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Procedure Contains NMM ECH eB REFLIB Forms: YES <input checked="" type="checkbox"/> NO <input type="checkbox"/>
Procedure Revision Type: New <input type="checkbox"/> NON-Editorial <input checked="" type="checkbox"/> Editorial <input type="checkbox"/> TC <input type="checkbox"/> Cancellation <input type="checkbox"/>

HQN Effective Date 10/15/15	Procedure Owner: Title: Site:	Frank Mitchell Manager, RP IPEC	Governance Owner: Title: Site:	Reid Tagliamonte Manager, Fleet RP HQN
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For site implementation dates see ECH eB REFLIB using site tree view (Navigation panel).

<u>Site and NMM Procedures Canceled or Superseded By This Revision</u> None
<u>Process Applicability Exclusion:</u> All Sites: <input type="checkbox"/> Specific Sites: ANO <input type="checkbox"/> BRP <input type="checkbox"/> CNS <input type="checkbox"/> GGNS <input checked="" type="checkbox"/> IPEC <input checked="" type="checkbox"/> JAF <input type="checkbox"/> PLP <input checked="" type="checkbox"/> PNPS <input checked="" type="checkbox"/> RBS <input type="checkbox"/> VY <input type="checkbox"/> W3 <input type="checkbox"/>

<u>Change Statement</u> The primary purpose of this revision is to issue identified in CR-HQN-2015-00751 regarding notification of Reactor Engineering of non-waste shipments containing SNM.	
<ul style="list-style-type: none"> • Attachments 9.2, 9.3, 9.4, 9.5, 9.6, 9.7, 9.8, 9.9: replaced "NRC form 540/541" with "the manifest" • Updated section 8 with information provided by the GGNS Commitment Review • Added missing document numbers for W3 and RBS entries in section 8. • Added commitment number for GGNS entry in section 8 regarding GNRI-92/00195 • Deleted W3 commitment P-11757 from section 8 per W3 Commitment Review response. 	
Associated PRHQN #: 2015-00363	Procedure Writer: Ron Schwartz
Contains Proprietary Information: YES <input type="checkbox"/> NO <input checked="" type="checkbox"/>	

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1.0 PURPOSE

The purpose of this procedure is to provide guidance for shipping radioactive material or waste in accordance with applicable regulations. No required Technical Specification surveillances or non air international shipments are covered in this procedure.

2.0 REFERENCES

- [1] Code Of Federal Regulations, Title 10, Parts 20, 30, 61 & 71
- [2] Code Of Federal Regulations, Title 40, Parts 240-246
- [3] Code Of Federal Regulations, Title 49, Parts 107-178 & 393
- [4] International Air Transportation Association (IATA) Dangerous Goods Regulation
- [5] Regulations For Radioactive Waste Transportation, Mississippi Code Of 1972; Section 45-14-67, Mississippi Radioactive Waste Transportation Act, Latest Revision - Mississippi Emergency Management Agency (MEMA)
- [6] Branch Technical Position On Radioactive Waste Form, Classification, Concentration Averaging, And Encapsulation
- [7] NRC I.E. Notice 79-19, Packaging of Low-Level Radioactive Waste for Transport and Burial
- [8] Energy Solutions Inc. State of Utah Radioactive Material License, UT2300249, Latest Revision
- [9] Energy Solutions Inc. Containerized Waste Facility (CWF) Waste Acceptance Criteria (WAC), TSC-2, Latest Revision
- [10] WMG/P-045, RADMAN Software & WMG/P-009, RAMSHP Software
- [11] NRC Generic Letter 91-02
- [12] NuReg 1608
- [13] 25 Texas Administrative Code §289.252 "Licensing of Radioactive Material" and §289.257 "Packaging and Transportation of Radioactive Material"
- [14] 10 CFR Part 37, "Physical Protection of Category 1 and Category 2 Quantities of Radioactive Material"
- [15] INPO Event Report Level 2 11-1, "Inadequate Collective Radiation Exposure Performance Improvements"

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3.0 DEFINITIONS

- [1] Transportation definitions are found in 49CFR173.403 and 49CFR171.8.
[GGNS P-18744]
- [2] Validation – an independent review of the package characterization using the Radwaste Shipping Computer Program.
- [3] Bulk packaging means a packaging, other than a vessel or a barge, including a transport vehicle or freight container, in which hazardous materials are loaded with no intermediate form of containment. A Large Packaging in which hazardous materials are loaded with an intermediate form of containment, such as one or more articles or inner packagings, is also a bulk packaging. Additionally, a bulk packaging has:
 - (a) a maximum capacity greater than 450 L (119 gallons) as a receptacle for a liquid;
 - (b) a maximum net mass greater than 400 kg (882 pounds) and a maximum capacity greater than 450 L (119 gallons) as a receptacle for a solid; or
 - (c) a water capacity greater than 454 kg (1000 pounds) as a receptacle for a gas as defined in §173.115.
- [4] Freight container means a reusable container having a volume of 64 cubic feet or more, designed and constructed to permit being lifted with its contents intact and intended primarily for containment of packages (in unit form) during transportation.

4.0 RESPONSIBILITIES

- [1] The RPM Peer Group is responsible for the implementation of this procedure and must approve any changes or revisions to this procedure.
- [2] Each site Senior Nuclear Executive (SNE) is responsible for ensuring that necessary site staff implements this procedure.
- [3] The Low Level Radwaste (LLRW) Focus Group is responsible for evaluating and recommending changes and revisions to this procedure.

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- [4] The Requestor (the individual requesting shipment of radioactive material from site) is responsible for informing the Radwaste Shipper (SHIPPING SUPERVISOR), to ensure proper radioactive material shipping classification and required supporting documentation be generated. The SHIPPING SUPERVISOR SHALL ensure all aspects of this procedure, applicable DOT, NRC, and burial site requirements are complied with, which includes:
- (a) Assign a Radiation Protection technician to perform tasks delineated in this procedure.
 - (b) Inform the Reactor Engineering Manager should any fissile materials need to be shipped.
- [5] The person designated & qualified to complete shipments (normally the RP specialist) is responsible for completing the shipment in accordance with this procedure and all state and federal regulations.

5.0 DETAILS

5.1 PRECAUTIONS AND LIMITATIONS

- [1] The provisions within 49CFR173.436 are not to be used, unless approved by the Radiation Protection Manager (RPM) or designee.
- [2] Evaluate material for Category 1 and 2 Quantities of Radioactive Material in accordance with EN-RW-106, "Integrated Transportation Security Plan," **AND** ensure all security issues have been satisfied in accordance with EN-RW-106.
- [3] Category 1 and 2 Quantities of Radioactive Material require significant lead time (at least 2 weeks) due to additional requirements for the physical protection of Category 1 and 2 Quantities of Radioactive Material. Refer to 10 CFR Part 37 **AND** EN-RW-106 for further details.
- [4] The following is applicable to specification packages above the general design packaging. Ensure non-waste shipments containing liquid material contains an inner lining **OR** enough absorbent material to absorb at least two times the volume of liquid in the shipment or so to contain liquid within an over-pack or other containment device, should leakage occur. See 49CFR173.412(k)
- [5] Sources to be shipped need to be checked to see if they fall under the requirements of the National Source Tracking System in 10 CFR 20.2207. **IF** the source meets the activity limits of Appendix E of 10 CFR 20, **THEN** ensure a transaction report is completed, using NRC Form 748 (or equivalent).

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- [6] A receipt copy of the Radioactive Shipment Manifest from the burial site or waste processor shall be received within 20 days of shipment departure, confirming waste shipment delivery.
- [7] **IF** receipt copy of the Radioactive Shipment Manifest is not received from the burial site or waste processor, **THEN** an investigation shall be initiated to locate the shipment [10 CFR 20, appendix G]. This investigation shall include tracing the shipment and filing a written report with the NRC regional office within two weeks of the completion of the investigation.
- [8] As required by NRC Generic Letter 91 02, a report to the NRC's Director of the Division of Low Level Waste Management and Decommissioning **AND** to the designated State disposal site regulatory authority is required **IF** any of the following conditions result from handling of radwaste. The report shall be prepared and mailed within 30 days of the incident
- (a) The failure of high integrity containers used to ensure a stable waste form. Container failure can be evidenced by changed container dimensions, cracking, or damage resulting from mishandling (e.g., dropping or impacting against another object).
 - (b) The misuse of high integrity containers, evidenced by a quantity of free liquid greater than 1 percent of container volume, or by an excessive void space within the container. Such misuse is prohibited by 10 CFR 61.56.
 - (c) The production of a solidified Class B or C waste form that has any of the following characteristics:
 - Contains free liquid in quantities exceeding 0.5 percent of the volume of the waste
 - Contains waste with radionuclides in concentrations exceeding those considered during waste form qualification testing accepted by the regulatory agency, which could lead to errors in assessment of waste class
 - Contains a significantly different waste loading than that used in qualification testing accepted by the regulatory agency
 - Contains chemical ingredients not present in qualification testing accepted by the regulatory agency, **AND** those quantities are sufficient to unacceptably degrade the waste product.

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- Shows instability evidenced by crumbling, cracking, voids, softening, disintegration, non-homogeneity, or dimensional changes
- Evidence of processing phenomena that exceed the limiting processing conditions identified in applicable topical reports on process control plans, e.g., foaming, temperature extremes, premature or slow hardening, and production of volatile material

[9] For an outgoing shipment, the 10 CFR 20 postings shall be removed prior to the vehicle leaving site.

