

Barnwell Processing Facility Radioactive Material Acceptance Criteria

Revision 17

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BPF Radioactive Material Acceptance Criteria

1. PURPOSE AND SCOPE**1.1 Purpose**

EnergySolutions/Barnwell Processing Facility (BPF) accepts radioactive material and/or waste for processing and storage. This document outlines the responsibilities of the customer and the BPF, and describes what constitutes an acceptable shipment for receipt at the BPF.

1.2 Scope

This document applies to any individual shipping radioactive material and/or waste to the BPF and to personnel involved with shipping and receiving shipments for processing at the BPF. A copy of the Acceptance Criteria should be retained by the customer's employees responsible for the packaging and shipping to the BPF.

Any questions regarding the facility acceptance criteria or processing capabilities, prior notification requirements, or shipment scheduling should be directed to the Licensing Department [Telephone: (803) 259-1781] unless otherwise specified.

2. REFERENCES

All customers shipping radioactive material to the BPF shall comply with the following applicable documents:

- 2.1 South Carolina Department of Health and Environmental Control (DHEC) Radioactive Material License, 287-04, as amended
- 2.2 U.S. Department of Transportation (DOT), Code of Federal Regulations, Title 49
- 2.3 Code of Federal Regulations, CFR Title 10
- 2.4 SC DHEC Regulation 61-83, Transportation of Radioactive Waste into or within South Carolina
- 2.5 SC DHEC Regulation 61-63, Title A, Radioactive Materials
- 2.6 Code of Federal Regulations, CFR Title 29
- 2.7 Code of Federal Regulation, CFR Title 40
- 2.8 DF-AD-010, Barnwell Processing Facility Radioactive Material Inventory and Control Procedure

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- 2.9 S20-RP-036, Barnwell Processing Facility Radiation Safety Radioactive Material Receipt and Release Operations
- 2.10 SC DHEC Regulation 61-79, Hazardous Waste Management
- 2.11 S20-AD-015, Barnwell Processing Facility Waste Testing Laboratory Procedure
- 2.12 S20-RP-009, Radiation Work Permit
- 2.13 Federal Motor Carrier Safety Regulation, Part 303, Subpart I, Protection Against Shifting and Falling Cargo.

3. GENERAL**3.1 Definitions**

- 3.1.1 *Enterprise Waste Tracking (EWT)* - EnergySolutions waste tracking database used to enter and track waste and radioactive material shipments from receipt to processing, storage, and disposal.
- 3.1.2 *BPF Shipment Number (SN)* - Unique number issued by EWT for each scheduled inbound radioactive waste/material shipment.

3.2 Responsibilities

None

3.3 Precautions and Limitations

None

3.4 Records

None

4. REQUIREMENTS AND GUIDANCE**4.1 General Information****4.1.1 BPF Address and Telephone Numbers**

For questions regarding shipments or notification of shipping schedules, the following address and telephone numbers are provided:

EnergySolutions, LLC
Barnwell Processing Facility
16043 Dunbarton Boulevard
Barnwell, South Carolina 29812
BPF General Manager (803) 450-2278 or (803) 259-1781
Fax 803-541-7302

4.1.2 **Normal Hours of Operation**

The normal hours of operation are Monday through Thursday, 5:30 a.m. to 4:00 p.m. (Eastern Time).

4.1.3 **Holidays**

BPF normally observes the following holidays and the BPF will be closed for business on the indicated dates, or as specifically noted in separate correspondence:

New Year's Day
Presidents' Day
Memorial Day
Independence Day
Labor Day
Thanksgiving Day and the day after
Christmas Day and the day before or after

The facility will normally be closed all three days during a three-day weekend holiday.

4.1.4 **Pre-Shipment Requirements**

The BPF accepts radioactive waste/material by rail or highway in accordance with State and Federal regulations. The following requirements shall be met before shipping any radioactive material/waste to the BPF.

- 4.1.4.1 Before the receipt of any radioactive material, a contract, purchase order, or a written letter of authorization in a form and substance acceptable to EnergySolutions certifying compliance with this procedure, Reference 2.1, and any subsequent changes, should be in the possession of EnergySolutions Contracts Department and/or the BPF.

Note: The contract shall specify that the customer possesses a radioactive material license or other authorization allowing the return of material.

- 4.1.4.2 The generator shall ensure that all applicable export authorization documentation has been obtained in accordance with the requirements of the generator's compact commission.
- 4.1.4.3 Unless prior agreement has been made between the BPF and the customer, "collect" freight shipments shall not be accepted at the facility. Any demurrage charges shall be paid by the customer.
- 4.1.4.4 All waste generators, waste collectors, and waste processors, unless otherwise exempted by the State of South Carolina, shall have a valid SC Radioactive Waste Transport Permit (Reference 2.4). The listing of effective permits shall be maintained at the Barnwell Complex and verified by the Licensing Department and/or BPF General Manager before granting a BPF Shipment Number (SN).
 - 4.1.4.4.1 Before any shipper/generator, waste collector, or processor transports or causes to be transported radioactive waste into the State of South Carolina, they shall obtain a Radioactive Waste Transport Permit (RWTP) from the South Carolina Department of Health and Environmental Control (SC DHEC). Shipper/generator, waste collectors, and processors shall ensure that the RWTP is current and valid.
 - 4.1.4.4.2 For each restricted waste transport permit, the broker/shipper shall ensure that they are listed as an authorized Broker of the RWTP.
 - 4.1.4.4.3 All applications for a RWTP should be completed, signed, and received by SC DHEC 30 days before shipping date.
 - 4.1.4.4.4 Permit Fees will be annually determined and assessed by SC DHEC based on the following classifications

4.1.4.4.1 Class X. More than an annual total of 75 cubic feet or more than 100 curies of radioactive waste for disposal, storage, or waste processing within the State.

4.1.4.4.2 Class Y. An annual total of no more than 75 cubic feet of radioactive waste for disposal, storage, or waste processing within the State.

4.1.4.4.3 Class Z. Any shipment of radioactive waste which is not consigned for disposal, storage, or waste processing within the State, but is transported into or within the State.

4.1.4.4.5 Reference 2.4 and permit applications may be obtained from the following office:

S.C. Department of Health & Environmental
Control
Infectious & Radioactive Waste Management
Section
Division of Waste Management
Bureau of Land & Waste Management
2600 Bull Street
Columbia, South Carolina 29201

Telephone: (803) 898-0422 or 0239
Fax Number: (803) 898-0391

4.1.4.5 All shippers shall obtain a BPF SN from the Licensing Department [(803) 541-5017 or 5013] prior to shipping.

Note: The Licensing Department shall obtain approval from BPF General Manager or designee prior to issuance of a BPF SN to a shipper.

4.1.4.6 The BPF SN shall be placed in the Shipment ID Number Section of the shipping papers to provide verification to the BPF receiving personnel that the radioactive material/waste shipment has been authorized.

- 4.1.4.7 Radioactive waste shipments or radioactive material shipments that arrive at the BPF without a BPF SN shall NOT be accepted.
- 4.1.4.8 All radioactive shipments shall be packaged, labeled, marked, and accompanied by proper shipping papers, in accordance with References 2.2, 2.3, 2.6, and 2.7, as applicable.
- 4.1.4.9 The waste class (A-U, A-Unstable, A-S, A-Stable, B, or C) shall be marked on top of the waste disposal container.

Note: Waste shipping to Thermex for processing does not require waste classification to be marked on top of the waste container or shipping container (tanker).

Note: Navy shipments being sent for Dewater processing do not require waste classification to be marked on top of the waste/shipping container. The inbound waste/shipping container will not be the final disposal container.

Note: If waste disposal containers cannot be marked with proper waste class due to ALARA concerns, contact the Licensing Department for variance from above requirement. Variance approval shall be noted in the “FOR CONSIGNEE USE ONLY” section of Form 540.

- 4.1.4.10 Shipments arriving at the BPF must be properly blocked, braced, and secured. Shippers should verify that their shipments meet the applicable requirements in accordance with Reference 2.13.

4.2 Shipment Prior Notification

- 4.2.1 Shippers shall comply with all notifications (written and telephone) in accordance with Section 4.7 of this procedure.
- 4.2.2 Shippers making shipments containing Category 1 and/or 2 Quantities of Radioactive Material to the BPF shall comply with the notification requirements of References 2.5 (Part XII) and Section 4.14.

- 4.2.3 Shippers making shipments containing Category 1 and/or Category 2 Nationally Tracked Sources to the BPF shall comply with the requirements of Reference 2.3, 2.5, and Section 4.15.

4.3 Shipment Documentation

The following documents shall accompany radioactive shipments to the BPF. Steps 4.3.1, 4.3.3, 4.3.4, 4.3.5, and 4.3.6 provide the documentation requirements for radioactive waste shipments. Steps 4.3.2, 4.3.5, and 4.3.6 provide the documentation requirements for radioactive material shipments. Radioactive material shipments include equipment or any other items/materials not received at the BPF for ultimate disposal.

