT commonly used at BNL that can be transported.</td>
</tr>
<tr>
<td>medium hazard</td>
<td>Material that, if containment is lost, has been determined to pose a moderate danger or health hazard to the emergency response personnel (e.g., no regulatory exposure limit would be exceeded for radiological or chemical controls), and moderate damage to the environment or equipment will result.</td>
</tr>
<tr>
<td>on-site movement</td>
<td>The transfer of hazardous material between facilities using motorized transport within the confines of the BNL-site boundary.</td>
</tr>
<tr>
<td>Transportation Safety Department/Division Point of Contact (POC)</td>
<td>Each Department/Division that has a need to ship or receive any radiological and/or hazardous material will have an established point of contact for transportation safety matters. The TSO or designee, TSWG members, and SMEs normally interact with organizational contacts. These contacts are designated by the Department/Division management. Usually one of the following is identified as the contact: an</td>
</tr>
</tbody>
</table>

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<table>
<thead>
<tr>
<th>ESH&amp;Q Representative or ES&amp;H Coordinator. (The contact may also be an SME if training is obtained and maintained). The contact assists in determining transport requirements. If further clarification is needed, the TSO or a Transportation Safety SME is consulted.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Transportation Safety Subject Matter Experts (SME)</strong></td>
</tr>
<tr>
<td>Staff designated as SMEs for transportation safety are trained and qualified in a specific area of expertise (e.g., radiological, hazmat, air transport). The TSO or designee, TSWG members, and POCs normally interact with Transportation Safety Subject Matter Experts. The SMEs are designated by the Department/Division management and approved by the TSO. The SMEs are expected to work in compliance with work planning and BNL transportation safety requirements.</td>
</tr>
</tbody>
</table>

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Before using a printed copy, verify that it is the most current version by checking the effective date.