[10] High Risk Shipments - When preparing shipments that contain tools and equipment that may have been subjected to discrete radioactive particle (DRP) contamination, site is to utilize as many of the following actions to ensure compliance with 49CFR173.441

- Validate personnel who package the material have had appropriate function specific training (on-site or vendor) to load radioactive packages that may contain DRP contamination.
- Use an enclosed transport vehicle or overpack to provide a greater margin associated with contact dose rates on the container. (When any package on a conveyance exceeds 160 mR/hr contact, RPM approval is needed for shipment without use of an enclosed transport vehicle or over pack). This approval must be documented on the appropriate radiological survey form. (See additional survey requirements in step 5.2[17] when dose rates exceed eighty percent administrative limit.)
- Sealing of equipment with appropriate wrapping material to prevent migration of residual DRPs
- Hydrolazing the equipment prior to removal from pool for packaging
- Use of a robust/shielded container to preclude the adverse effects associated with Discrete Hot Radioactive Particle migration during transport
- Use of fixatives such as a strippable or dissolvable coating to positively entrain and affix DRPs
- IF** particles are suspected, **THEN** consider disassembling the equipment for inspection

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- [11] For shipments that contain resin **OR** other known or suspected methane-producing waste, an explosive gas test may be required in accordance with the applicable cask Certificate of Compliance.
- [12] For shipments of material that exceed 1 R/hr at three meters from the unshielded material, the material must be packaged in an NRC approved Type B package, and the Proper Shipping Name will be “UN 3329, Radioactive material, Type B(M) package, fissile”, “UN 2917, Radioactive material, Type B(M) package non fissile or fissile-excepted”, “UN 3328, Radioactive material, Type B(U) package, fissile”, **OR** “UN 2916, Radioactive material, Type B(U) package non fissile or fissile-excepted”. The material IS no longer “LSA” or “SCO”.
- [13] **[For GGNS Only]** Any Grand Gulf contracts written for the free release of radioactive material must include the requirement that any material not free released must be returned to the site for final disposition.

5.2 GENERAL REQUIREMENTS

- [1] As a prerequisite to loading any shipment as exclusive use ensure the transport vehicle has been radiologically surveyed IAW 49 CFR 173.443 (c).
- [2] Flowchart steps may be performed non-sequentially provided the applicable regulations are satisfied prior to shipment. All regulatory requirements are met prior to using a specification packaging for transporting radioactive material.
- [3] Ensure lifting devices are inspected prior to use and /or annually by qualified personnel. ALARA considerations may limit inspection (camera usage is an available option).
- [4] The requirements of 49CFR173.410 through 417, 10CFR71 & applicable NRC Certificates of Compliance for each specification packaging are met and/or verified prior to loading and transport radioactive material/waste in them.
[GGNS P-18754,18756,32586,32606]
- [5] All applicable shipper permits for the appropriate states and regulatory bodies have been obtained (this list may not be all inclusive).
 - (a) Mississippi Emergency Management Agency (MEMA) Waste Transport Permit (as required)
 - (b) Department of Transportation Hazardous Material Certificate of Registration
 - (c) Tennessee Waste Delivery Permit

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- (d) Utah Waste Permit
- (e) Notifications per EN-RW-106 for Category 1 Quantities of Radioactive Material
- [6] Notify Reactor Engineering for initiation of a Special Nuclear Material accounting record prior to shipment of any quantity of U-233, U-235 or plutonium as required by 10CFR74.19.
- [7] Verify DOE/NRC Form 741 evaluation has been completed by Reactor Engineering prior to shipment of one gram or more of U-233, U-235, or Plutonium as required by 10CFR74.15. 49CFR173.434 can be used in the calculation of activity-mass relationship for uranium and natural thorium.
- [8] All applicable state, federal, burial site and processor notifications are made.
- [9] WMG Software or equivalent computer software is available.
- [10] All personnel working under this procedure are trained to the specific level required in 49CFR172.700 Subpart H, I.E. Notice 79-19, applicable computer software training & 40CFR262 (when applicable). [W3 P-11759], [RB P-14510]
- [11] **WHEN** utilizing transport casks as a specification package, **THEN** handle in accordance with the respective vendor manual and/or Certificate of Compliance. A site procedure may be used in lieu of the vendor manual, **IF** qualified by the appropriate site group and management.
 - (a) Complete applicable cask user's check off sheet – perform step validation (verify that the container procedure steps that implement the Certificate of Compliance implementing requirements has a second verification step performed) as a part of vendor oversight when shipment is made by the appropriate Certificate of Compliance.
 - (b) Procedures or instructions needed to safely open the cask/package are to be sent to the consignee or verified that possession exists.
 - (c) The transport cask may be used as a general design package versus its approved specification level (e.g. Industrial Package II, Type A, Type B).
- [12] Document compliance with applicable regulations by using the appropriate checklists (Category 1 and 2 Quantities of Radioactive Material have additional checklists in EN-RW-106). The level of review and validation of shipping paperwork is performed by personnel trained per Step 5.2[10]. Shipments that require placarding are reviewed prior to the departure of the conveyance from the site.

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- [13] Radioactive material **AND** waste loaded into packages must meet appropriate requirements of 10CFR71.87, 49CFR173.410-417, 49CFR173.475, 49CFR173.24, 24a, 24b & 25a. [GGNS P-18738,18741,18742,18743]
- [14] Specification communications (Shipment documentation, Marking, Labeling, Placarding, and Emergency Response) are to be completed in accordance with appropriate sections of 49CFR172 Non-specification markings are to be applied in accordance with designated reference document (i.e. burial site waste class, Radioactive-LSA, Radioactive-SCO & Radioactive / UN ID number on appropriate excepted packages for limited quantities).
- (a) Specification Marking is to be completed in accordance with 49CFR172.300-338. IF an overpack is used to consolidate radioactive packages, THEN compliance with 49CFR173.448(g) is required. IF a sunscreen or personnel barrier is being used over a specification package, THEN the package itself is required to have the UN ID number markings applied directly to the package surface as well as the sunscreen or personnel barrier.
 - (b) Specification Labeling is to be completed in accordance with 49 CFR 172.400-450

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5.2[14] continued

- (c) Placarding is to be completed in accordance with 49CFR172.500-560. Use the following table for guidance on Placarding requirements.

Packaging Type	Placards on Package	Placards on Vehicle	Reference
Non – Bulk	None	4 Placards	172.504: 172.516: 173.427(a)(6)(v)
Bulk < 640 ft ³ (non-freight container)	4 Placards	4 Placards	172.504: 172.514: 173.427(a)(6)(v)
	2 Placards	4 Placards	172.504: 172.514(c)
	2 Labels	4 Placards	172.504: 172.514(c)
Bulk ≥640 ft ³ (non-freight container)	4 Placards	4 Placards	172.504: 172.514(a): 173.427(a)(6)(v)
Freight Container <640 ft ³	4 Placards	None if visible *	172.504: 172.516(a)
	2 Placards	4 Placards	172.504: 172.514(c)
	2 Labels	4 Placards	172.504: 172.514(c)
Freight Container ≥ 640 ft ³	4 Placards	None if visible *	172.504: 172.512(a): 172.516(a)
* If not visible, then 4 Placards are required on the transport vehicle (there is no prescribed preference for application of the placarding requirements)			

- (d) Emergency Response Information is completed in accordance with 172.600 – 606, and consists of documented emergency response information provided with the shipping papers, and an emergency response telephone number that is monitored at all times the hazardous material is in transportation. The requirement for a monitored phone line may be met either on site (ie. Control room), or by a contracted agency or organization such as Chem-trec.
[GGNS P-24924]

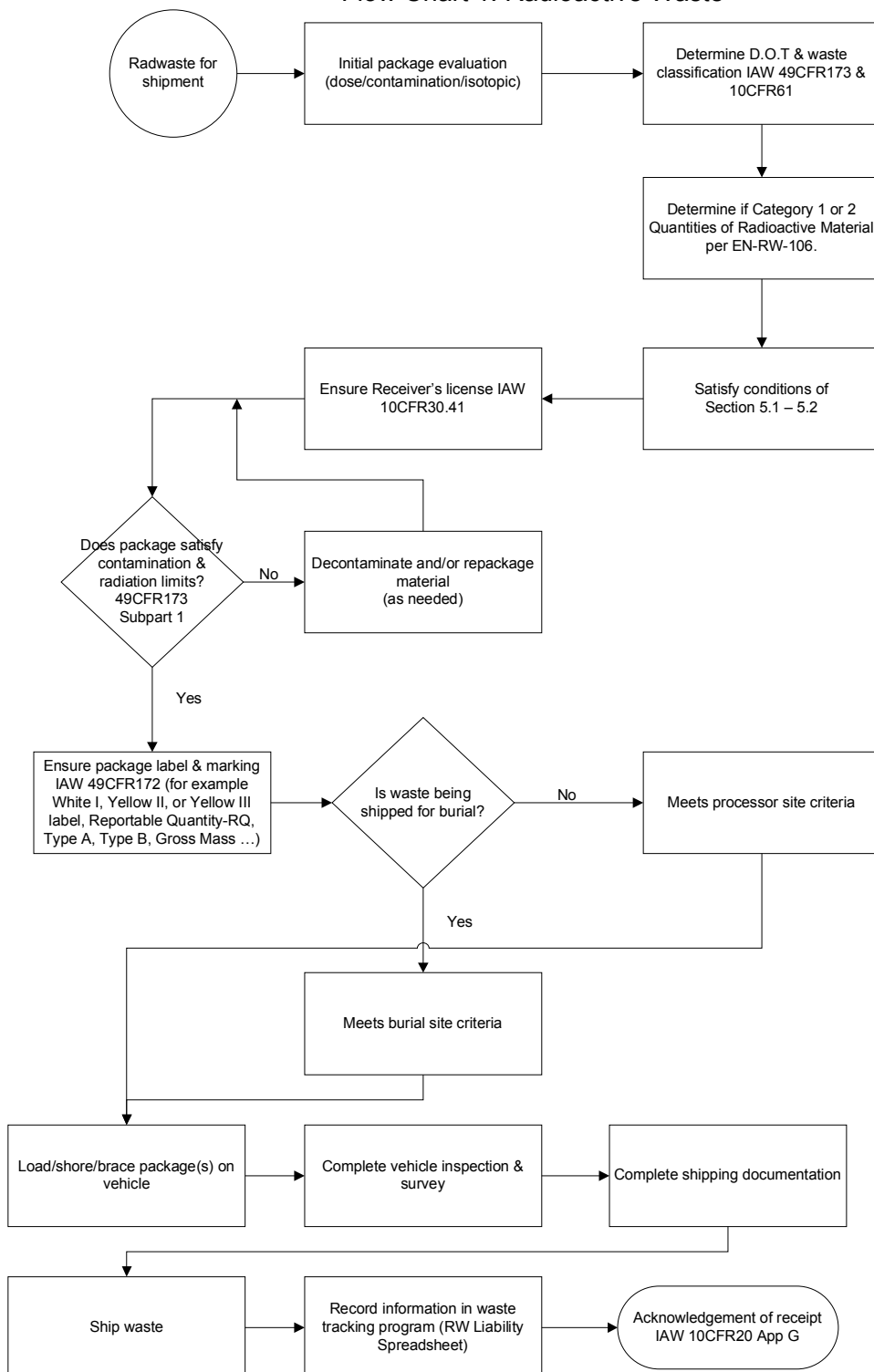
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- [15] Tritium gun sights are handled per EN-NS-225, "Tactical Engagement Simulation System."
- (a) Security officers may transport individual gun sights in performance of their normal duties with no restrictions.
 - (b) Transportation of gun sights in Entergy-owned MILES trailers may be accomplished by security personnel or contracted common carriers meeting the requirements Section 5.0 of EN-NS-225. The following should be met:
 - (1) Security will affirm to RP that the individual gun sights are operational.
 - (2) Attachment 9.7 will be completed (no shipment paperwork is required to accompany the shipment but a bill of lading may be utilized at the site's RP department discretion)
 - (c) Transportation of gun sights under the direct control of DOE personnel is exempt from these requirements.
- [16] Ship radioactive material **AND/OR** waste in accordance with the Flow Charts 1 and 2 **AND** complete all applicable attachments.