- 4.3.1 The BPF Uniform Low-Level Radioactive Waste Manifest Forms, Attachment 5.2. This includes Forms 540/540A, 541/541A, and 542/542A, as appropriate. Detailed instructions for completing these forms are provided in Attachment 5.3, Instructions for Completing the BPF Uniform Low-Level Radioactive Waste Manifest Forms.
- 4.3.2 A radioactive material shipment is documented on a Radioactive Material Shipment Record (RMSR) as shown in Attachment 5.1.
- 4.3.3 SC DHEC Radioactive Waste Shipment Prior Notification and Manifest Form (SC DHEC 802 Form).

Note: A SC DHEC 802 Form is required for all waste shipments greater than 75 cubic feet and/or greater than 1 curie and for radioactive waste required to be transported by exclusive-use conveyance per DOT regulations. A SC DHEC 802 Form is not required for RMSR Shipments (i.e., non-waste shipment).

- 4.3.4 SC DHEC Radioactive Waste Shipment Certification Form (SC DHEC 803 Form).

Note: A SC DHEC 803 Form is not required for RMSR Shipments.

Note: Shipments transported via Federal Express do not require driver signature on the SC DHEC 803 Certification Form or the EnergySolutions/Barnwell Processing Facility Uniform Low-Level Radioactive Waste Manifest.

- 4.3.5 Complete isotopic analysis printout or equivalent for aqueous filter media, and resins.

4.3.6 Complete isotopic analysis printout or equivalent for worst case filter and the combined filters in package for mechanical filters for dewatering. The specific activity of each radionuclide and the total radionuclide concentration shall be expressed in uCi/cc or Ci/m³, and transuranic nuclides in nCi/gram.

4.3.7 A DOE/NRC Form 741 for Special Nuclear Material (SNM) when required.

4.4 Driver Check-In Procedure

Note: Shippers should ensure that carriers are informed of normal BPF working hours.

4.4.1 Present shipping papers to the Lobby Area at the Main Entrance of the BPF and follow the posted instructions.

4.4.2 BPF General Manager or designee shall receipt shipment in accordance with Reference 2.9.

4.4.3 Radiation Safety Technician personnel shall receive the incoming shipment in accordance with Reference 2.9.

4.4.4 Drivers with shipments that are arriving at BPF during non-working hours shall report to the EnergySolutions Barnwell Complex, 740 Osborn Road, main Security Office for shipment receipt.

4.5 Delays

4.5.1 The BPF shall not be responsible for transport equipment detention or special equipment demurrage charges assessed by the carrier. Payment of detention charges shall be the responsibility of the customer.

4.5.2 The BPF assumes no responsibility for transport equipment delays or special detention charges assessed by the carrier due to weather delays, improper paperwork, special casks, non-routine offloads, decontaminating vehicles or containers, violation of federal and/or state requirements, shipment discrepancies, or regulatory agency inspection.

4.6 Returnability/Retrievability/Storage of Processed Material

The BPF processes radioactive material and/or waste for subsequent shipment for disposal or return to the generator or other authorized recipient. Return of material, while at the BPF, must be authorized by the generator as stated in contract requirements (Step 4.1.4.1).

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- 4.6.1 Retrieval of material during processing at the BPF must be authorized by the generator or stated in contract requirements.
- 4.6.2 No provision or authority exists for material retrieval following shipment by the BPF to a licensed disposal site.
- 4.6.3 Upon the determination that radioactive waste received for consolidation and repackaging cannot be shipped to a disposal facility under the terms and conditions of that facility's radioactive material license and acceptance criteria, that waste shall be returned to the original generator/shipper within two (2) weeks.
- 4.6.4 Waste received for processing or storage shall not be stored at the BPF greater than one year without prior approval from the Licensing Department and SC DHEC.

4.7 Prior Notification Requirements**4.7.1 General**

The Prior Notification of radioactive waste and radioactive material shipments are required by Reference 2.4 and/or this procedure. Questions concerning SC DHEC notifications shall be directed to SC DHEC. SC DHEC and the BPF should receive the SC DHEC 802 Form at least 72 hours prior to the waste shipment being transported into or within the State of South Carolina or unless 72 hours notification has been waived by SC DHEC.

4.7.2 SC DHEC Prior Notification Instructions

- 4.7.2.1 Complete the SC DHEC 802 and 803 Forms as instructed on the reverse side of the form.
- 4.7.2.2 Shippers shall use the BPF Shipment Number (SN) in Block 4 (Shipment Identification Number) of the SC DHEC 802 Form.
- 4.7.2.3 Distribute the SC DHEC 802 Form as follows:
 - 4.7.2.3.1 One copy mailed, emailed, or faxed (803) 896-0391 to the SC DHEC office in Columbia, South Carolina.
 - 4.7.2.3.2 One copy faxed to the Licensing Department (803) 259-1744 or emailed.

4.7.2.3.3 Original to accompany the shipment.

4.7.3 Facility Prior Notification Instructions

- 4.7.3.1 The BPF General Manager or designee shall notify the Licensing Department to issue a BPF SN. BPF SNs are required for all radioactive waste shipments and radioactive material shipments. A copy of the Uniform Low-Level Radioactive Waste Manifest or the RMSR may be requested prior to issuance of a BPF SN.
- 4.7.3.2 Shippers shall keep the BPF, Licensing Department, and SC DHEC informed of all data changes concerning the SC DHEC 802 Form and all shipment cancellations.
- 4.7.3.3 Shipment departure notification and updates shall be given to the BPF and Licensing Department when the shipment leaves the customer's facility.

4.8 Uniform Low-Level Radioactive Waste Manifest

- 4.8.1 The BPF Uniform Low-Level Radioactive Waste Manifest including Forms 540/540A, 541/541A, and 542/542A, Attachment 5.2 as appropriate, shall be used to make waste shipments to the BPF. Detailed instructions for completing these forms are provided in Attachment 5.3, Instructions for Completing the BPF Uniform Low-Level Radioactive Waste Manifest Forms. Contact the Licensing Department to obtain approval of any other manifest forms before shipping.
- 4.8.2 Uniform Low-Level Radioactive Waste Manifest Forms are obtainable from the Licensing Department and/or the BPF General Manager.
- 4.8.3 Uniform Low-Level Radioactive Waste Manifest Forms are reviewed by EnergySolutions/BPF personnel prior to shipment acceptance. State and federal regulatory agency inspections may also be performed, as required.
- 4.8.4 Improperly prepared Uniform Low-Level Radioactive Waste Manifest Forms will result in acceptance delays or refusal of the shipment.
- 4.8.5 A signed Acknowledgment of Receipt Letter and a copy of the Uniform Low-Level Radioactive Waste Manifest Form 540 shall be returned to the shipper within seven (7) days after the shipment has been accepted at the BPF.

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- 4.8.6 The BPF copy of the Uniform Low-Level Radioactive Waste Manifest Form shall accompany the shipment.
- 4.8.7 All totals shown on the Uniform Low-Level Radioactive Waste Manifest Form shall match all accompanying paperwork for a given shipment.
- 4.8.8 All volumes, activity, etc., shall be accurate when shipment is received for processing.
- 4.8.9 The weight listed on the Uniform Low-Level Radioactive Waste Manifest Form must be as accurate as possible since it is used by EnergySolutions personnel to select the proper offloading technique for the particular package.
- 4.8.10 Shipments containing multiple generators must indicate on the 541 and 542 Forms the individual waste volume and activity by SC DHEC Radioactive Waste Transport Permit Number and Generator Name.

4.9 Van Shipments**4.9.1 Drums**

BPF utilizes a mechanical lifter for offloading drums weighing 1000 pounds or less. Open-top vans or flatbed trailers are the preferred method of shipment for drums weighing greater than 1000 pounds.

Note: All drums above 1000 pounds shall be palletized.

- 4.9.1.1 Non-palletized drums greater than 1000 pounds shall have, prior to shipment, approval by the BPF General Manager or designee.
- 4.9.1.2 Drums shall not be placed on their sides.
- 4.9.1.3 Drum rings and bolts shall be secured properly and be structurally strong enough to support the weight of the drum while offloading.
- 4.9.1.4 Lever-lock closure devices shall have prior approval from the BPF General Manager or designee, prior to shipments departure from customer.
- 4.9.1.5 Drums shall comply with Reference 2.2. Bulging lids shall not exceed height of closure ring; bulging bottoms shall not extend below bottom ring of drums.

- 4.9.1.6 Drums may be double stacked with proper bracing, provided the heavier drums are on the bottom.
- 4.9.1.7 Palletized drums may be double stacked.
- 4.9.1.8 Pallets shall be considered sacrificial. The recommended pallet for handling drums holds two parallel rows of two drums each (four drums total).
- 4.9.1.9 A three-drum pallet (singular row of three drums) may be used if weight is a limitation.
- 4.9.1.10 Drums shall be banded together and secured to the pallet to prevent sliding off during handling.
- 4.9.1.11 Small drums should be stacked in reasonable quantities so that a technician may remove the highest container without need of a platform.
- 4.9.1.12 Heaviest containers shall be on the bottom.

4.9.2 Packages Weighing Less Than 8,000 Pounds (BPF Forklift Capacity)

- 4.9.2.1 Each package shall have a minimum clearance of three inches from the van walls.
- 4.9.2.2 Packages shall be elevated above the van floor and accessible to a forklift. The use of two 2" X 4" boards nailed together is acceptable.
- 4.9.2.3 Each package shall have a top clearance of at least twelve inches in a closed van.
- 4.9.2.4 Steps 4.9.2.1 through 4.9.2.3 are not applicable for non-palletized drums.
- 4.9.2.5 Dunnage used to establish spacing is considered sacrificial.

4.9.3 Packages Weighing More Than 8,000 Pounds

- 4.9.3.1 Packages shall be provided with properly attached lifting devices.

- 4.9.3.2 Lifting devices shall be secured to the top of package for easy access.
- 4.9.3.3 Lifting devices shall as a minimum be certified to twice the weight of the packages.
- 4.9.3.4 Packages shall not be shipped in a closed hardtop vehicle.
- 4.9.3.5 Each package shall have a minimum clearance of three inches from the van walls.
- 4.9.3.6 Shipments with boxes weighing more than 8,000 pounds and palletized drums shall be segregated.
- 4.9.3.7 Packages with attached lifting devices are not required to have bottom clearance.
- 4.9.3.8 Customer provided lifting slings may be returned upon request at the customer's expense, provided:
 - 4.9.3.8.1 The slings are not contaminated.
 - 4.9.3.8.2 Additional BPF personnel exposure will not be accumulated.
 - 4.9.3.8.3 Excessive loading time will not be incurred.
 - 4.9.3.8.4 Metal/steel braided/twisted cables/fabric slings are not generally released from the BPF due to difficulties in performing adequate radiological surveys.

Note: There may be an additional charge when a radiological survey and release of slings or equipment is requested.

4.9.4 Shipments with Multiple Shipping Container Types

- 4.9.4.1 Mixed container shipments shall comply with Steps 4.9.1 through 4.9.3 as applicable.
- 4.9.4.2 Do not stack non-palletized drums on boxes or boxes on non-palletized drums.

- 4.9.4.3 Palletized drums are considered as boxes. No segregation is necessary if boxes (less than 8,000 pounds) and palletized drums are on the same truck.
- 4.9.4.4 Non-palletized drums or boxes may be loaded in the forward section of the van with definite segregation of the two types of containers. (Preferably non-palletized drums loaded in forward section of van).
- 4.9.4.5 Shipments containing palletized drums and boxes weighing more than 8,000 pounds shall be segregated.
- 4.9.4.6 Step 4.9.3.8 is applicable.
- 4.9.4.7 Improperly mixed container shipments shall result in an additional offloading charge or refusal of the shipment.

4.10 Flatbed Trailer Shipments

- 4.10.1 Flatbed trailer shipments shall comply with Section 4.9 as applicable.
- 4.10.2 Packages with attached lifting devices are not required to have bottom clearance.
- 4.10.3 Lifting devices shall as a minimum be certified to twice the weight of the packages.
- 4.10.4 Boxes and/or palletized drums shipped on flatbed trailers must be loaded in such a manner that they may be offloaded from the side using a forklift.

4.11 Cask Shipments

- 4.11.1 Customers using a licensed cask not owned by *EnergySolutions* shall ensure that *EnergySolutions* is a "Registered User" of the licensed cask prior to shipment to the BPF. This applies to all shipments requiring licensed packages.
- 4.11.2 All cask shipments shall strictly comply with the applicable Certificate of Compliance and cask handling procedures for the cask in use (lid torqueing, sealing gaskets, weight restrictions, shoring requirements, etc.).
- 4.11.3 All drums and/or boxes shall be palletized and pallets shall have proper lifting devices attached.

- 4.11.4 The waste container and/or pallet shall have the lifting device secured at the top of the container(s). This is to prevent the cable from becoming caught under or between the container(s) or pallet.

Note: Lifting devices shall be of sufficient length to allow retrieval and crane hook-up without personnel physically entering the cask. The Radiation Safety Supervisor or designee, BPF General Manager or designee, and the Licensing Department shall be notified prior to shipment of any lifting device supplied with the container that has been altered, removed, or replaced. Lifting devices shall as a minimum be certified to twice the rated load of the devices.

- 4.11.5 When using pallets, the containers shall be positioned to remain balanced and stable on the pallet when lifted clear of the cask.
- 4.11.6 Palletized drums inside a cask shall be loaded to prevent movement in such a manner that any shifted position of drums on the pallet will not increase radiation levels measured outside the cask. (Dunnage shall be removable with palletized loads).
- 4.11.7 A shipment consisting of individual waste containers not on pallets shall have attached to each container a lifting device that will allow offloading by a single lift.
- 4.11.8 Customer-provided lifting slings may be returned upon request at the customer's expense, provided:
- 4.11.8.1 The slings are not contaminated.
 - 4.11.8.2 Additional EnergySolutions personnel exposure will not be accumulated.
 - 4.11.8.3 Excessive loading time will not be incurred.
 - 4.11.8.4 Metal/steel braided/twisted cables/fabric slings are not generally released from the BPF due to difficulties in performing adequate radiological surveys.

Note: There may be an additional charge when a radiological survey and release of slings or equipment is requested.

4.12 Contamination Limits of Package/Vehicle

4.12.1 General

- 4.12.1.1 All shipments received at the BPF shall comply with contamination control limits of Reference 2.2 and/or this procedure.
- 4.12.1.2 Loose contamination on and between packages that may be obscured by various barriers (i.e., impact limiters, base plates, etc.) shall be considered. Contamination limits for the package, the barrier, and the vehicle shall comply with Reference 2.2.
- 4.12.1.3 The receipt of excessive surface contamination on containers in casks or otherwise, is very undesirable from the standpoint of facility cleanliness and contamination control. Customers should use all means possible to ship containers with minimal surface contamination.
- 4.12.1.4 Notify the Radiation Safety Supervisor or designee or Licensing Department prior to shipment of any smearable contamination on the container and/or cask interior surface exceeding 50,000 dpm/100 cm² beta-gamma and/or 2,200 dpm/100 cm² alpha.
- 4.12.1.5 Containers that have been wrapped to prevent the spread of loose contamination shall have, prior to shipment, approval from the BPF General Manager or Radiation Safety Supervisor or designees.

Note: The customer shall notify the Radiation Safety Supervisor prior to departure of any shipment in which the potential exists for airborne contamination and/or excessive smearable contamination is present.

4.12.2 Inner Packaging

Radioactive material/waste, which consists of small glass containers, shall be packaged in cardboard boxes or plastic bags to prevent breakage and facilitate the repackaging at a later date. These separate packages can be in larger packages (i.e., overpacks) for shipment to the BPF.

4.12.3 Floor Covering

Plywood or other materials that are placed over the transport vehicle's flooring for contamination control shall be considered sacrificial and may be considered as part of the disposal volume if they cannot be decontaminated and released. Time and/or supplies for floor covering removal will be chargeable.

4.12.4 Decontamination Prior to Release

Vehicles exiting the BPF shall be decontaminated to release limits described in Step 4.12.5 prior to release. Charges for decontamination services to comply with these levels shall be assessed as necessary.

4.12.5 Contamination Release Limits for Vehicles Exiting the BPF

4.12.5.1 Enclosed vehicles used solely for the transport of radioactive materials (Exclusive Use) and properly marked "For Radioactive Materials Use Only".

4.12.5.1.1 Fixed contamination shall not exceed 10 mR/hr on contact with the interior surface or 2 mR/hr at one meter from the interior surface.

4.12.5.1.2 Fixed contamination shall not exceed 0.5 mR/hr at any exterior accessible surface.

4.12.5.1.3 Removable contamination shall not exceed 220 dpm/100 cm² alpha and 2200 dpm/100 cm² beta-gamma in the interior or on the exterior of the vehicle.

4.12.6 Empty Casks

4.12.6.1 Fixed contamination shall not exceed 0.5 mR/hr at any accessible surface unless cask is properly labeled and a completed Radioactive Material Shipment Record (RMSR) accompanies the cask.

4.12.6.2 Removable external contamination for beta-gamma shall not exceed 2200 dpm/100 cm².

4.12.6.3 Removable external contamination for alpha shall not exceed 220 dpm/100 cm².

4.12.7 All Vehicles for Unconditional Release

- 4.12.7.1 Fixed contamination shall not exceed 0.1 mR/hr at any accessible surface.
- 4.12.7.2 Removable contamination for beta-gamma shall not exceed 220 dpm/100 cm².
- 4.12.7.3 Removable contamination for alpha shall not exceed 22 dpm/100 cm².

4.13 Special Categories**4.13.1 Dry Active Waste**

Dry Active Waste (DAW) comprised of paper, plastics, contaminated metals, soil, wood, building rubble, air filters, etc., shall be received under the following conditions:

- 4.13.1.1 Radioactive shipments shall be packaged, labeled, and placarded in accordance with References 2.2 and 2.3.
- 4.13.1.2 DAW must be included in the description in block (11) of the Uniform Low-Level Radioactive Waste Manifest Form 540. If material is compacted, or compactable, it should be noted in the description.
- 4.13.1.3 DAW packaging in bags, drums/boxes, or sealands is acceptable.

Note: All packages received at the BPF must not show signs of significant package deformation, loss or dispersal of the package contents, or an increase in the maximum radiation levels recorded or calculated at the external surface of the package. No chemical, galvanic, or other reaction among packaging components or between the packaging components and the package contents is allowed.

- 4.13.1.4 For biological, pyrophoric, hazardous chemicals, mixed or explosive wastes see Steps 4.13.2, 4.13.7, 4.13.9, 4.13.10, and 4.13.3. Contact the BPF General Manager, the Licensing Department, or the Radiation Safety Officer (RSO) for additional information.