5.2[16] continued

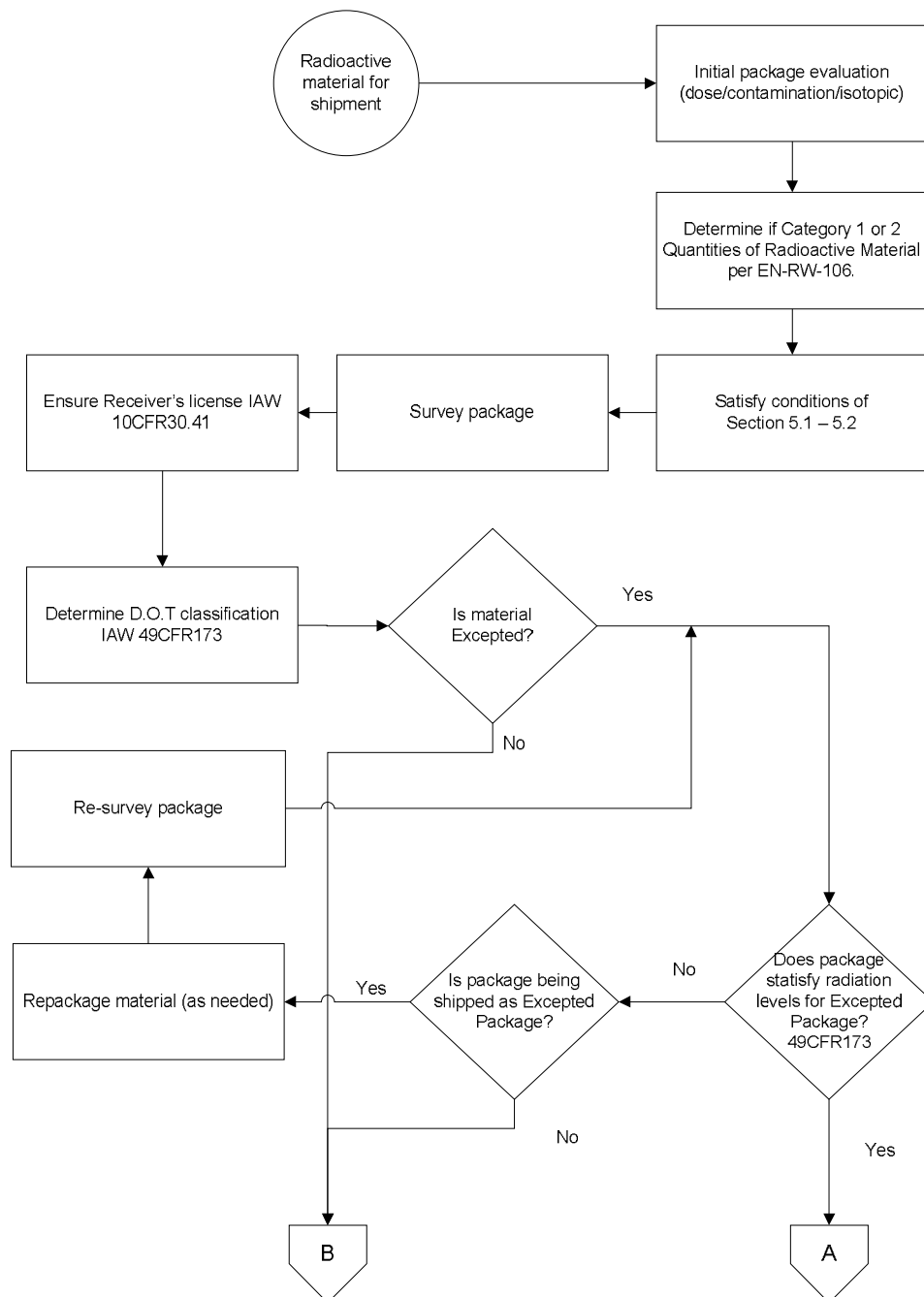
Flow Chart 1: Radioactive Waste



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5.2[16] continued

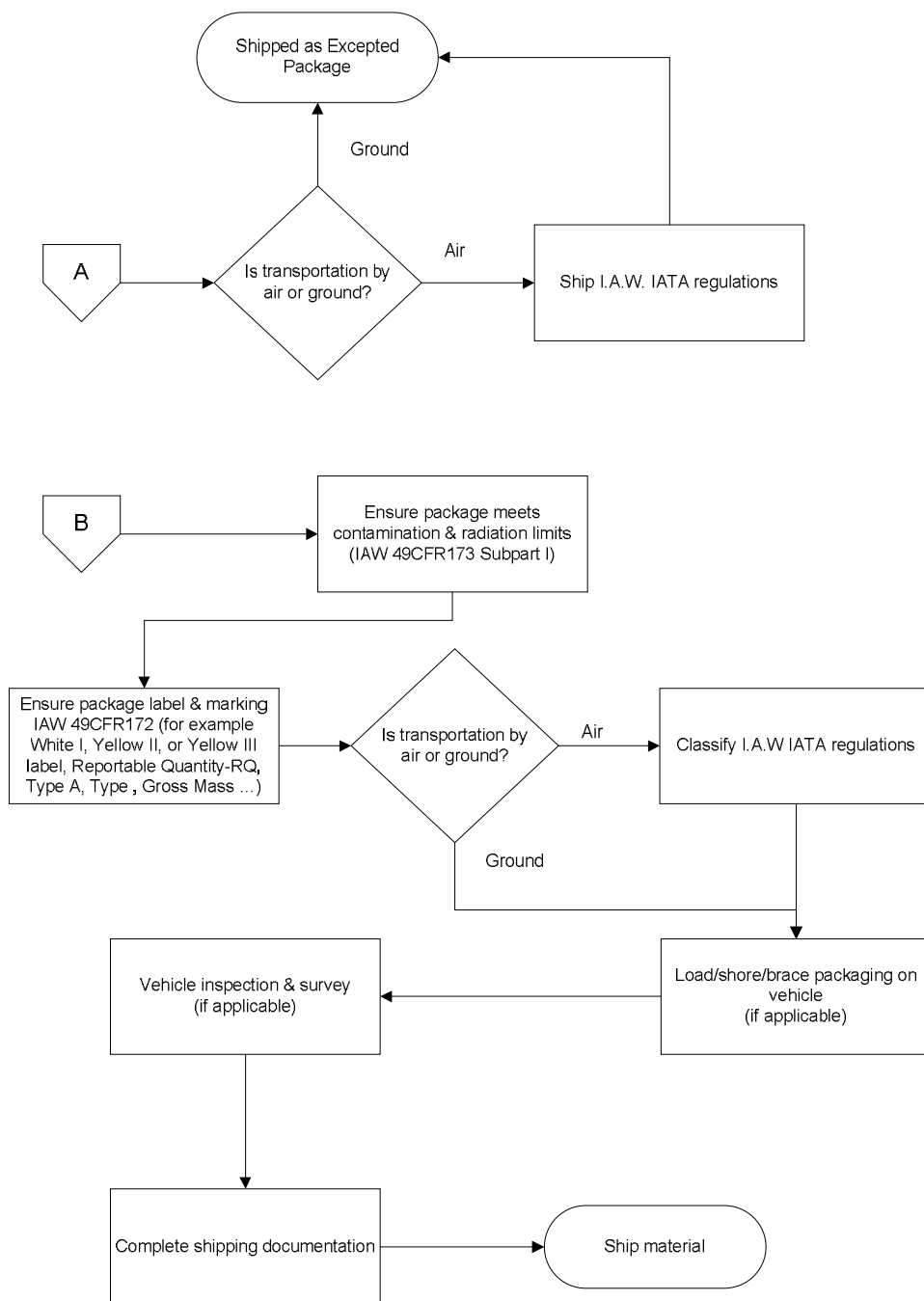
Flow Chart #2: Radioactive Material



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Flow Chart #2 (Continued): Radioactive Material



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- [17] Surveys of packages and conveyances are completed with instrumentation similar to the facility receiving the material/waste. Instrumentation normally utilized for shipments are those that contain GM detectors.
- [18] The radiation surveys for shipments and packages covered under the requirements of 49CFR173.421, 424, 426, 428, 49CFR177.842, 10CFR71.47 and 49CFR173.441 are not to exceed eighty percent of the levels outlined in the appropriate requirement. Radiation Protection Supervision may grant permission to ship packages or conveyances above the eighty percent administrative limit, in Attachment 9.11, "Radiation & Contamination Survey Limits for Radioactive Material Shipments", provided the guidelines listed in 5.2[18] (a) and 5.2[18] (b) are performed.
 - (a) The dose rate survey is performed independently by at least two qualified (ANSI qualifications required) Radiation Protection Technicians utilizing different survey instruments of similar types.
 - (b) The verification survey instrument utilized in step listed above is to be source checked prior to shipment departure.
- [19] After unloading exclusive use vehicles, surveys must be performed prior to releasing the vehicle back to an in-service status. The radiation dose rate at every accessible surface is 0.5 mR/hr or less and the removable contamination is less than the levels in 49 CFR 173.443(a).
- [20] All packages and conveyances are to meet the contamination levels of less than 1000 dpm/100 cm² of non-fixed beta-gamma and less than 20 dpm/100 cm² of non-fixed alpha. Radiation Protection Supervision may authorize the shipment of packages and conveyances exceeding these limits up to those listed in 49CFR173.443.
- [21] The carrier to be used for shipments placarded Radioactive, Type A, Type B or Highway Route Controlled Quantity (HRCQ) maintains a Transportation Security Plan covering applicable requirements of 49CFR172.800-804. The use of contractual agreements may be a method to ensure this is met. Category 1 and 2 Quantities of Radioactive Materials require additional transportation security measures, which are addressed in EN-RW-106, "Integrated Transportation Security Plan."
- [22] Each fissile material, controlled shipment must be transported in accordance with 49CFR177.842(f) and applicable fissile requirements of 10CFR71.