- 4.13.1.5 Liquid scintillation fluids, toluene, xylene, dioxane, or other organic liquids similar in chemical properties, and DAW with residues of these fluids are not acceptable.

Note: Containers, which contained these organic chemicals, are acceptable if they have been certified RCRA empty in accordance with Reference 2.7.

- 4.13.1.6 Sealed sources are accepted in accordance with Step 4.13.4 and Section 4.15. Contact the BPF General Manager or Licensing Department for information on the acceptability of sealed sources.
- 4.13.1.7 Incidental liquids are only acceptable in DAW shipments.
- 4.13.1.8 In general, typical waste forms, which are acceptable for shallow land burial are acceptable for DAW processing. Contact the BPF General Manager, if any waste acceptability issues are questionable.
- 4.13.1.9 No container shall have radiation levels greater than 200 mR/hr on the package exterior (contact) without prior approval from the BPF General Manager. Packages that have supplemental shielding, internal, or external to the package, shall be approved by the BPF General Manager prior to shipment.
- 4.13.1.10 Contamination limits on package exteriors and vehicles shall be in accordance with Section 4.12 of this procedure.
- 4.13.1.11 DAW containing transuranic (TRU) material must contain less than 10 nCi/g TRU waste and this quantity must be incidental (<1%) to the total shipment activity.
- 4.13.1.12 DAW containing Special Nuclear Material (SNM) shall be managed in accordance with Section 4.13.8 of this procedure.
- 4.13.1.13 All DAW shall meet Class A-Unstable classification as received at the BPF and shall maintain Class A-Unstable classification when radionuclide concentration is increased by a factor of 10.

4.13.2 Biological Material

Biological wastes and waste containing pathogenic agents are not acceptable at the BPF, unless properly sterilized. Plants, animals, and by-products thereof are considered biological material. Glassware, etc., that at one time contained these materials may also be considered biological. A signed certification documenting that the material has been sterilized shall be provided to the BPF General Manager prior to shipment of waste.

4.13.3 Gaseous Waste

4.13.3.1 Krypton 85 and Xenon 133 are acceptable in DOT specification cylinders or NRC approved sealed sources with internal pressures less than 1.5 atmospheres and less than 100 curies per container.

4.13.3.2 Sealed Tritium gas sources are acceptable, provided:

4.13.3.2.1 The source is approved by the U.S. Nuclear Regulatory Commission or an agreement state.

4.13.3.2.2 The maximum activity per container must not exceed 1100 curies.

Note: The maximum activity for tritium gas sources disposed of at the Barnwell Disposal Site is 1000 curies per container.

4.13.3.2.3 All sources are disposed/recycled as entire devices to provide additional physical protection to the primary tritium source containment.

4.13.3.2.4 Sources requiring stabilization as determined by waste classification [using the volume of the sealed source only] are placed in high integrity containers or encapsulated with an appropriate stabilization media.

4.13.3.2.5 The internal pressure of each source is less than 1.5 atmospheres.

4.13.3.2.6 Methods used for stabilizing these sources shall be approved by the BPF General Manager and/or the Licensing Department prior to shipment.

4.13.3.3 Smoke or gas detectors/devices containing Am-241 shall be received as complete intact devices only unless specifically approved by the Licensing Department.

4.13.4 **Sealed Sources or Special Form Radioactive Materials**

Sealed sources used for radiography or high exposure gamma irradiation shall be in the original device or a comparable source holder with shutters or closures locked or otherwise secured. Sealed source capsules not contained in a manufactured device shall only be received inside a larger steel container for handling purposes with appropriate additional shielding. These devices shall not be received at the facility without prior approval by the BPF General Manager and/or the Licensing Department. See section 4.15 for Nationally Tracked Sources.

Note: Package contact exposure rates shall not exceed 200 mR/hr, without prior approval.

Note: Approval from the Licensing Department is required prior to the receipt of sealed sources.

Note: Lead containers and/or lead packaging shall be received at the BPF only when used as radioactive material shielding. Contaminated lead is considered mixed waste and will not be accepted without prior approval.

4.13.5 **Aqueous Radioactive Liquids**

4.13.5.1 Shipments of aqueous radioactive liquids to the BPF shall be packaged in accordance with U.S. DOT Regulation 49 CFR Parts 100-185.

Note: The method used for packaging and shipping aqueous liquids to the BPF must be approved by the Licensing Department and the BPF General Manager or designee prior to shipping.

4.13.5.2 Hazardous organic solutions solidified or otherwise, are not acceptable for processing at the BPF.

- 4.13.5.3 Non-hazardous scintillation products may be acceptable provided the scintillation products have been approved by the Licensing Department prior to shipment.
- 4.13.5.4 Acceptable wastes for processing include aqueous liquids, sludge, concentrates, resins, evaporator bottoms, diatomaceous earth, and filter media.
- 4.13.5.5 Aqueous radioactive materials/wastes shall be managed in accordance with approved EnergySolutions processing procedures and/or work instructions.
- 4.13.5.6 Dose assessments shall be performed and approved in accordance with Reference 2.12 for all shipment containers and new or revised processes.
- 4.13.5.7 Containers exhibiting dose rates over the top of the container greater than 10 R/hr require the approval of the BPF General Manager or designee and ALARA Subcommittee, prior to acceptance.
- 4.13.5.8 Containers exhibiting a dose rate greater than 15 R/hr over the top of the container shall be processed with a top shield in place unless exempted by the ALARA Subcommittee. Casks with secondary lids may qualify as having a top shield.
- 4.13.5.9 For each shipment containing aqueous radioactive waste, a complete isotopic analysis shall be provided with the shipment. The analysis shall identify the following:
 - 4.13.5.9.1 Waste description
 - 4.13.5.9.2 Radionuclides identification and concentrations in $\mu\text{Ci/cc}$ and nCi/g (if applicable).
 - 4.13.5.9.3 Total activity content
 - 4.13.5.9.4 Waste volume within the container (cc or ft^3)

4.13.6 Resin/Aqueous Filter Media (Including Mechanical Filters)

- 4.13.6.1 Dewatered resin/aqueous filter media (including mechanical filters) packages, which contain liquid in excess of the waste disposal criteria of 0.5% by volume shall be transported in a shipping cask.

Note: Lids on liners are required to be closed/engaged (i.e., maintain its contents). HIC lid seal marks must be in compliance with C of C when appropriate prior to disposal.

- 4.13.6.2 Gross dewatered liners are acceptable for receipt at the BPF.
- 4.13.6.3 The waste must be contained in EnergySolutions High Integrity Containers (HICs), EnergySolutions poly liners, EnergySolutions steel liners, or EnergySolutions 24-Inch Diameter Pressure Vessels (PVs) constructed for dewatering purposes. Other containers may be acceptable on a case-by-case basis after review and approval by the BPF General Manager or designee, RSO or designee, and the Licensing Department.
- 4.13.6.4 A dose assessment shall be performed and approved in accordance with Reference 2.12 for all containers.
- 4.13.6.5 Containers exhibiting a dose rate greater than 15 R/hr over the top of the container shall be processed with a top shield in place unless exempted by the ALARA Subcommittee. Casks with secondary lids may qualify as having a top shield.
- 4.13.6.6 For each shipment consigned for dewatering containing resin or other aqueous filter media (including mechanical filters), a complete isotopic analysis shall be provided with the shipment. For mechanical filters a complete isotopic for worst case filter and for combined filters per package shall be provided with the shipment. The analysis shall identify the following:
 - 4.13.6.6.1 Waste description
 - 4.13.6.6.2 Radionuclides identification and concentrations in $\mu\text{Ci/cc}$ and nCi/g (if applicable).
 - 4.13.6.6.3 Total curie content
 - 4.13.6.6.4 Resin/filter media volume (cc or ft^3)
 - 4.13.6.6.5 Indicate the total number of filters in the container.

4.13.7 Pyrophoric Materials or Flammable Solids

- 4.13.7.1 Pyrophoric or flammable solid material contained in waste shall be made inert to prevent self-ignition during transport, receipt, and processing.
- 4.13.7.2 Contact the BPF General Manager for inerting process requirements prior to shipping.
- 4.13.7.3 No material that might react violently with water or moisture shall be accepted for processing at the BPF.

4.13.8 Special Nuclear Material (SNM)

Note: Special Nuclear Material (SNM) is defined as radioactive material containing any combination of the following isotopes: plutonium (Pu), U-233, or uranium enriched in U-233 or U-235.

- 4.13.8.1 All SNM waste shall be packaged and reported in accordance with References 2.1, 2.2, and Section 4.3 of this procedure.
- 4.13.8.2 No shipment shall contain more than 350 grams total of U-235 or 200 grams of U-233 or 200 grams of plutonium or any combination of these provided the sum of the ratios of the quantities does not exceed unity.

Note: The BPF radioactive material possession limits for SNM on site at any time shall not exceed the quantities indicated above.

4.13.9 Hazardous Chemicals

- 4.13.9.1 Waste and/or material containing hazardous chemicals/agents and radioactive materials shall be acceptable for receipt only when the radiological hazard clearly exceeds the toxic chemical/agent hazard.
- 4.13.9.2 Radioactive waste, which contains or is capable of generating quantities of toxic gases, vapors, or fumes harmful to persons transporting, handling, or disposing of the waste is not acceptable.