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- [23] Packages required to be loaded by Entergy on to conveyances under the requirements of 49CFR173.427(a)(6)iii, 49CFR173.441(b)(1)ii, 49CFR177.842, 49CFR173.448(a) or applicable Certificate of Compliance are to be accomplished to meet the applicable requirements of the consignee performing the off-loading at the shipments final destination. The package blocking, bracing and shoring is performed in conjunction to support the carrier in meeting the requirements for associated parts of 49CFR393.

(a) On-site securement of loads while on company owned property is covered by EN-IS-120 including steps 5.3 and 5.9.

- [24] ALARA should be considered when loading packages. Load packages with higher dose rates in the center with the lower dose rates facing outward whenever possible. Dose rate surveys should be performed during the loading process to ensure DOT requirements are met.

5.3 WASTE CLASSIFICATION

- [1] Determination of concentration in waste containers may be performed by direct sampling or indirect measurements.
- [2] Classification of waste is to be accomplished in accordance with the requirements of 10CFR61.55.

5.4 WASTE CHARACTERISTICS

- [1] Waste shipments sent to disposal facilities are to meet the applicable requirements of 10CFR61.56, Certificate of Compliance (if shipment required), burial site criteria and burial site by-product radioactive material license.
- [2] Waste shipments sent to processors of radioactive waste must meet the applicable portions of 10CFR61.56, Certificate of Compliance (if shipment required), processor waste acceptance guidelines/criteria AND processor by-product radioactive material license.

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6.0 INTERFACES

- [1] “Entergy Quality Assurance Program Manual Control”
- [2] EN-RW-106, “Integrated Transportation Security Plan”
- [3] EN-LI-102 “Corrective Action Process”
- [4] EN-RP-143, “Source Control”
- [5] EN-NS-225, “Tactical Engagement Simulation System”
- [6] EN-IS-120 “Motorized Vehicle Safety”

7.0 RECORDS

- [1] Retain records in accordance with 49CFR173.415, along with 10CFR20 Appendix G and 10CFR30.51.
- [2] Transfer all applicable records to site-specific permanent plant files. If files require modification, both the original and modified files will be retained and sent as an official file per this section. These records include the following as applicable:
 - NRC Forms 540 and 541
 - Attachment 9.1 (used for shipments with notifications – with page 2 of 2 being optional)
 - Attachments 9.2 through 9.9
 - Attachment 9.12
 - Emergency Response Documentation
 - Exclusive Use Documentation
 - Package and Vehicle Surveys
 - State Notifications
 - Packaging and Dewatering Checklists
 - RADMAN Documentation/Isotopic Information

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8.0 SITE SPECIFIC COMMITMENTS

Site	Document	Commitment Number or Reference	NMM Procedure Section/Step
All	49 CFR 173	421, 422 & 423	Att 9.5, 9.8, 9.9
All	49 CFR 173	424	Att 9.7
All	49CFR 173	426	Att. 9.8
All	49 CFR 173	427 (a) (6) (i) – (iii) & (iv), (vi) &(b)	Att 9.2
All	49 CFR 173	428	Att 9.6
All	49 CFR 173	433	5.2[16]
All	49 CFR 173	435	5.2[16]
All	49 CFR 173	441 (a) (b) & (c)	5.2[18]
All	49 CFR 173	443 (a) & (b)	5.2.[18]
All	49 CFR 173	441 (c)	5.2[18]
All	49 CFR 173	448 (a) & (g)	5.2 [23]
All	49 CFR 173	465, 466	Att. 9.3
All	49 CFR 173	475 (a), (b), (c), (e), (f) & (i)	Att 9.3
All	49 CFR 173	471 (a), (b)	Att. 9.4
All	49 CFR 173	475	5.2 [11]
All	49 CFR 177	842 (a), (b), (c), (d) & (f)	5.2[16], [22]
All	49 CFR 177	843	5.2[19]
All	49 CFR 178	350 (a) & (b)	Att 9.3
All	10 CFR 20	1501 (a)	5.2[18]
All	10 CFR 20	2001 (a)	5.3 and 5.4
All	10 CFR 20	2101 (a), (b) & (c)	5.2[14]
All	10 CFR 20	2005 (a), (c)	5.3 and 5.4
All	10 CFR 20	2006 (b) - (d)	5.3 and 5.4
All	10 CFR 20	Appendix G	5.3 and 5.4
All	10 CFR 30	41 (c) & (d)	5.2[12]
All	10 CFR 61	55	5.3 and 5.4
All	10 CFR 61	56	5.3 and 5.4
All	10 CFR 61	57	5.3 and 5.4
All	10 CFR 71	5(a) (1) (iv) & (vi), 5(b)	*5.2[10],[14]
All	10 CFR 71	87 a-k	*
All	10 CFR 71	97 (a), (b), (c)	Att 9.2,Att. 9.4

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Site	Document	Commitment Number or Reference	NMM Procedure Section/Step
Grand Gulf	FSAR	11.4.1.2 S7	5.2[14]
Grand Gulf	FSAR	11.4.2.3.C.S 3,S 4	5.2[14]
Grand Gulf	FSAR	11.4.2.4.3	5.2[14]
Grand Gulf	FSAR	11.4.2.4.5.S 4	5.2[14]
Waterford 3	W3P83-2211	P-11759	5.2[10]
River Bend	RBF1-96-0284	P-14510	5.2[10]
All	Reg. Guide 1.21	Appendix A C. S1, S2 & S3	5.2[14]
All	ANSI N13.2	4.7.4	5.2[14]
All	GNRI-91/00117	IN 91-35	5.2[14]
Grand Gulf	GNRI-92/00195 P.3OF4, PARA 2	P-24924	5.2[14] (d)
Grand Gulf	GNRI-92-00149	92-24	5.2[14] (d)
Grand Gulf	QAPM	A.1.C	*
Grand Gulf	QAPM	B.7.D	*
Grand Gulf	49CFR172	*	*
Grand Gulf	49CFR173.24	P-18738	5.2[13]
Grand Gulf	49CFR173.25(A)(2-4)	P-18741,18742,18743	5.2[13]
Grand Gulf	49CFR173.403	P-18744	3.0[1]
Grand Gulf	49CFR173.411(A)	P-18754	5.2[4]
Grand Gulf	49CFR173.415(A)S1	P-18756	5.2[4]
Grand Gulf	49CFR173.410	P-32586	5.2[4]
Grand Gulf	49CFR173.411B	P-32606	5.2[4]

* Covered by directive as a whole or by various paragraphs of the directive.

9.0 ATTACHMENTS

- 9.1 Radioactive Shipment Document Checklist
- 9.2 Shipping Checklist – LSA/SCO / Exclusive Use & Domestic
- 9.3 Shipping Checklist – Type A
- 9.4 Shipping Checklist – Type B
- 9.5 Shipping Checklist – Limited Quantity
- 9.6 Shipping Checklist – Empty Packaging
- 9.7 Shipping Checklist – Instruments and Articles
- 9.8 Shipping Checklist – Articles Containing Natural/Depleted Uranium or Natural Thorium
- 9.9 Shipping Checklist – Limited Quantity – Neutron Meters
- 9.10 Packaging Reference Tables
- 9.11 Radiation & Contamination Survey Limits for Radioactive Material Shipments
- 9.12 Vehicle Inspection Check Sheet
- 9.13 Radioactive Material Shipment Truck Survey Form-Typical
- 9.14 Instructions for Maintenance of Exclusive Use Shipment Controls
- 9.15 Appendix A: Notifications – Site Specific

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ATTACHMENT 9.1
RADIOACTIVE SHIPMENT DOCUMENT CHECKLIST
Sheet 1 of 2

(sample form)

Shipment Number: _____ Date of Departure: _____

Description: _____

Destination: _____

Notifications:	(Date/Time)	(Date/Time)
----------------	-------------	-------------

Vermont (48 hr / 2 hr) /

Mass (24 hr / 2 hr) /

Gill MA (48 hr / 2 hr) /

Mississippi (4 days) / N/A

SC (72 hrs) / N/A

Arkansas (Prior to leaving site) / N/A

Emergency Response information
 delivered to appropriate location (i.e., Control Room, RP Office)

Total Activity: _____ mCi Carrier: _____

 Completed By: _____
 Print/Sign Date

 Reviewed By: _____
 Print/Sign Date

 Document Package Completed: _____
 Print/Sign Date

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ATTACHMENT 9.1

RADIOACTIVE SHIPMENT DOCUMENT CHECKLIST

Sheet 2 of 2

Limited Quantity Shipments	Consignee	Driver	Shipper
Manifest / Shipping Record (if required)			
Isotopic Analysis – Nuclide Concentration (if performed)			
Chain of Custody (if required)			
NRC/DOT Messages (RAMSHP)(if performed)			
DOT Classification (RAMSHP)(if performed)			
DOT Shipment Classification (RAMSHP)(if performed)			
Package Characterization Report (RAMSHP)(if performed)			
Package Survey (if required)			
Radioactive Materials Shipment	Consignee	Driver	Shipper
Manifest / Shipping Record			
Isotopic Analysis – Nuclide Concentration (if performed)			
Chain of Custody (if required)			
NRC/DOT Messages (RAMSHP)(if required)			
DOT Classification (RAMSHP)(if required)			
DOT Shipment Classification (RAMSHP)(if required)			
Package Characterization Report (RAMSHP)(if required)			
Package Survey			
Emergency Response Information(if required)			
Truck Survey / Exclusive Use Statement(if required)			
Vehicle Mechanical Inspection Report			
State (i.e. Ark, Mass) Notification (placarded vehicle only)(if required)			
Driver Routing Instructions(if required)			
Bill of Lading (if Required)			
Notice of Shipment(if required)			
Material Processor Shipment	Consignee	Driver	Shipper
Manifest (NRC 540/540A, 541/541A)			
Isotopic Analysis – Nuclide Concentration (if performed)			
Dewatering System Sequence Check Sheet (VYOPF 2153.01)			
NRC/DOT Messages (RADMAN)(if performed)			
DOT Classification (RADMAN)(if performed)			
DOT Shipment Classification (RADMAN)			
Package Characterization Report (RAMMAN)(if performed)			
Nuclide Concentration Summary (RADMAN)(if performed)			
10 CFR Part 61 Documentation (RADMAN)			
Package Survey			
Emergency Response Information			
Truck Survey / Exclusive Use Statement			
Vehicle Mechanical Inspection Report			
State (i.e. Ark, Mass) Notification (placarded vehicle only)(if required)			
Driver Routing Instructions(if required)			
Waste Profile Form (i.e. Energy Solutions, Studsvik, Waste Control Specialists)			
Bill of Lading (if Required)			
Notice of Shipment(if required)			

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ATTACHMENT 9.2
SHIPPING CHECKLIST – LSA/SCO/EXCLUSIVE USE & DOMESTIC
Sheet 1 of 3
Shipment Number: _____

1. **IF** shipment meets Category 1 and 2 Quantities of Radioactive Material levels, **THEN** refer to EN-RW-106, "Integrated Transportation Security Plan," in addition to this checklist.

NOTE

The licensee is required to use the Licensee Verification System (LVS) developed by the NRC or contact the regulatory agency (NRC or Agreement State) to verify that the license is valid before shipping a category 1 or 2 quantity of radioactive material. Refer to EN-RW-106.
[CR-WF3-2014-05098]

2. Verified transferee's license authorizes the receipt of the type, form and quantity of byproduct material to be transferred via one of the methods listed in 10CFR30.41(d) 1 through 5 or DOE Prime Contractor exempt status shall be kept on file.

Consignee's License Number: _____ Expiration date _____

3. The package(s) meet the definition of LSA/SCO per 49CFR173.403:
4. If radiation level at 3 meters from unshielded material does not exceed 10mSv/hr (1 Rem/hr) then select one of the following packaging options (indicate option chosen by circling one):
 - 49CFR173.427 Table 6 (IP-1, 2 or 3) meeting the requirements of 49CFR173.411, 49CFR173.410 & 49CFR173.24, 24a & 24b

-OR-

- Specification 7A Type A meeting the requirements of 49CFR178.350 If a sunscreen or personnel barrier is being used over a specification package then the package itself is required to have the markings applied directly to the package surface as well as the sunscreen or personnel barrier.

-OR-

- If package does not exceed A2 quantity limit, packaging meeting the requirements of 49CFR173.24, 24a & 49CFR173.410 is allowed for domestic transport only:
 - Non-specification marking in accordance with 49CFR173.427(6)(vi) Exterior of package marked "Radioactive-LSA" or "Radioactive-SCO" Exterior of package containing a hazardous substance marked "RQ"
 - Package is excepted from Specification marking, and labeling, However the following are required:
 - Shipping Papers
 - Emergency Response Information
 - Placarding (required whenever Label is Yellow III or Excl Use LSA)

-OR-

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ATTACHMENT 9.2
SHIPPING CHECKLIST – LSA/SCO/EXCLUSIVE USE & DOMESTIC
Sheet 2 of 3
Shipment Number: _____

- For LSA-I and SCO-I transported in a closed vehicle, bulk packaging meeting the requirements of 49CFR173.24, 24a & 24b is allowed

-OR-

- For LSA-I and SCO-I transported unpackaged in accordance with 49CFR173.427(c)

- Conveyance activity within limits of 49CFR173.427 Table 5
- Specific written instructions for maintenance of exclusive use shipment controls included with the shipping papers in accordance with 49CFR173.403 Instructions for Maintenance of Exclusive Use Shipment Controls
- Radiation levels within limits of 49CFR173.441, all EN-RW-102 requirements for radiation levels met
- Contamination levels within limits of 49CFR173.443, all EN-RW-102 requirements for contamination levels met
- Specification communication is in accordance with 49CFR172 Subpart C, F & G (Shipping Papers, Placarding, and Emergency Response Information respectively).
- Complete Bill of Lading (if applicable) – highlight the emergency response information on non-computerized generated forms
- Complete Vehicle Inspection
- (If applicable) Complete MEMA 5-3 and MEMA 5-4, fax MEMA 5-3 no later than four days prior to shipment. Notify MEMA of all changes prior to shipment leaving site.
- Complete the applicable HIC Certification for Disposal and Checklist, as applicable.
- For shipments that contain resin or other known or suspected methane producing waste, perform an explosive gas test as required in accordance with the applicable cask Certificate of Compliance.
- If waste shipment for burial, the package:
 - Is classified using the criteria of 10CFR61.55
 - Meets the requirements for waste characteristics of 10CFR61.56
 - Is labeled in accordance with 10CFR61.57
 - Meets the acceptance requirements of the Burial Site Criteria and License
- If waste shipment to processor, the package:
 - Meets the acceptance requirements of the Processor Criteria and License

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ATTACHMENT 9.2

SHIPPING CHECKLIST – LSA/SCO/EXCLUSIVE USE & DOMESTIC

Sheet 3 of 3

Shipment Number: _____

17. If package is an IP-3, the requirements of 49CFR173.412(a)-(j) are met, including a tamper indicating feature installed on the package or may be installed on the cargo compartment if the shipment is closed vehicle exclusive use
18. General transportation requirements of 49CFR173.448 are met, including cargo secured to prevent shifting
19. The package meets the requirements of 49CFR173.475 prior to shipment.
20. If any portion of the transportation is to be by air, the applicable requirements of IATA's Dangerous Goods Regulations have been met
21. Complete the applicable Advance Notification Form (if applicable) for shipments to processor
 - EnergySolutions – Oak Ridge, TN
 - Studsvik Processing Facility LLC – Erwin, TN
 - EnergySolutions – Clive, UT
22. The carrier maintains a Transportation Security Plan covering applicable requirements of 49CFR172.800-804. The use of a contractual agreement may be utilized to ensure this is met.
23. **IF** shipment contains sources applicable to National Source Tracking System in 10 CFR 20.2207 and meets the activity limits of Appendix E of 10 CFR 20, ensure a transaction report is completed, via NRC Form 748
24. **WHEN** shipment involves Category 1 Quantities of radioactive material, **THEN**, perform advance notification per EN-RW-106.
25. **IF** material classified LSA III, ensure all applicable documentation is completed IAW 49CFR173.468.
26. **IF** material contains measured quantities of Special Nuclear Material (U-233, U-235 or plutonium), **THEN** forward a copy of the manifest to Reactor Engineering.

Checklist Completed By: _____

Date: _____

Validation/Review Completed By: _____

Date: _____

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ATTACHMENT 9.3

SHIPPING CHECKLIST – TYPE A

Sheet 1 of 2

Shipment Number: _____

1. **IF** shipment meets Category 1 and 2 Quantities of Radioactive Material levels, **THEN** refer to EN-RW-106, "Integrated Transportation Security Plan," in addition to this checklist.

NOTE

The licensee is required to use the Licensee Verification System (LVS) developed by the NRC or contact the regulatory agency (NRC or Agreement State) to verify that the license is valid before shipping a category 1 or 2 quantity of radioactive material. Refer to EN-RW-106.
[CR-WF3-2014-05098]

2. Verified transferee's license authorizes the receipt of the type, form and quantity of byproduct material to be transferred via one of the methods listed in 10CFR30.41(d)1 through 5 or DOE Prime Contractor exempt status shall be kept on file.

Consignee's License Number: _____ Expiration date _____

3. Package activity does not exceed limits of 49CFR173.431(a)
4. Packaging is a Type "A" package meeting the applicable requirements of 49CFR173.410, 49CFR173.24, 24a & 24b, 49CFR173.412, 49CFR173.415, 49CFR173.418, 49CFR173.419 and 49CFR173.442
5. Radiation levels within limits of 49CFR173.441, all EN-RW-102 radiation level requirements met
6. Contamination levels within limits of 49CFR173.443, all EN-RW-102 contamination level requirements met
7. Specification communication IAW 49CFR172 Subparts C, D, E, F & G are complete:
 - a. Shipping Papers – highlight the emergency response information on non-computerized generated forms
 - b. Emergency Response Information
 - c. Labeling
 - d. Marking
 - e. Placarding (required whenever Label is Yellow III)
8. If a sunscreen or personnel barrier is being used over a specification package then the package itself is required to have the markings applied directly to the package surface as well as the sunscreen or personnel barrier.
9. If exclusive use, specific written instructions for maintenance of exclusive use shipment controls included with the shipping papers per 49CFR173.403 403 (Attachment 9.14 Instructions for Maintenance of Exclusive Use Shipment Controls)
10. Complete Vehicle Inspection if Exclusive use

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ATTACHMENT 9.3

SHIPPING CHECKLIST – TYPE A

Sheet 2 of 2

Shipment Number: _____

11. If waste shipment for burial, the package:
 - a. Is classified using the criteria of 10CFR61.55
 - b. Meets the requirements for waste characteristics of 10CFR61.56
 - c. Is labeled in accordance with 10CFR61.57
 - d. Meets the acceptance requirements of the Burial Site Criteria and License
12. If waste shipment for processing, the package
 - a. Meets the acceptance requirements of the Processor Criteria and License
13. Complete the applicable Advance Notification Form (if applicable) for shipments to processor
 - EnergySolutions – Oak Ridge, TN
 - Studsvik Processing Facility LLC – Erwin, TN
 - EnergySolutions – Clive, UT
14. For shipments that contain resin or other known or suspected methane producing waste, perform an explosive gas test as required in accordance with the applicable cask Certificate of Compliance.
15. A tamper-indicating feature is installed on the package or on the cargo compartment if the shipment is closed vehicle exclusive use per 49CFR173.412(a)
16. General transportation requirements of 49CFR173.448 are met, including cargo secured to prevent shifting
17. The package meets the requirements of 49CFR173.475 prior to shipment
18. If any portion of the transportation is to be by air, the applicable requirements of IATA's Dangerous Goods Regulations have been met
19. The carrier maintains a Transportation Security Plan covering applicable requirements of 49CFR172.800-804. The use of a contractual agreement may be utilized to ensure this is met.
20. If shipment contains sources applicable to National Source Tracking System in 10 CFR 20.2207 and meets the activity limits of Appendix E of 10 CFR 20, ensure a transaction report is completed, via NRC Form 748
21. **WHEN** shipment involves Category 1 Quantities of radioactive material, **THEN**, perform advance notification per EN-RW-106..
22. If Special Form, the following requirements are met:
 - a. Conforms to the definition of Special Form in 49CFR173.403
 - b. Satisfies the test requirements of 49CFR173.469
 - c. Satisfies the requirements of 49CFR173.476
 - d. Marked with the proper shipping name – 49CFR172.101
23. **IF** material contains measured quantities of Special Nuclear Material (U-233, U-235 or plutonium), **THEN** forward a copy of the manifest to Reactor Engineering.