- 4.13.9.3 All shipments shall comply with Reference 2.1 regarding the assessment of chemical versus radiological hazards.

4.13.10 Mixed Waste

- 4.13.10.1 No mixtures of radioactive waste and hazardous waste as defined by Title 40 Code of Federal Regulations (CFR) Part 261 and S.C. Hazardous Waste Management Regulation 61-79.261 will be accepted for processing.
- 4.13.10.2 A mixture of radioactive waste and waste which was classified as hazardous solely because it exhibited one or more of the hazardous characteristics defined in 40 CFR 261 Subpart C, but has been treated in a manner such that it no longer exhibits any of the characteristics, will be reviewed for acceptance on a case-by-case basis. As required by 40 CFR 261.24, the Toxicity Characteristic Leaching Procedure shall be used.
- 4.13.10.3 A description of the treatment process and results of the analytical tests of the final waste shall be submitted to the Licensing Department for evaluation prior to shipment.

4.13.11 Polychlorinated Biphenyl Waste (PCB)

- 4.13.11.1 No PCB's or PCB items as defined in 40 CFR 761 will be accepted for processing without prior approval from the Licensing Department.
- 4.13.11.2 Documentation or analytical results from the shipper substantiating the absence of PCB's for PCB suspect waste shall be provided prior to shipment.

4.13.12 Asbestos

- 4.13.12.1 Packages containing radioactively contaminated asbestos waste (0.1% or greater by weight) shall be packaged in double bags, and shall be identified as asbestos under the waste description on the Uniform Waste Manifest and continuation sheet.
- 4.13.12.2 Acceptance of waste containing less than 0.1% asbestos by weight and is not double bagged requires BPF approval prior to shipment.

- 4.13.12.3 OSHA Asbestos standard 29 CFR 1910.1001 requires affixment of warning labels on waste packages containing asbestos.

4.13.13 Detonation or Explosive Decomposition

Radioactive waste that is readily capable of detonation or of explosive decomposition or reaction, or of explosive or exothermic reaction with water is not acceptable.

4.13.14 Material and Equipment Decontamination

Materials and equipment for decontamination, segmentation, disassembly, survey, and re-use or release will be accepted, processed, and controlled in accordance with Reference 2.12.

4.13.15 Other Processes

The BPF performs radioactive material/waste processing on a project basis. Specific internal and/or SC DHEC approvals are required.

4.13.16 Laboratory Test Samples

This section provides instructions for the notification, shipment, and receipt of radioactive/hazardous material samples at the BPF for bench scale testing only.

- 4.13.16.1 All samples shall be packaged so that they will not leak, spill, or vaporize from the package during shipment and meets the requirements of References 2.1, 2.2, 2.7, 2.10, and 2.11.

- 4.13.16.2 Liquid samples shall be doubly packaged with absorbent material (i.e. vermiculite, speedi-dry, etc.). The outer container must have sufficient absorbent material necessary to absorb twice the volume of liquid. Glass inner containers are not acceptable without prior approval from the Licensing Department.

- 4.13.16.3 DOT Specification 5-gallon outer containers with bolted ring closures are recommended for limited quantity and LSA shipments. DOT 7A Type A packages must be used for Type A quantities in compliance with Reference 2.2. If the material is a mixed waste (hazardous and radioactive), the packaging must also meet the requirements for that particular waste as specified in Reference 2.10.

- 4.13.16.4 Shipments made to the BPF as excepted quantity, low specific activity (LSA) or Type A quantity shall be accompanied with an RMSR, Attachment 5.1, Radioactive Material Shipment Record (RMSR).
- 4.13.16.5 The maximum contact dose rate on any individual radioactive/hazardous sample shall not exceed 50 mR/hr without prior approval from the Licensing Department.
- 4.13.16.6 The total mass of hazardous or mixed waste possessed at the BPF at any one time shall not exceed 1000 kgs of non-acute waste, 1 kg of acute waste, or 250 kgs of soils, water or debris contaminated with acute waste in accordance with Reference 2.7. The Licensing Department shall verify quantities prior to shipment approval.

Note: The BPF is required to return all mixed waste products and residual samples to the generator/shipper.

- 4.13.16.7 All waste testing of samples shall be performed in accordance with References 2.10 and 2.11.

4.14 Category 1 and Category 2 Quantities of Radioactive Material Shipment

- 4.14.1 Category 1 and Category 2 shipments are shipments that contain radionuclides and quantities that are listed in References 2.3 and 2.5, which pose a concern for potential malevolent use and potential risk or consequences.
- 4.14.2 Shippers preparing waste shipments containing Category 1 and Category 2 Quantities of Radioactive Material to the BPF should be familiar with the shipment requirements specified in References 2.3 and 2.5.
- 4.14.3 The shipper of a Category 1 or Category 2 shipments, shall notify the BPF General Manager and the Licensing Department in accordance with Step 4.2.2 prior to making the shipment to the BPF.

4.15 Nationally Tracked Sources

- 4.15.1 A nationally tracked source, as defined in 10 CFR 20.1003, refers to a sealed source containing a quantity equal to or greater than Category 1 or Category 2 levels of any radioactive material listed in Appendix E to Part 20 – “Nationally Tracked Source Thresholds”.

- 4.15.2 Shippers preparing waste shipments containing Category 1 and/or Category 2 nationally tracked sources to the BPF shall comply with the reporting requirements specified in References 2.3 and 2.5 and obtain prior to shipment approval from the Barnwell Licensing Department.
- 4.15.3 Prior to shipping, the shippers shall provide the Barnwell Licensing Department the following information for review and approval.
 - 4.15.3.1 Shipper's name, shipping address, license number, SC Radioactive Waste Transport Permit Number, and name of individual preparing the reported information.

Note: If the shipper is a Broker, waste processor, etc., and is not the waste generator, the shipper must also provide the name, shipping address, license number, and SC Radioactive Waste Transport Permit Number for each waste generator.
 - 4.15.3.2 The manufacturer, model, and serial number of the source or, if not available, other information to uniquely identify the source.
 - 4.15.3.3 The radioactive material in the source and current activity in becquerels and curies. The activity reported must be the same as the activity that will be listed on the shipment manifest.
 - 4.15.3.4 The date the source strength is reported.
 - 4.15.3.5 The shipping date and estimated arrival date.
 - 4.15.3.6 The waste manifest number and the waste disposal container number.
- 4.15.4 The Barnwell Licensing Department will notify the shipper of each source as being either approved or disapproved for shipment to the BPF.
- 4.15.5 Upon source shipment receipt, the Barnwell Licensing Department will complete the source tracking transaction report as required in References 2.3 and 2.5 by the close of the next business day.

4.16 Shipments Violating Regulations Or Criteria**4.16.1 Packaging, Labeling, Marking, and Manifest Non-Compliance**

- 4.16.1.1 Any package not in compliance with this procedure that presents NO radiation or contamination hazard shall be conspicuously marked with a Hold Tag. Storage in a segregated storage area is required until disposition is determined by the Licensing Department.
- 4.16.1.2 Any package not in compliance with this procedure that PRESENTS a radiation or contamination hazard shall be managed under the guidance of the Health Physics Department.
- 4.16.1.3 The BPF General Manager shall notify the Licensing Department prior to issuance of instructions for disposition of the shipment. The Licensing Department is required by license to notify SC DHEC of shipment discrepancies and obtain concurrence for disposition.
- 4.16.1.4 Notice shall be made and confirmed in writing to the waste generator as specified on the Uniform Low-Level Radioactive Waste Manifest Form.
- 4.16.1.5 Acceptance of the packages shall only occur upon verification of the package contents and receipt of proper paperwork. Radioactive materials or quantities not authorized by Reference 2.1 cannot be accepted at the BPF and will be returned to the shipper, in accordance with regulations of Reference 2.4.

4.16.2 Radiation or Contamination Limit Non-Compliance

- 4.16.2.1 Any package not in compliance with contamination limits specified in Section 4.12 of this procedure shall be isolated in a controlled area to minimize the spread of contamination.
- 4.16.2.2 When a package or vehicle in non-compliance has been safely isolated and access control has been established, the Radiation Safety Supervisor shall make notification to the Licensing Department. The Licensing Department will notify the waste generator and SC DHEC.