Checklist Completed By: _____

Date: _____

Validation/Review Completed By: _____

Date: _____

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ATTACHMENT 9.4

SHIPPING CHECKLIST – TYPE B

Sheet 1 of 4

Shipment Number: _____

1. **IF** shipment meets Category 1 and 2 Quantities of Radioactive Material levels, **THEN** refer to EN-RW-106, "Integrated Transportation Security Plan," in addition to this checklist.

NOTE

The licensee is required to use the Licensee Verification System (LVS) developed by the NRC or contact the regulatory agency (NRC or Agreement State) to verify that the license is valid before shipping a category 1 or 2 quantity of radioactive material. Refer to EN-RW-106.
[CR-WF3-2014-05098]

2. Verified transferee's license authorizes the receipt of the type, form and quantity of byproduct material to be transferred via one of the methods listed in 10CFR30.41(d)1 through 5 or DOE Prime Contractor exempt status shall be kept on file.

Consignee's License Number: _____ Expiration date _____

3. Package activity does not exceed limits of 49CFR173.431(b)
4. Packaging is a Type "B" package meeting the applicable requirements of 49CFR173.410, 49CFR173.24, 24a & 24b, 49CFR173.413, 49CFR173.416, 49CFR173.417, 49CFR173.442 & 10CFR71
5. Radiation levels within limits of 49CFR173.441, all EN-RW-102 radiation level requirements met
6. Contamination levels within limits of 49CFR173.443, all EN-RW-102 contamination level requirements
7. Specification communication IAW 49CFR172 Subparts C, D, E, F & G are complete:
 - a. Shipping Papers – highlight the emergency response information on non-computerized generated forms
 - b. Emergency Response Information
 - c. Labeling
 - d. Marking
 - e. Placarding (required when Label is Yellow III)
8. If a sunscreen or personnel barrier is being used over a specification package then the package itself is required to have the markings applied directly to the package surface as well as the sunscreen or personnel barrier.
9. If exclusive use, specific written instructions for maintenance of exclusive use shipment controls included with the shipping papers IAW 49CFR173.403
10. Complete Vehicle Inspection if Exclusive use

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ATTACHMENT 9.4

SHIPPING CHECKLIST – TYPE B

Sheet 2 of 4

Shipment Number: _____

11. If waste shipment for disposal, the package:
 - a. Is classified using the criteria of 10CFR61.55
 - b. Meets the requirements for waste characteristics of 10CFR61.56
 - c. Is labeled in accordance with 10CFR61.57
 - d. Meets the acceptance requirements of the Burial Site Criteria and License
12. If waste shipment for processing, the package
 - a. Is classified using the criteria of 10CFR61.55
 - b. Meets the acceptance requirements of the Processor Criteria and License
13. Complete the applicable Advance Notification Form (if applicable) for shipments to processor
 - EnergySolutions – Oak Ridge, Tn
 - Studsvik Processing Facility LLC – Erwin, Tn
 - EnergySolutions – Clive, Ut
14. The requirements of 10CFR71.43 are met, including a tamper indicating feature and positive fastening device
15. General transportation requirements of 49CFR173.448 are met, including cargo secured to prevent shifting
16. The package meets the requirements of 10CFR71.87 prior to shipment.
17. If any portion of the transportation is to be by air, the applicable requirements of IATA's Dangerous Goods Regulations have been met
18. The carrier maintains a Transportation Security Plan covering applicable requirements of 49CFR172.800-804. The use of a contractual agreement may be utilized to ensure this is met.
19. If Special Form, the following requirements are met:
 - a. Meets the definition of Special Form in 10CFR71.4
 - b. Satisfies the test requirements of 10CFR71.75
 - c. Satisfies the requirements of 49CFR173.476
 - d. Proper shipping name per 49CFR172.101
20. If Fissile Material not excepted by 49CFR173.453, all applicable requirements in 49CFR173 & 10CFR71 have been satisfied
21. If special instructions for safely opening the package are required, the requirements of 10CFR71.89 are met.
22. The requirements of 10CFR71.17 & 49CFR173.471 are met, including possessing a copy of the certificate of compliance, complying with all its terms and conditions, registering as a user of the packaging prior to first use and placing the package identification marking on each page of the shipping papers.

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ATTACHMENT 9.4

SHIPPING CHECKLIST – TYPE B

Sheet 3 of 4

Shipment Number: _____

23. When applicable, perform the advance notification per EN-RW-106, for Advance notification of Shipment of Category 1 Quantities of Radioactive Material and Highway Route Controlled Quantities (HRCQ) of Radioactive Material
24. If the material meets the definition of “Highway Route Controlled Quantity” in 49CFR173.403, the following requirements are met:
 - a. Yellow III labels applied per 49CFR172.403
 - b. Background placard used per 49CFR172.507(a)
 - c. “Highway Route Controlled Quantity” entered in association with the basic description on the shipping papers per 49CFR172.203(d)(4)
 - d. The requirements of 49CFR397 Subpart D have been met, including trained drivers, designated routes and a route plan
 - e. Notify QA/QP Department prior to shipment (if applicable)
25. For shipments that contain resin or other known or suspected methane producing waste, perform an explosive gas test as required in accordance with the applicable cask Certificate of Compliance.
26. If shipment contains sources applicable to National Source Tracking System in 10 CFR 20.2207 and meets the activity limits of Appendix E of 10 CFR 20,, ensure a transaction report is completed, via NRC Form 748
27. The records required by 10CFR71.91 are complete
28. Advance Notification Shipments: 10 CFR 71.97

NOTE

Advance notification is required for radioactive waste material (not irradiated fuel) which:

- a. Requires Type B packaging
- b. Is being transported to a disposal site or to a collection point for transport to a disposal site, AND
- c. The quantity of licensed material in a single package exceeds 3000 times the A1 or A2 values as specified in Appendix A, Table A-1 or 27,000 curies.

Advance Notification Shipment Requirements include:

- a. Initiate the Advance Notification Waste Shipment Check-off Form,
- b. Notify in writing, using the Advanced Notification of Nuclear Waste Shipment Form, each governor or governor's designee for those states through which the shipment will travel, and the Regional Administrator Region I Office listed in Appendix A of 10 CFR 73, giving the following information:
- c. Update any change in written shipment details, to the governor's designee, by telephone, recording the update and individual contacted.
- d. Forward a cancellation notice, if applicable, to the governor or governor's designee, and to the Regional Administrator Region I Office.

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ATTACHMENT 9.4

SHIPPING CHECKLIST – TYPE B

Sheet 4 of 4

Shipment Number: _____

- e. Notify the consignee of the shipment and arrival dates, and any special loading or unloading instructions.
 - f. The carrier route plan shall be received on-site before the departure of an Advance Notification Shipment. Any variation from the "as received" route plan, plus the reason for change, shall be received on-site prior to shipment departure.
29. **IF** material contains measured quantities of Special Nuclear Material (U-233, U-235 or plutonium), **THEN** forward a copy of the manifest to Reactor Engineering.

Checklist Completed By: _____

Date: _____

Validation/Review Completed By: _____

Date: _____

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ATTACHMENT 9.5

SHIPPING CHECKLIST – LIMITED QUANTITY

Sheet 1 of 1

Shipment Number: _____

1. Verified transferee's license authorizes the receipt of the type, form and quantity of byproduct material to be transferred via one of the methods listed in 10CFR30.41(d)1 through 5 or DOE Prime Contractor exempt status shall be kept on file.
Consignee's License Number: _____ Expiration date _____
2. The packaging meets the requirements of 49CFR173.410 and 49CFR173.24, 24a & 24b
3. Package activity does not exceed the limits of 49CFR173.425
4. No package contains greater than 15 grams of Uranium 235
5. The radiation level at any point on the external surface of the package does not exceed 0.004 mSv/hr (0.4 mRem/hour) within administrative limits of EN-RW-102
6. Radiation levels within limits of 49CFR173.421, all EN-RW-102 requirements met
7. Contamination levels within limits of 49CFR173.443, all EN-RW-102 contamination level requirements met
8. The outside of the inner packaging or if there is no inner packaging, the outside of the packaging itself bears the marking "Radioactive"
9. The outside of each package must be marked with the four digit UN identification number for the material preceded by the letters UN.
10. If the material meets the definition of another hazard class or division, the requirements of 49CFR173.423 are met
11. If any portion of the transportation is to be by air, the applicable requirements of IATA's Dangerous Goods Regulations have been met
12. **IF** material contains measured quantities of Special Nuclear Material (U-233, U-235 or plutonium), **THEN** forward a copy of the manifest to Reactor Engineering.

Checklist Completed By: _____

Date: _____

Validation/Review Completed By: _____

Date: _____

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ATTACHMENT 9.6

SHIPPING CHECKLIST – EMPTY PACKAGING

Sheet 1 of 1

Shipment Number: _____

1. Verified transferee's license authorizes the receipt of the type, form and quantity of byproduct material to be transferred via one of the methods listed in 10CFR30.41(d)1 through 5 or DOE Prime Contractor exempt status shall be kept on file.