5. ATTACHMENTS AND FORMS

- 5.1 Radioactive Material Shipment Record (RMSR)
- 5.2 BPF Uniform Low-Level Radioactive Waste Manifest Forms
- 5.3 Instructions for Completing the BPF Uniform Low-Level Radioactive Waste Manifest Forms

Attachment 5.1
RADIOACTIVE MATERIAL SHIPMENT RECORD (RMSR)
(4 pages)

[illegible]

RADIOACTIVE SHIPMENT RECORD FORM ADDENDUM				SHIPPER USE ONLY		1. RSR NUMBER								
NAME				SHIPPER USE ONLY		2. PAGE ____ OF ____ PAGE(S)								
S.C. RADIOACTIVE WASTE TRANSPORT PERMIT NUMBER				SHIPPER USE ONLY										
SHIPPING DATE				SHIPPER USE ONLY										
3. TRANSPORT PERMIT NUMBER	4. GENERATOR NAME AND TELEPHONE NUMBER	5. GENERATOR FACILITY ADDRESS	6. MATERIAL DESCRIPTION (NOMENCLATURE)	7. PREPROCESSED MATERIAL VOLUME (a) ¹ (b) ²	8. MANIFEST NUMBER (S) UNDER WHICH MATERIAL RECEIVED AND DATE OF RECEIPT	9. MATERIAL CODE (a) PREPROCESSED (b) COLLECTED	10. ORIGINATING COMPACT REGION OR STATE	11. AS PROCESSED/COLLECTED TOTAL						
								A. SOURCE MATERIAL (a) ¹ (b) ²	B. SNM (c)	C. ACTIVITY (a)(d) (b)(e)		D. VOLUME (a)(f) (b)(g)	E. WEIGHT (c)	F. MAXIMUM PACKAGE RADIOLOGICAL LEVEL (a)(h)(i)
TOTALS OF ALL RSR ADDENDUM PAGES														

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[illegible]

BPF Radioactive Material Acceptance Criteria

UNIFORM LOW-LEVEL RADIOACTIVE WASTE MANIFEST										ENERGYSOLUTIONS BARNWELL PROCESSING FACILITY		2. MANIFEST NUMBER				
DISPOSAL CONTAINER DESCRIPTION										WASTE DESCRIPTION FOR EACH WASTE TYPE IN CONTAINER					16. WASTE CLASSIFICATION	
5. CONTAINER IDENTIFICATION NUMBER/ S.C. TRANSPORT PERMIT NUMBER	6. CONTAINER DESCRIPTION (See Note 1 & Note 1A)	7. VOLUME m ³ ft ³	8. WASTE AND CONTAINER WEIGHT kg lb	9. SURFACE RADIATION LEVEL mSv/hr mrem/hr	10. SURFACE CONTAMINATION MBq/100 cm ² dpm/100 cm ²		11. WASTE DESCRIPTION (See Note 2 and Note 2A)	12. APPROXIMATE WASTE VOLUME(S) IN CONTAINER m ³ ft ³	13. SOLIDIFICATION OR STABILIZATION MEDIA (See Note 3 and Note 3A)	14. CHEMICAL FORM/ CHELATING AGENT	WEIGHT % CHELATING AGENT IF > 0.1%	15. RADIOLOGICAL DESCRIPTION			16. WASTE CLASSIFICATION AS-Class A Stable AU-Class A Unstable B-Class B C-Class C	
				ALPHA	BETA-GAMMA				INDIVIDUAL RADIONUCLIDES AND ACTIVITY AND CONTAINER TOTAL OR CONTAINER TOTAL ACTIVITY AND RADIONUCLIDE PERCENT			RADIONUCLIDES	MBq	mCi		

FORM 541A (10-96)

BPF Radioactive Material Acceptance Criteria

FORM 542		ENERGYSOLUTIONS BARNWELL PROCESSING FACILITY		1. WASTE COLLECTOR/PROCESSOR				2. MANIFEST NUMBER								
UNIFORM LOW-LEVEL RADIOACTIVE WASTE MANIFEST				NAME		SHIPPER USE ONLY										
				B.C. RADIOACTIVE WASTE TRANSPORT PERMIT NUMBER												
				SHIPPING DATE												
MANIFEST INDEX AND REGIONAL COMPACT TABULATION List all original "PROCESSED Waste" generators (if any) before "COLLECTED WASTE" generators.								3. PAGE ___ OF ___ PAGE(S)								
4.	5.	6.	6A.	7.	8.	9.	10.	11. AS PROCESSED/COLLECTED TOTAL								
SC TRANSPORT PERMIT NUMBER	GENERATOR NAME AND TELEPHONE NUMBER	GENERATOR FACILITY ADDRESS	WASTE DESCRIPTION (NOMENCLATURE)	PREPROCESSED WASTE (OR MATERIAL) VOLUME	MANIFEST NUMBER (S) (UNDER WHICH WASTE (OR MATERIAL) RECEIVED AND DATE OF RECEIPT	WASTE CODE PURPOSED COLLECTED	ORIGINATING COMPACT REGION OR STATE	A. SOURCE MATERIAL		B. SNM	C. ACTIVITY		D. VOLUME		E. WEIGHT	F. MAXIMUM PACKAGE RADIATION LEVEL
				(m ³) (lb)				(a)	(b)	(g)	(Bq)	(mCi)	(m ³) (ft ³)	(lb)	(mrem/yr)	
TOTALS OF ALL PAGES (542 AND 542A)																N/A

FORM 542 A										ENERGYSOLUTIONS BARNWELL PROCESSING FACILITY				2. MANIFEST NUMBER			
UNIFORM LOW-LEVEL RADIOACTIVE WASTE MANIFEST																	
MANIFEST INDEX AND REGIONAL COMPACT TABULATION CONTINUATION												3. PAGE ____ OF ____ PAGE(S)					
4. SH TRNSPORT PERMIT NUMBER	5. GENERATOR NAME AND TELEPHONE NUMBER	6. GENERATOR FACILITY ADDRESS	7A. WASTE DESCRIPTION (NOMENCLATURE)	7. PREPROCESSED WASTE (OR MATERIAL) VOLUME		8. MANIFEST NUMBER (S) UNDER WHICH WASTE (OR MATERIAL) RECEIVED AND DATE OF RECEIPT	9. WASTE CODE PURCHASED/RECEIVED	10. ORIGINATING COMPACT REGION OR STATE	11. AS PROCESSED/COLLECTED TOTAL								
				(m ³)	(ft ³)				A. SOURCE MATERIAL		B. SNM	C. ACTIVITY		D. VOLUME		E. WEIGHT	F. MAXIMUM PACKAGE RADIATION LEVEL
									(Bq)	(B)	(g)	(MBq)	(mCi)	(m ³)	(ft ³)	(lb)	(mrem/hr)
		Robins AFB, Georgia 31098															
PAGE TOTALS																	

Form 542 A (10-96)

Attachment 5.3

**INSTRUCTIONS FOR COMPLETING THE BPF
UNIFORM LOW-LEVEL RADIOACTIVE WASTE MANIFEST FORMS**

Note: Shipments may be refused if contents, supporting documentation, packaging, and all other aspects of the shipment are not in compliance with EnergySolutions state licenses, the BPF Radioactive Material Acceptance Criteria (DF-AD-009), 49 Code of Federal Regulations, and 10 Code of Federal Regulations.

I) General Instructions for Completing Forms

1. Copies of the BPF Uniform Low-Level Radioactive Waste Manifest forms are available from the Licensing Department or the BPF General Manager. Computer generated versions of these forms may be acceptable, but must have approval prior to use.

Note: The uniform low-level radioactive waste manifest forms authorized for shipments to the BPF have been modified and are not identical to the NRC generic uniform low-level radioactive waste manifest forms. The NRC's generic uniform low-level waste manifest forms may not be used for shipments of radioactive waste to the BPF.

2. These specific instructions for completing the Uniform Low-Level Radioactive Waste Manifest must be strictly adhered to. Any deviations from these instructions must be approved by the Licensing Department. Additional pertinent information may be included if desired, but must be presented in a manner fully compliant with applicable regulations, licenses, and the BPF Radioactive Material Acceptance Criteria (DF-AD-009).
3. Unless otherwise specified, all blanks must be filled. If a blank is not to be used, the abbreviation "NA" (not applicable) may be used. In some cases, the abbreviation NP (not present) may be used (if specified in these instructions).
4. Forms should be completed in permanent dark blue or black ink. Manual printing, typing or electronic printer may be used.
5. Continuation lines may be used for redundant entries.
6. For any numerical entry that is < 1.0 , use a 0 (zero) prior to the decimal place. For example 0.8.

BPF Radioactive Material Acceptance Criteria

7. In general, SI units are the standard unit used on the manifest. Unless specifically instructed otherwise, SI units must be recorded followed by the conventional unit. Measurement units must be indicated for all values recorded. For example, the authorized SI unit for activity used in the manifest is the Megabecquerel and the conventional unit is the millicurie. An activity of 1,000 millicuries would be recorded as: 37000 in the MBq column and 1000 in the mCi column.

Note: Units of measurement are provided in column headings (or row headings) and need not be recorded after each numerical entry. Only those units specified on forms and in these instructions may be used. The use of parenthesis is reserved for certain key entries on these manifest forms. The use of parenthesis for the purpose of indicating a measure in conventional units is not authorized.

8. The use of scientific notation is authorized.
9. The instructions for completing continuation pages (540A, 541A, 542A) are identical to the corresponding items for the associated form.
10. All forms are in triplicate. The first copy is the consignee's original copy, the second copy is the consignor's copy, and the third copy is for reproduction as necessary.
11. The following table provides the standard SI units and the standard conventional units to be used in completing these forms. Approved conversion values are provided.

Measurement	Conventional Unit	SI Unit	Conversion
Activity	millicurie (mCi)	Megabecquerel (MBq)	1 mCi = 37 MBq
Radiation Level	millirem/hour (mrem/hr)	millisieverts/hour (mSv/hr)	1 mrem/hr = 0.01 mSv/hr
Contamination Level	disintegration per minute per 100 square centimeters (dpm/100 cm ²)	Megabecquerels per 100 square centimeters (MBq/100 cm ²)	1 dpm/100 cm ² = 1.67E ⁻⁸ MBq/100 cm ²
Mass or weight	pound (lb)	Kilogram (kg)	1 lb = 0.4535924 kg
Source Material	pound (lb)	Kilogram (kg)	1 lb = 0.4535924 kg
SNM Grams	NA	grams (g)	N/A
Volume	Cubic Foot (ft ³)	Cubic Meter (m ³)	1 ft ³ = 0.02831685 m ³

BPF Radioactive Material Acceptance Criteria

- 1) Form 540 must be completed for all shipments.
- 2) The purpose of this form is to meet the DOT's shipping paper requirements. In addition to the specific instructions listed below, the shipper must ensure full compliance with all applicable requirements of 49 Code of Federal Regulations (transportation).

Item Number	Detailed Instructions
1	<p>Record the emergency response telephone number or numbers for use in the event of an emergency.</p> <p>Record the name of the organization (or individual) providing the emergency response information as required by the DOT.</p>
2	Mark the appropriate box "yes" or "no".
3	<p>Record the total number of DOT packages in the shipment.</p> <p>Note: In the case of waste packages shipped inside a larger package, (for example 55 gallon drums contained in a shipping cask - with the cask acting as the "dot" package), Item 3's entry is the total number of "dot" packages. In the case of a cask used as the dot shipping package - it would be "1".</p>
4	<p>Mark the appropriate box "yes" or "no".</p> <p>Record the EPA Manifest number, if applicable.</p> <p>Note: The BPF does not accept mixed or hazardous waste. For additional information, refer to the BPF Radioactive Material Acceptance Criteria (DF-AD-009)</p>
5	<p>Record the following information:</p> <p>Shipper's Company Name / Facility Name / Facility Address</p> <p>SC Transport Permit Number: Record the State of South Carolina Radioactive Waste Transport Permit Number.</p> <p>Shipment Number: Record a unique number assigned by the Shipper to this shipment for tracking purpose.</p> <p>Contact / Telephone Number: The name and phone number of a responsible representative of the shipper's organization who can answer detailed questions concerning the shipment.</p> <p>Shipment ID Number or Shipper ID Number (SN): The Unique BPF Shipment ID Number assigned to this shipment by the Licensing Department.</p> <p>Collector/ Processor / Generator: Record an "X" or "✓" in the appropriate box.</p> <p>Generators must record one of the following codes in the "Generator Type" item:</p> <p>A = University (academic)</p> <p>FC = Fuel Cycle Industry</p> <p>G = Government</p> <p>I = Industrial</p> <p>M = Medical</p> <p>NP = Nuclear Power</p> <p>O = Other</p>

6	<p>Record the following:</p> <p>Carrier's Company Name</p> <p>Carrier's Company Address</p> <p>EPA ID Number: Record the carrier's EPA ID number if applicable.</p> <p>Shipping Date: Record the date that the shipment is released to the carrier for transport.</p> <p>Contact / Telephone Number: The name and phone number of a responsible representative of the carrier's organization who can answer detailed questions concerning the shipment.</p> <p>Signature / Date: The signature of an authorized representative of the carrier acknowledging receipt of the waste for the shipment. Record the date that the carrier's signature is affixed. (Signature not required for non-exclusive use shipments)</p>
7	Record the number of pages of each set of forms (i.e., number of 540/540A's, 541/541A's, and 542/542A's). Also, record the number of other pages of additional information. If there are no pages of a given form record "None".
8	Record a unique traceable number comprised of at least four number/letter characters assigned by the shipper. This number should be used on all continuation pages. It is preferred that the shipper use the same number recorded in Item 5 for "shipment number".
9	<p>Record the following:</p> <p>EnergySolutions Barnwell Processing Facility</p> <p>16043 Dunbarton Blvd. Hwy 64 (1 mile west of Snelling)</p> <p>Barnwell, South Carolina 29812 Barnwell, South Carolina 29812</p> <p>is also approved</p> <p>Contact: Inventory Control</p> <p>Telephone Number: (803) 259-1781</p> <p>Signature / Date: Leave blank for the consignee to complete.</p>
10	The signature of the shipper or authorized representative.
11	Record the DOT's Basic Shipping Description (UN ID number, PSN, Hazard Class, and if applicable, packing group) for each package. Record any needed additional information as required by 49 Code of Federal Regulations. If the material is a reportable quantity - record RQ as appropriate. If the material is fissile excepted, record Fissile Excepted as appropriate.
12	<p>Record the type of radioactive label that appears on the package.</p> <p>"White I" = White One Label</p> <p>"Yellow II" = Yellow Two Label</p> <p>"Yellow III" = Yellow Three Label</p> <p>"NA" = If no label is required</p> <p>For other hazard class labels: Write out the Hazard Class Name, for example, Oxidizer.</p> <p>Note: Do not record radioactive-LSA or radioactive-SCO in this blank.</p>
13	<p>Record the package TI.</p> <p>If the TI is not required for the package, record "NA".</p>

14	<p>Record the physical form: “Solid”, “Liquid”, or “Gas” as appropriate</p> <p>Record the predominant chemical form: for example “oxides”.</p> <p>Note: The BPF accepts liquids in accordance with the BPF Radioactive Material Acceptance Criteria (DF-AD-009).</p>
15	<p>List nuclides in the shipping package in accordance with 49 CFR. Separate multiple nuclides with a space or semicolon. DOT approved abbreviations are authorized.</p>
16	<p>Record the total package activity in appropriate SI units followed by appropriate conventional units. Use the SI unit Megabecquerel and the conventional unit millicurie. For example, 10,000 mCi of activity would be recorded as: 370000 MBq; (10000 mCi).</p>
17	<p>For a shipment of LSA or SCO, record the correct group notation for example LSA-I, II, III or SCO-I, II). If the material is not LSA or SCO, record “NA”.</p>
18	<p>Record the total package weight or volume with appropriate units. You may choose either of two options in completing this item:</p> <p>Use conventional units</p> <p>Use SI units followed by conventional units</p> <p>Example: 2.2 pounds of waste could either be recorded as 2.2 lb, or if using SI units it would be recorded as 1.0 kg; 2.2 lb.</p>
19	<p>Record the unique number for each package in the shipment assigned by the shipper. This number should be recorded on the manifest and also marked on the package exterior.</p> <p>When shipping a licensed cask, record the Certificate of Compliance Number and the model/serial number. For example; USA/9168/B(U)-96 8-120B-1</p>
20	<p>South Carolina Certification Statement: Record the date, signature of the shipper or authorized representative, title and organization, and telephone number.</p>

B) Form 541, Container and Waste Description:

1. The Form 541 is required for all shipments.
2. The purpose of this form is to record the waste data that is required by 10 CFR 20, 10 CFR 61, State Licenses, and the BPF Radioactive Material Acceptance Criteria (DF-AD-009).
3. When recording the weight of SNM nuclides the unit of grams (g) is used and it is not necessary to record the number in conventional units.
4. Exercise caution when choosing the codes found in the notes on the bottom of Form 541. Consult the BPF License and BPF Acceptance Criteria for further guidance or contact the Licensing Department or BPF General Manager.

Item Number	Detailed Instructions
1	<p>Record the total number of Packages/Disposal Containers. This may be a different number than recorded on the Form 540, Item 3, when multiple disposal packages are contained within a single DOT package. For example, if multiple waste drums are shipped within an approved shipping cask (using the cask as the DOT package) the correct number for this item is the number of waste drums.</p> <p>Record the total net waste volume in cubic meters and cubic feet. For example, 7.5 ft³ of waste would be recorded as: 0.2124 m³ 7.5 ft³</p> <p>Record the total net waste weight in kilograms and pounds. For example, 500 pounds of waste would be recorded as: 226.8 kg 500.0 lb.</p> <p>Special Nuclear Material Entries:</p> <p>Record the weight in grams for U-233, U-235, and Pu. Record the total number of packages that contain each quantity of SNM in the same item with the SNM grams for that isotope. For example, a total 1.0 gram of U-233 shipped in four different packages would be recorded as: 1.0 g (4 pkg.). Include the unit “g” in the entry. The abbreviation pkg. may be used for package. NP may be used for Not Present.</p> <p>Record the grand total of the SNM (U-233, U-235, and Pu). Include the unit “g” in the entry.</p>