Consignee's License Number: _____ Expiration date _____

2. The packaging is in unimpaired condition and is securely closed
3. Internal contamination does not exceed 100 times the limits of 49CFR173.443(a)
4. No package contains greater than 15 grams of Uranium 235
5. The radiation level at any point on the external surface of the package does not exceed 0.004 mSv/hr (0.4 mRem/hour) within administrative limits of EN-RW-102
6. Radiation levels within limits of 49CFR173.421, all EN-RW-102 requirements met
7. Contamination levels within limits of 49CFR173.443, all EN-RW-102 contamination level requirements met
8. The outside of each package must be marked with the four digit UN identification number for the material preceded by the letters UN.
9. Any labels previously applied in conformance with Subpart E of 49CFR172 are removed, obliterated or covered and the "Empty" label of 49CFR172.450 is affixed
10. If any portion of the transportation is to be by air, the applicable requirements of IATA's Dangerous Goods Regulations have been met
11. **IF** material contains measured quantities of Special Nuclear Material (U-233, U-235 or plutonium), **THEN** forward a copy of the manifest to Reactor Engineering.

Checklist Completed By: _____

Date: _____

Validation/Review Completed By: _____

Date: _____

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ATTACHMENT 9.7
SHIPPING CHECKLIST – INSTRUMENTS AND ARTICLES
Sheet 1 of 1
Shipment Number: _____

1. Verified transferee's license authorizes the receipt of the type, form and quantity of byproduct material to be transferred via one of the methods listed in 10CFR30.41(d)1 through 5 or DOE Prime Contractor exempt status shall be kept on file.

Consignee's License Number: _____ Expiration date _____

2. The packaging meets the requirements of 49CFR173.410 and 49CFR173.24, 24a & 24b
3. Package activity does not exceed the limits of 49CFR173.425
4. Each instrument's or article's activity does not exceed the limits of 49CFR173.425
5. No package contains greater than 15 grams of Uranium 235
6. The radiation level at any point on the external surface of the package does not exceed 0.004 mSv/hr (0.4 mRem/hour), or for exclusive use domestic shipments, 0.016 mSv/hr (1.6 mRem/hour) within administrative limits of EN-RW-102
7. The radiation level at 10 cm from any point on the external surface of any unpackaged instrument or article does not exceed 0.08 mSv/hr (8 mRem/hour) within administrative limits of EN-RW-102
8. Radiation levels within limits of 49CFR173.424, all EN-RW-102 requirements met
9. Contamination levels within limits of 49CFR173.443, all EN-RW-102 contamination level requirements met
10. The outside of each package must be marked with the four digit UN identification number for the material preceded by the letters UN.
11. If the material meets the definition of another hazard class or division, the requirements of 49CFR173.423 are met
12. If any portion of the transportation is to be by air, the applicable requirements of IATA's Dangerous Goods Regulations have been met
13. **IF** material contains measured quantities of Special Nuclear Material (U-233, U-235 or plutonium), **THEN** forward a copy of the manifest to Reactor Engineering.

Checklist Completed By: _____

Date: _____

Validation/Review Completed By: _____

Date: _____

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ATTACHMENT 9.8
**SHIPPING CHECKLIST – ARTICLES CONTAINING NATURAL/DEPLETED
URANIUM OR NATURAL THORIUM**
Sheet 1 of 1
Shipment Number: _____

1. Verified transferee's license authorizes the receipt of the type, form and quantity of byproduct material to be transferred via one of the methods listed in 10CFR30.41(d)1 through 5 or DOE Prime Contractor exempt status shall be kept on file.

Consignee's License Number: _____ Expiration date _____

2. The packaging meets the requirements of 49CFR173.410 and 49CFR173.24, 24a & 24b
3. The outer surface of the uranium or thorium is enclosed in an inactive sheath of metal or other durable material
4. The radiation level at any point on the external surface of the package does not exceed 0.004 mSv/hr (0.4 mRem/hour) within administrative limits of EN-RW-102
5. Radiation levels within limits of 49CFR173.421, all EN-RW-102 requirements met
6. Contamination levels within limits of 49CFR173.443, all EN-RW-102 contamination level requirements met
7. The outside of each package must be marked with the four digit UN identification number for the material preceded by the letters UN.
8. The outside of the inner packaging or if there is no inner packaging, the outside of the packaging itself bears the marking "Radioactive"
9. DOE/NRC 741 evaluation completed
10. If any portion of the transportation is to be by air, the applicable requirements of IATA's Dangerous Goods Regulations have been met
11. **IF** material contains measured quantities of Special Nuclear Material (U-233, U-235 or plutonium), **THEN** forward a copy of the manifest to Reactor Engineering.

Checklist Completed By: _____

Date: _____

Validation/Review Completed By: _____

Date: _____

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ATTACHMENT 9.9
SHIPPING CHECKLIST – LIMITED QUANTITY – NEUTRON METERS
Sheet 1 of 1
Shipment Number: _____

1. Verified transferee's license authorizes the receipt of the type, form and quantity of byproduct material to be transferred via one of the methods listed in 10CFR30.41(d)1 through 5 or DOE Prime Contractor exempt status shall be kept on file.

 Consignee's License Number: _____ Expiration date _____
2. Bag the meter in a plastic bag and mark the top surface "Radioactive".
3. Package meter in a packaging which meets the requirements of 49 CFR 173.410, CFR 173.24, 24a, & 24b lined with cushioning material to effectively prevent movement of the inner packaging during transit.
4. The radiation level at any point on the external surface (contact) of the package does not exceed 0.004 mSv/hr (0.4 mRem/hr.) Document on appropriate form.
5. Contamination levels on the outside of the package are <1000 dpm/100cm² βY and <20 dpm/100cm² α. Document on appropriate form.
6. Legibly and clearly mark the outside of the outer container with the UN identification number, UN2910, for limited quantity of radioactive material.
7. Domestic transport only is approved with use of this package.
8. The package has a tamper indicating seal placed on it after packaging is complete.
9. Two address labels with the consignor and consignee names and proper shipping locations are on at least the top and one side of the package.
10. Mark the weight on the package.
11. Fill out the appropriate Bill of Lading to be used with carrier, if applicable.
12. Inform the consignee of the shipment and expected time of arrival. This is to be done by phone or other method as long as acknowledgement is made by the consignee.
13. Ensure you have been trained on the use of this exemption and as required by 49 CFR 172.700 – 172.704.
14. **IF** material contains measured quantities of Special Nuclear Material (U-233, U-235 or plutonium), **THEN** forward a copy of the manifest to Reactor Engineering.

Checklist Completed By: _____

Date: _____

Validation/Review Completed By: _____

Date: _____

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ATTACHMENT 9.10

PACKAGING REFERENCE TABLES

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ACCEPTABLE SHIPPING CONTAINERS FOR RADIOACTIVE MATERIAL

TYPE OF MATERIAL	OUTER CONTAINER
<u>Radioactive Material LSA or SCO Shipped exclusive use/domestic</u> Package contains a Type A quantity (<1R/hr @ 3 meters unshielded) Package contains > Type A quantity (<1R/hr @ 3 meters unshielded) LSA-I or SCO-I (<1R/hr @ 3 meters unshielded) >1R/hr @ 3 meters unshielded	Acceptable Package (49CFR173.410, 24 and 24a) Industrial Package I Industrial Package II Industrial Package III Dot 7A Type A (as applicable) Bulk Packaging meeting the requirements of 49CFR173.24/24a/24b Type B Packaging (10CFR71 & 49CFR173.471)
<u>Radioactive Material LSA or SCO Shipped non exclusive use/domestic</u>	Industrial Package I Industrial Package II Industrial Package III Dot 7A Type A (as applicable)
<u>Radioactive Material Limited Quantity</u>	Excepted Package 49CFR173.410/24/24a/24b
<u>Radioactive Material Type A Quantity</u>	Type A Specification Package
<u>Radioactive Material Type B Quantity</u>	NRC Approved Type B Container

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ATTACHMENT 9.10

PACKAGING REFERENCE TABLES

Sheet 2 of 3

EXAMPLES OF ACCEPTABLE SHIPPING CONTAINERS FOR RADIOACTIVE MATERIAL

TYPE OF MATERIAL	INNER CONTAINER	OUTER CONTAINER
<u>Radioactive Waste LSA or SCO exclusive use/domestic shipment</u> Resins <Type A quantity <1R/hr @ 3 meters unshielded	Disposable Liner or HIC	None required unless shielding is necessary due to dose rates. Cask used as acceptable package per 49CFR173.410, 24, 24a
Resins > Type A quantity <1R/hr @ 3 meters unshielded	Disposable Liner or HIC	Industrial Package I, II, III Type A Packaging
Resins >1R/hr @ 3 meters unshielded	Disposable Liner or HIC	NRC Approved Type B Cask
Dry Active Waste (DAW)-compactable	Drums or boxes	None required unless shielding is necessary, then utilize an outer container that meets the applicable shipping requirements
Dry Active Waste (DAW)-non compactable	Drums or boxes	None required unless shielding is necessary, then utilize an outer container that meets the applicable shipping requirements
Liquids	Drum Disposable Liner	Oil bins or sealand meeting applicable requirements holding drums (2x absorbents may be considered) Cask meeting applicable requirements

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ATTACHMENT 9.10

PACKAGING REFERENCE TABLES

Sheet 3 of 3

EXAMPLES OF ACCEPTABLE SHIPPING CONTAINERS FOR RADIOACTIVE MATERIAL

TYPE OF MATERIAL	INNER CONTAINER	OUTER CONTAINER
<u>Radioactive Material Limited Quantity</u> Solids Liquids	Plastic bag/wrapping Bottle, flask, metal sample container with the neck sealed with tape.	Excepted Package 49CFR173.410/24/24a/24b Same as previous
<u>Radioactive Material Type A Quantity</u>	Drums or Liner or HIC\ (2x absorbents for liquids)	Type A Specification Package
<u>Radioactive Material Type B Quantity or Highway Route Controlled Quantity</u>	Drums or Liner or HIC (2x absorbents for liquids)	NRC Approved Type B Container