Item Number	Detailed Instructions
1 (cont'd)	<p>All Nuclides Entry: Record the total activity of all nuclides in Megabecquerels and in millicuries. For example: 50,000 Curies would be recorded as: 1.85E9 MBq; 5E⁷ mCi. Radionuclides below LLD should not be included.</p> <p>Tritium, C¹⁴, Tc⁹⁹, and I¹²⁹ Entries: Record the activity of Tritium, C¹⁴, Tc⁹⁹, and I¹²⁹ in Megabecquerels and in millicuries. For example: 5 millicuries of C¹⁴ would be recorded as: 185.0 MBq; 5.0 mCi. If the radionuclide is not present in the shipment record "NP" for not present. If the radionuclides are present in any of the containers within a shipment, but are identified in item 15 in quantities below the lower limit of detection (LLD), the quantities of these nuclides must be recorded as the sum of the respective LLD values. Place this summed value in parenthesis. For example: if one of the radionuclides was <LLD and had a summed LLD value of 1E⁻¹⁰ millicuries, this would be recorded as (3.7E⁻⁹ MBq; 1E⁻¹⁰ mCi) If both detectable and LLD based quantities of these radionuclides exist in containers making up the shipment, the sum of the detectable and "LLD-based" values must be reported separately, with the latter in parenthesis. For example, if C¹⁴ levels in some containers were <LLD and is summed up to be 1E⁻¹⁰ millicuries, while some other containers had detectable C¹⁴ at 0.5 millicuries, the entry would be: 18.5 MBq; 0.5 mCi (3.7E⁻⁹ MBq; 1E⁻¹⁰ mCi).</p> <p>Source Pound Entries: Record the total source weight in Kilograms (kg) and pounds (lb). For example, if 100 pounds of source material was being shipped this entry would be: 45.36 kg; 100.0 lb.</p>
2	Transfer the manifest number from Form 540, Item 8.
3	Record the total number of Form 541 or 541A pages.
4	Transfer shipper's name and Shipment Order Number from Form 540, Item 5.
5	<p>Record a unique container identification number. This entry is assigned by the shipper and may be alpha-numeric.</p> <p>Note: Each container number on a shipment must be unique.</p> <p>Record the unique State of South Carolina's Radioactive Waste Transport Permit number of the generator(s) contributing waste to a container.</p> <p>Note: Only one generator and one waste form may be listed per row. Items 5-10 & 16 data represents the total disposal container, while Items 11-15 are on a per generator and per waste form basis.</p> <p>Note: Generators with multiple facility locations utilizing the same SC transport permit number must indicate the facility address in this block also.</p>
6	<p>Using the codes found in Note 1 and Note 1A on the bottom of the Form 541, record the type of disposal container. Choose only one code from Note 1 and only one code from Note 1A. For example, a Poly HIC would be assigned the code 13A.</p> <p>When Code 13 (High Integrity Container) is used, identify the manufacturer, the model number, serial number, and the Certificate of Compliance number for the container.</p> <p>When Code 19 (other) is used, describe the container in Item 6. If necessary to adequately describe the container, the entry "see additional page" may be recorded in this item. The container should then be described on the additional page and that page count recorded on the Form 540, Item 7.</p>

Item Number	Detailed Instructions
7	Record the waste container volume using the SI unit cubic meter (m ³) and the conventional unit cubic feet (ft ³). For example, a 300 ft ³ waste container would be recorded as: 8.495 m ³ ; 300 ft ³
8	List the weight of the waste plus disposal container in the SI unit kilograms (kg) and the conventional unit pounds (lb). For example, a 5,000 pound package would be recorded as 2270 kg; 5000 lb.
9	Record the highest radiation level on contact with the container in SI units of millisieverts (mSv/hr) and conventional units of millirem (mrem/hr). For example, a package that has a maximum radiation reading of 195 mrem/hr would be recorded as: 1.95 mSv/hr; 195 mrem/hr.
10	Record the highest contamination levels anticipated on the exterior of the disposal container in the SI unit of Megabecquerel per 100 square centimeters (MBq/100 cm ²) and the conventional units of disintegration per minute per 100 square centimeters (dpm/100 cm ²). For example: Contamination levels of 100 dpm/100 cm ² would be recorded as 1.67E-6 MBq/100 cm ² ; 100 dpm/100 cm ² . Do not use BKG for background unless the level is recorded also.
11	<p>Using the codes found in Note 2 and Note 2A at the bottom of the Form 541, record the codes that most specifically describe the type of waste in the container. Choose up to three Note 2 codes, which predominate by volume. Choose all Note 2A codes that are applicable. For example, a dewatered mixed-resin waste might be assigned the codes 32, G, H, and I depending on the unique characteristics of the waste.</p> <p>For different waste forms contained in the same container, the codes should be associated with the rest of the description required in items 12-15 for each listed waste form.</p> <p>If code 59, other, is used, a written explanation is required. This additional explanation may be recorded in Item 11 or the entry "see additional page" may be recorded and an additional page attached. The additional page must be included in the Form 540 Item 7 page counts.</p>
12	Record the volume in the SI unit of cubic meters and the conventional unit of cubic feet of the waste per generator and per waste form.
13	<p>Using the codes found in Note 3 and Note 3A on the bottom of Form 541, record the codes that apply. In addition, the media vendor and brand name must be recorded in this column as well.</p> <p>If the media is intended to provide stability for the waste in accordance with 10CFR61, State, and Facility requirements, the entry "-S" must be recorded following the appropriate code.</p> <p>If code 99, other, is used a written explanation is required. . This additional explanation may be recorded in Item 13 or the entry "see additional page" may be recorded and an additional page attached. The additional page must be included in the Form 540 Item 7 page counts.</p>

Item Number	Detailed Instructions
14	<p>List the most prevalent chemical form of the waste.</p> <p>Information in Item 14 should expand upon the entry on the Form 540, Item 14. Record significant chemicals like lime if used.</p> <p>Record the name of chelating agents that are present in amounts greater than 0.1% by weight of the waste. In the associated column, record the weight % of the chelating agent if >0.1%. If no chelating agents are present record "NP" for not present. If large processes using chelating agents were used record the process name. Use additional sheets as needed. Record the additional page counts on the Form 540, Item 7.</p>
15	<p>List all significant radionuclides (approved abbreviations are authorized) and the nuclide's activity in Megabecquerels followed by the Millicurie value. For example:</p> <p>1.0 mCi of Cs¹³⁷ would be recorded as follows: Cs¹³⁷ 37 MBq; 1.0 mCi.</p> <p>If the waste in the container is from multiple generators or is of multiple waste forms, the radionuclides must be broken down to the corresponding generator and waste form.</p> <p>When the radionuclides tritium (H-3), C-14, Tc-99, or I-129 are present, but the quantities are below the LLD, note the radionuclide and report the LLD value in parentheses. After listing the individual radionuclides as described above, enter the word "Total" on a new line and enter the total activity contained in the container. However, if any LLD values were included in the container, these values should not be included in the container sum because they will be totaled separately under Item 1.</p> <p>After listing all the package's radionuclides as described above, record the word "Total" on a new line and record the total activity in the package.</p> <p>Note: The activity for uranium and thorium in source material and U-233, U-235, and plutonium in special nuclear material must be reported in megabecquerels. The quantity of these isotopes must be reported, in pounds and kilograms for source material -- including the abbreviation "kg" and "lbs", and in grams for special nuclear material -- including the abbreviation "g". The weight quantities must be reported in brackets, either adjacent to the activity listing or below the radionuclide listing.</p>
16	<p>Record the waste classification and the stability of the waste using the appropriate code provided in Item 16. The waste class marking is not required to be recorded for Thermex or High Activity Filter Shredding Shipments. Shipper should enter N/A.</p>

C) Form 542 - Manifest Index and Regional Compact Tabulation

1. Form 542 is required for all waste shipments that are processed or collected.

Item Number	Detailed Instructions
1	Record the collector or processor's name. Record the collector or processor's SC Radioactive Waste Transport Permit Number. Record the shipping date.
2	Transfer the manifest number from the Form 540, Item 8.
3	Record the total number of 542 and 542A pages.
4	<p>In each row, record one generator's South Carolina Waste Transport Permit Number and one waste form.</p> <p>Use as many rows as is needed to uniquely record each waste form that the generator is shipping. For each waste form entry, record all entries as required in Form 542 columns 5-11F.</p> <p>Ensure that all generators whose waste is being shipped are represented.</p>
5	Record the generator name and telephone number.
6	Record the complete address of the generator's facility.
6A	Record the waste form nomenclature. For example; dewatered resin, sources, dry activated waste, etc.
7	Record the approximate volume in cubic meters followed by the cubic feet (not including the container) of the preprocessed waste. For example, a waste that was 96 ft ³ prior to processing would be recorded as: 2.72 m ³ ; 96 ft ³ .
8	<p>List the previous manifest number(s) applicable to the waste that has been attributed to the generator listed in Item 5.</p> <p>Record the date(s) of waste receipt by the shipper identified on Form 540, Item 5.</p>
9	Record the proper waste code, "p" or "c" using the definitions of waste processor and waste collector in Appendix G of 10 CFR Part 20. Do not mix processed and collected waste on the same line, list separately.
10	Identify the originating Compact Region or State of the original generator of the waste. Standard state abbreviations may be used.

11	<p>For each original generator and waste form listed in Item 5, list the total source material in kilograms and in pounds.</p> <p>For each original generator and waste form listed in Item 5, list the total special nuclear material in grams.</p> <p>For each original generator and waste form listed in Item 5, list the total activity attributed to the generator in Megabecquerels and in Millicuries.</p> <p>For each original generator and waste form listed in Item 5, list the volume attributed to the generator in cubic meters and in cubic feet.</p> <p>For each original generator and waste form listed in Item 5, list the weight attributed to the generator in pounds. (SI units are not required for this entry.)</p> <p>For each original generator and waste form listed in Item 5, list the maximum on-contact radiation level for the package that this waste is packaged in. Record in units of millirem per hour. (SI units are not required for this entry.)</p> <p>Record the totals for columns 11A-11E for each generator by drawing a horizontal line below the last entry for the generator and entering the generators column totals.</p> <p>Record the overall column totals at the bottom of the Form 542.</p>
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