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ATTACHMENT 9.11

RADIATION & CONTAMINATION SURVEY LIMITS FOR RADIOACTIVE MATERIAL SHIPMENTS

Sheet 1 of 2

RADIATION SURVEY LIMITS			
Packages in a Nonexclusive Use Vehicle			
TYPE PACKAGE	CONTACT mR/hr		1 METER (TI) mR/hr
	Administrative (DOT)		Administrative (DOT)
Limited Quantity	0.4 (0.5)		N/A
Empty	0.4 (0.5)		N/A
Instruments and Articles	0.4 (0.5) 8.0 (10) @ 4" unpackaged		N/A
Type A	160 (200)		8 (10)
Type B	160 (200)		8 (10)
LSA	160 (200)		8 (10)
Packages in Exclusive Use, Closed Vehicle			
	Contact mR/hr	1 Meter mR/hr (Package)	2 Meter mR/hr (Vehicle Surface)
Instruments & Articles	1.6 (2)	N/A	N/A
Type A, B	800 (1000)	N/A	8 (10)
LSA	800 (1000)	N/A	8 (10)
Packages in Exclusive Use, Open Vehicle			
Instruments & Articles	1.6 (2)	N/A	N/A
Type A, B	160 (200)	N/A	8 (10)
LSA	160 (200)	N/A	8 (10)

Note: 1. All numbers in parentheses () are DOT limits

2. All units are listed in customary units. When using SI units, they are to be listed first with the customary units following in parenthesis. (examples of SI units include Sv/hr & mSv/hr)

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ATTACHMENT 9.11

RADIATION & CONTAMINATION SURVEY LIMITS FOR RADIOACTIVE MATERIAL SHIPMENTS

Sheet 2 of 2

CONTAMINATION LIMITS			
Item	Limits Set By	Beta/Gamma	Alpha
External surface of packages, equipment in radioactive material shipments	DOT	220 dpm/cm ² ; also for all nuclides with T _{1/2} < 10 days; natural U; natural Th; U-235, U-238, Th-228, Th-230 and Th-232	22 dpm/cm ² for all alpha emitters
	Admin	1,000 dpm/100 cm ²	20 dpm/100 cm ²
Internal surfaces of packages involved in shipment, having previously contained radioactive material	DOT	22000 dpm/cm ²	2200 dpm/cm ²
	Admin	1,000 dpm/100 cm ²	20 dpm/100 cm ²

- Notes: 1. See 49CFR173.403, for radioactive contamination limits for contaminated, non radioactive solids qualifying as Class 7 radioactive material - Surface Contaminated Object (SCO)
2. All units are listed in customary units. SI units are to be listed first with the customary units following in parenthesis. (examples of SI units include Bq/100 cm² & mBq/100 cm²).

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ATTACHMENT 9.12

VEHICLE INSPECTION CHECK SHEET

Sheet 1 of 1

(Sample Form)

Shipment Number: _____

Truck/Tractor Number: _____

Trailer Number: _____

<u>Inspection Item</u>	<u>Satisfactory</u>	<u>Unsatisfactory</u>
Driver(s) has a current DOT Hazardous Material Endorsement	_____	_____
Vehicle and trailer have a current yearly inspection	_____	_____
Vehicle tires are free from obvious defects.	_____	_____
Vehicle windshield and mirrors are not cracked or broken to the extent it could impair vision.	_____	_____
Vehicle lighting is operational.	_____	_____
Vehicle horns are operational.	_____	_____
Safety equipment is readily available (i.e. fire extinguisher, flags, etc.)	_____	_____
No unsecured materials on the vehicle prior to release for shipment.	_____	_____

Note: Check appropriate column for satisfactory or unsatisfactory

Comments _____

If items affecting safe transportation of the shipment (inspector's judgment) are found, the problem will be resolved by the Shipper prior to vehicle release.

Vehicle Inspection is satisfactory and shipment release from site is acceptable.

Shipper Name (Printed): _____

Shipper (Signature): _____ / _____
 Date

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ATTACHMENT 9.14

INSTRUCTIONS FOR MAINTENANCE OF EXCLUSIVE USE SHIPMENT CONTROLS

Sheet 1 of 1

Shipment Number: _____ Carrier: _____

You are advised per these instructions to transport the items defined on the attached shipping documents under "EXCLUSIVE USE" provisions.

"Exclusive Use" (also referred to as "Sole Use" OR "Full Load" as used in IAEA regulations) means:

Sole use by a single consignor of a conveyance for which all initial, intermediate, and final loading and unloading are carried out in accordance with the direction of the consignor or consignee

Special Remarks Concerning Exclusive Use (provided by shipper when deemed appropriate):

The consignor and the carrier must ensure that any loading or unloading is performed by personnel having radiological training and resources appropriate for safe handling of the consignment

This consignment is subject to the survey requirements of 49CFR173.443 (c) as applicable,

DO NOT transfer shipment from originating carrier vehicle.*

DO NOT load other packages on originating carrier vehicle.

DO NOT change the vehicle configuration / fifth wheel setting.

Deliver shipment DIRECTLY to consignee.

Emergency Phone Numbers: _____

* IF transfer from originating carrier vehicle is necessary, THEN maintenance of exclusive use provisions are required for EACH subsequent carrier vehicle.

Driver's Signature

Date: _____

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ATTACHMENT 9.15

APPENDIX A: NOTIFICATIONS – SITE SPECIFIC

Sheet 1 of 3

1.0 Vermont

1.1 The State of Vermont requires prior notification of certain radioactive shipments at least two working days in advance, with final update of all required information no later than two hours prior to shipment. Initial and final notifications should be made by phone, reporting all information requested on the Vermont Radioactive Materials Shipment Report. This report can be faxed. Vermont requires notification for shipments meeting any of the following criteria:

1.1.1 Radioactive waste shipped for disposal. Radioactive material requiring advance notification (10 CFR 71.97).

1.1.2 Spent fuel.

1.1.3 Authorization to deviate from any Vermont Regulation may be granted only by the individuals outlined.

1.1.4 During off-hours, weekends, and holidays, Vermont notifications should be made.

1.2 Initial and Final Notifications

1.2.2 802-865-7730 Fax: 802-863-7745

1.3 Authorizations concerning Radioactive shipments:

1.3.2 (Health Commissioner)

1.4 Off-Hours, Weekends and Holiday Notifications

1.4.2 802-658-0384

1.4.3 802-863-7280

1.4.4 802-874-4025

2.0 Massachusetts

2.1 The Commonwealth of Massachusetts requires prior notification of certain radioactive shipments passing through Massachusetts at least 24 hours in advance, with final update of all information, as required on the Massachusetts Radioactive Shipment Report, approximately two hours prior to shipping.

2.2 Massachusetts shall be notified of all radioactive shipments requiring placarding.

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ATTACHMENT 9.15

APPENDIX A: NOTIFICATIONS – SITE SPECIFIC

Sheet 2 of 3

2.3 Laundry shipments through Massachusetts are excluded from notification per letter dated 11/30/89.

2.4 Massachusetts notifications should be made by faxing a Massachusetts Radioactive Materials Shipment Log.

2.5 Initial and Final Notifications:

2.5.1 Fax: 617-242-3457

2.5.2 Voice: 617-242-3035

3.0 Gill, Massachusetts

3.1 The Town of Gill, Massachusetts requires prior notification of certain radioactive shipments passing through Gill at least 48 hours prior to shipment, with final update of all information listed on the Mass. Radioactive Shipment Report two hours prior to shipping.

3.2 Gill, MA shall be notified of all radioactive "waste shipments".

3.3 Notifications to Gill, MA should be made faxing a Massachusetts Radioactive Materials Shipment Log.

3.4 Initial and Final Notifications:

3.4.1 Fax: 413-863-3657

413-863-9804

413-665-7759

413-863-8955 or VY Nuclear Alert System

3.4.2 Off-Hours, Weekends and Holiday Notifications

MA State Police

413-863-9804

413-566-4500

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ATTACHMENT 9.15

APPENDIX A: NOTIFICATIONS – SITE SPECIFIC

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4.0 Connecticut

- 4.1 The State of Connecticut requires a hard-copy of the Connecticut Radioactive Material Transportation Permit, to accompany all waste and placarded radioactive shipments passing through Connecticut.
- 4.2 A completed Connecticut Permit Application shall be faxed to the Connecticut DOT. Permit requests are accepted during normal business hours (0800-1600) only.
- 4.3 Connecticut Radioactive Materials Transportation Permit criteria:
- 4.3.1 Only routes stated on the permit may be traveled.
 - 4.3.2 Travel is restricted to daylight hours (0900-1600).
 - 4.3.3 No travel is permitted on weekends or holidays.
 - 4.3.4 The driver shall have the hard-copy permit in his possession.

4.4 Permit Application – Phone 203-594-2880 Fax: 203-665-8335

5.0 Arkansas

- 5.1 The State of Arkansas requires that the Arkansas Department of Health be notified of placarded radioactive shipments.
- 5.2 This information may be faxed to 501-661-2136, normally within 1 hour of shipment departure.

6.0 Mississippi

- 6.1 Prior to transport of nuclear waste into, within or through MS. The shipper shall provide advance notification to the agency (MEMA) using Agency Form Rad 5-3 "Radioactive Waste Shipment Advance Notification and Manifest."
- 6.1.1 If mailed it must be postmarked 7 days prior to entry into the state.
 - 6.1.2 If faxed or sent by messenger it must be received at least 4 days prior to entry into the state.
- 6.2 Manifest shall also include the shipper's certification – Agency Form Rad 5-4 "Radioactive Waste shipment Certification" with the shipment

7.0 Texas

- 7.1 Five (5) Days prior to making a shipment to the Texas Low level radioactive waste disposal facility each shipper shall notify DSHS providing a copy of the waste manifest and the date of shipment. The requirements can be found in Texas Department of Health Services, Radiation Safety Licensing Branch Regulatory Guide 2.19 (12/1/11) Section VI.
- 7.2 Five (5) Days prior to making the shipment to the Texas Low level radioactive waste disposal facility, the shipper shall notify WCS per disposal site license/waste acceptance criteria & TCEQ requirements